IRAQI
Academic Scientific Journals
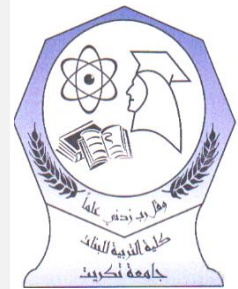
العـــراقيــة
المجلات الأكاديمية العلمية

Accessing Lexicon Versus Time Pressure: Testing Non-native Speakers of English to Perform in English Language

Broosk Ali Jalil *
Salahaddin University \ Language and Translation Centre
brooskalijalil@gmail.com

ABSTRACT

Storing words in memory is an interesting topic for a great number of researchers working in the fields of linguistics, applied linguistics and psycholinguistics around the globe. It is worth mentioning that the words we know are stored in a very complex way in our memory this can be pictured as the World Wide Web. Researchers have always been curious about the way this store is accessed, which in psycholinguistics is known as mental lexicon. This paper aims to explore how this network-like-store is accessed when a person is under pressure. In this study, twenty-four participants are tested in two runs of the experiment, which is used to conduct the study. On the first attempt, participants are placed in a typical scenario where there is no time constraint or any pressure to produce a certain number of words within a given amount of time. Later, they will be asked to write again in a shorter period of time and then the time is further decreased to produce written words in the third run. The effects of time constraints on the capacity to use the mental lexicon during written language production will be examined in this study. At the conclusion of the paper, the improvement of accessing mental lexicon is shown when the time pressure is increased.
Key Words: accessing lexicon, memory, mental lexicon

* **Corresponding Author**: Broosk Ali Jalil, **Email:** brooskalijalil@gmail.com
Affiliation: Salahaddin University - Iraq

الوصول إلى المعجم تحت ضغط الوقت: اختبار المتحدثين غير الأصليين للغة الإنجليزية للأداء في اللغة الإنجليزية

بروسك علي جليل
مركز اللغات و الترجمة/ جامعة صلاح الدين

المستخلص

الكلمات التي نتعلمها يتم تخزينها في اذهاننا بطريقة معقدة للغاية، على غرار الطريقة التي تعمل بها شبكة الويب العالمية. يهتم الباحثون منذ فترة طويلة بكيفية الوصول إلى هذا المستودع، المعروف باسم المعجم الذهني في علم اللغة النفسي. حيث تحاول هذه الدراسة معرفة كيفية الوصول إلى هذا المعجم عندما يكون الشخص تحت الضغط. لذلك، تم اختبار أربعٍ وعشرون متطوعًا في جولتين من التجربة المستخدمة لإجراء البحث. في الجولة الأولى، يتم وضع المشاركين في سيناريو نموذجي حيث لا يوجد أيّة قيود زمنية أو أي ضغط لإنتاج عدد معين من الكلمات خلال فترة زمنية معينة. اما في الجولة الثانية، لاحقًا، سيُطلب منهم الكتابة مرة أخرى في فترة زمنية أقصر ثم يتم تقليل الوقت بشكل أكبر لإنتاج كلمات مكتوبة في الجولة الثالثة. تقوم هذه الدراسة بدراسة تأثير ضيق الوقت على القدرة على استخدام المعجم الذهني أثناء إنتاج اللغة المكتوبة. وفي ختام البحث ظهر تحسن في الوصول إلى المعجم العقلي عند زيادة الضغط الزمني.
الكلمات الدالة: الولوج الى المعجم الذهنى، الذاكرة، المعجم الذهني

1. INTRODUCTION

This study looks into how non-native speakers utilize their mental lexicon to help them remember words during the writing process. Finding out how vocabulary is learned and organized simultaneously is interesting. Furthermore, there are numerous ways in which academics and language teachers can benefit from unravelling such a conundrum. Teachers may find it useful to know how to help pupils retain and recall vocabulary in order to enhance the language learning process. Sripada (2008) claims that the word arrangements in people's minds are referred to as their "mental lexicon" by scientists. According to Bruza et al. (2009, p.363) the terminology represents those "words that comprise a language". Moreover, Hulstijn (2000, p. 210) (retrieved from Farahian, 2011, p. 56) says that mental lexicon is "a memory system in which a vast number of words, accumulated in the course of time, has been stored."

The grammar part, which includes all the phonological, syntactic, morphological, and semantic information that speakers may possess about a word, is known as the mental lexicon (Bonin, 2004). In addition, psycholinguists contend that a word's orthographic and phonological forms—which are regarded as its syntactic and semantic properties—are essential to its retention (Murthy, 1989).

Aitchison (1997) asserts that several factors affect the association between language and memory. The first variable is word frequency, which is typically associated with how frequently a term appears in spoken and written language. It has been suggested that imagery is another factor that has the greatest impact on memory, with abstract words being less remembered than those with strong imagery.

This paper explores the capacity to retrieve the mental lexicon under pressure and in the absence of it. This study examines three potential hypotheses and demonstrate one of them. These arguments are as follows: (a) when people feel pressured to meet high standards, their performance will suffer; (b) when people feel pressured to meet high standards, their performance will improve; or (c) applying pressure won't materially affect their ability to access vocabulary items.

2. LITERATURE REVIEW

One of the main areas of research in applied linguistics over the past few decades has been the connection between language and the brain. Kajcsa (2010) states that studies on mental lexicon, which are associated with the fields of psycholinguistics and neurolinguistics, are sometimes characterized as the inner understanding of words. Aitchison claims that mental lexicon is the word storage of our minds and goes on to say that the way words are arranged in a lexicon is still a mystery because the human brain is not like dictionaries. He goes on to say that although some people believe otherwise, words are stored in their entirety (1994, 2003).

Psycholinguists have undertaken an enormous amount of research to learn more about how the human brain develops and produces language. The storing of words in the brain, or mental lexicon, has been the subject of numerous studies.
Phonological lexicon access is one of the topics that neuroscientists have been addressing. Those who have worked on the theories that direct visual and arbitrated phonological procedures influence lexicon accessing include Clotheart (1978) and Lukatela and Turvey (1991). According to Heij (2005), lexicon accessing tests consist of a basic selection process combined with a complicated word accessing process that activates the lexicon's word levels.

It is also proposed that when lexical decision is in progress, prior to lexical access, an evaluation of the prefixed words will be performed in terms of morpheme combinations. This approach allows the person to access the lexicon through recognizing combinations of the desired word (Taft and Forster, 1975).
The Stroop-test has been a widely used technique in numerous studies to identify lexical accessibility. This test primarily assesses word recognition and memory in connection to colour. This type of examination displays two different types of elements: a picture and a context word. The task requires the participant to name the image while ignoring the provided term in order to identify it (Heij, 2005). In order to investigate various facets of lexical access, syntactic, semantic, and phonological similarities between the provided word and what the picture symbolizes are worked on (Heij, 2005)

One could claim that academics are currently attempting to uncover the truth about human lexicon access and its true nature. According to Zock et al. (2010), if we think that the process of discovering a term in our lexicon involves searching, then we need to be aware of the best ways to search and when to do so. They go on to say that humans will encounter difficulties when they are unable to locate a previously learned lexical term when writing or speaking. Furthermore, the majority of the time, this search is focused on

finding something in the actual world, such as an object, a person's initials, a date, a phone number, or anything else.

However, some neuroscientists contend that mental lexicon has the ability to store information or activate records instead of accessing them, although it is currently unclear whether storing occurs at all. Furthermore, they think that the lexicon's organization is more akin to a network with a multidimensional feature rather than having a distinct area for each item on its own (Altman, 1997).

Not to mention, one other important area of research has been identifying the accessing lexicon during language generation. For many years, writing and voice output have been components of research done for these goals. Yet, given that the study of writing production is more advanced than the study of speech production, it appears that scholars are not as interested in these two facets of language production (Bonin and Gombert, 1998).

Many studies have been done on lexical access in writing, but almost all of them focus on advanced writing tasks like planning and rewriting. Bonin and Gombert (1998) believed that the system of producing written and spoken language are in different levels of processing and these processes have several specific components. In a complex experiment these authors wanted to experimentally investigate study lexical access in producing written language. They used both visual and auditory cues to offer the participants various items and pictures that represented words and things. Some of the words, which had little to do with the items they were supposed to symbolize orthographically or phonetically, had to be uttered aloud, and the rest had to be written down. The objective was to determine the variations in latency between responding to words and pictures when accessing a lexicon. The test takers had to perform three tasks such as categorization, naming and writing responding to pictures and linguistic inputs shown to them. Boning and Gombert found out that there were significant delays when the participants produced written language in response to both pictures and linguistic inputs.

 In order to produce spoken language, Levelt et al. (1991) studied speech creation in picture naming, while Dell (1986) studied accessing mental lexicon during sentence production. Additionally, Levelt and colleagues (1999) investigated the process of retrieving words from memory during spoken language production. Levelt et al. (1999) concluded that word articulation is a complex process that requires a rapid brain scan. The degree of lexical concept activation at the outset, the selection of lemmas, the morphological and phonological encoding of the word in context, and the phonetic encoding of the word are the hypotheses that contribute to the procedure's complexity.

The aim of this study is to determine how well participants can access lexicon and discover words when faced with various time constraints.

3. METHODOLOGY

3.1 **Test subjects**

At the time of the study's conduct, the test takers, who were 24 adult male students, were native Kurds doing a language course at Salahaddin University's Language and Translation Centre. They were English language learners of intermediate level (B2 CEF). Their ages ranged from 27 to 39, and they all had similar levels of English language proficiency. Since the test only contained English words and they were non-native speakers, their English language proficiency was taken into consideration. This is to make sure that there is no significant difference in the number of words stored in their mental lexicon or at least they fall under the same category of language proficiency.

3.2 Apparatus

This experiment uses a pen, blank sheets of paper, and a stopwatch to time the test as well as a calculator. Participants write the necessary words on the paper.

3.3 Procedure

The required exam for this study mostly required participants to write words in a set amount of time. It took roughly 15 to 20 minutes to complete the entire process, including the time needed to read and explain the instructions.

Before starting the test, the participants and the researcher convened in a calm and amicable setting. They were provided with guidelines to follow during the test and the purpose of the study was described. In order to avoid misunderstandings and produce more accurate findings, the test takers were also allowed to ask any questions they had about the test and the study. The researcher personally responded to all of their inquiries, answering them in-depth and clearly.

For test 1, each member of the group received a sheet of paper at the beginning of the test, and they were instructed to write as many words as they could on it in two minutes. These words had to be "nouns" in English language excluding proper nouns. The participants ceased writing as soon as the two minutes elapsed and there was no indication of the word length in terms of the consistent letters.

For the 2nd test, the participants were also given a clean sheet of paper and the instruction was also given to follow in this run.

Then, test takers were given 60 seconds this time. The test takers were instructed to write as many words as they could within this time. The words had to have only been "nouns" excluding the proper nouns. They stopped writing after one minute, and the paper sheets were subsequently gathered.

The time was further shortened to 30 seconds for the 3rd run under further pressure. The participants' task was to write as many "nouns", excluding proper nouns, as they could in the allotted time. The test takers ceased writing when they were done, and the words they had written were gathered.

4. RESULTS

Instead of employing statistical software, a straightforward mathematical computation is made to enable comparison between the results rated by the participants in all the three runs. The average amount of words written by each individual was calculated. Then, the overall number of words written were divided by the number of seconds it took each participant to write the words. This is so that it can be determined how long it took each participant to write a single word during a run. Additionally, the stability or dynamicity of the ability to access the mental lexicon under time pressure will depend on the variations in the number of seconds required for each word across runs.

In the initial administration of the test, the participants were given two minutes to write down as many common nouns as they could. The 24 participants in this section wrote 312 nouns in total, or 13 words per person on average every two minutes. This indicates that it took 9.23 seconds for each participant to produce a word in writing.

The second run required the test takers to produce common nouns in writing again. The amount of time allowed for this activity was 60 seconds only. The average amount of words produced by each of the test takers was 9.4 as 226 isolated nouns were written by the 24 test takers in this run. This indicates that the average time for each person to write a noun was around 6.38 seconds.

In the 3rd run of the test, the twenty-four test takers had 30 seconds to write as many solitary common nouns as they could. On average, each writer penned 4.8 words in the given time i.e. 115 words written by all the test subjects in total. This suggests that the average time required by each individual to write a single written descriptor was around 6.25 seconds.

There were cases where the observation had to be cancelled from the analysis such as in cases of: (1) misspelled words; (2) unfinished words; (3) the test taker wrote a word that was different from the required word type such as producing a "verb" instead of a "noun" and\or proper nouns were given instead of common nouns. On such a basis, 9% of the collected data was ignored.

Table: 1

The test results per each group and time as well as the required types and start including the time given to each group and time spent to put down each word.

Group	Number of participants	Allotted Time	Word type	Produced	Time for a word per-person (seconds)

Test1	*24*	*2 minutes*	*Noun*	*312*	*9.23*
Test 2	*24*	*60 seconds*	*Noun*	*228*	*6.38*
Test 3	*24*	*30 seconds*	*Noun*	*115*	*6.25*

5. DISCUSSION

As indicated previously in this paper, this study aims at identifying the capacity to access the mental lexicon in various contexts. By reducing the amount of time allotted to each participant during the test runs for writing isolated words. The purpose of the exercise was to assess the capacity to produce written work under various time constraints.

This study is predicated on three hypotheses in order to determine whether or not pressure to produce written words will have an impact on language users. The first theory states that when people operate under pressure to meet high standards, their performance will suffer (Sweller, J., 1998; Schmidtke, D. S., & Schröder, T. 2011). On the other hand, another theory suggests that time pressure neither delays nor accelerates accessing lexicon during language production (Jescheniak, J. D., & Levelt, W. J. M., 1994; Wheeldon, L. R., & Levelt, W. J. M., 1995). However, there is an alternative notion that contends that under strain, a person's ability to access their brain's vocabulary will improve (Pashler, H., & Johnston, J. C., 1989; Navon, D., & Miller, J., 2002).

The purpose of the initial administration of our test to the participants was to minimize pressure and aim for an average level of word production under normal conditions. Even so, it might be claimed that even though the participants experienced considerable strain during the first session, it will serve as a typical scenario because the final two sessions reflect a different, higher burden due to their shorter duration.

Based on the available data, a distinction needs to be observed between the results of the several research sessions. It will be evident from the differences which of the hypotheses can be verified.

It is important to note that, in a no-pressure setting, the recorded time for the first run, as it is used as the base, was 9.23 seconds per-word. By contrasting this outcome with the second run, one can see that nearly three seconds separates them. In the second test, when the time was cut from two minutes to sixty seconds, individuals took less time to generate a single written words= from their mental vocabulary; on average, they required 6.38 seconds to complete a single item. According to this study, one could argue that the results show that when under time pressure, accessing lexicon takes approximately 31% less than usual.

The average amount of time that group took in the third run of the test to complete each word throughout their performance was slightly less than what was recorded during the second session. Even with the pressure increasing to write a single lexical item in 30 seconds, this group required 6.25 seconds for each lexical item. This could indicate that their ability to access and generate the words from their brain vocabulary was marginally improved by the significant time pressure.

The participants' capacity to retrieve their mental lexicon seems to increase depending on the temporal constraints. This can be another prove of the Forster and Chambers's (1973) "activation threshold hypotheses" in which they suggest that individuals' cognitive system activates the lexical items in their mental lexicon faster and gives priority to them whenever they are under the pressure of time. One reason behind this can be due to the need of faster activation of words so as to be accessed in the given time. Moreover, when individuals are put under pressure, their cognitive arousals are increased, and their focus upsurges to complete the task they have. The third reason can go back to the "adaptive response" which means the environment plays a role in increasing the ability to recall the language stored faster especially when they need to make decision or communicate quickly (Forster and Chambers, 1973).

6. CONCLUSION

It is important to note that, based on the enormous quantity of research and tests carried out over the past few decades, the study of the human brain and how it relates to language has been a growing field. Knowing how the brain processes language enables us to comprehend the acquisition and production of language. This is among the reasons neurologists and psycholinguists have focused on determining the construction and accessibility of the mental lexicon. The many test procedures that are available to identify mental lexicon have been reviewed throughout the text. The majority of the exams focused on language acquisition. Furthermore, lexicon has primarily been examined through spoken language creation as opposed to written language.

Three theories have been taken into consideration since the study has been focusing on how time constraints affect the ability to access mental vocabulary. This has been done in order to determine if the pressure will have an impact on writing language production—that is, whether it will increase, decrease, or has no effect at all.

It has been discovered that there was a noticeable improvement in the participants' accessing abilities when pressure was applied during the test. This meant that the test takers spent more time on writing a word during the first test, when they were not put under pressure, than they did in the other two tests in which they were given less time. Moreover, their performance gave the best record when the time given to them was the shortest during tests. Subsequently, it was noted that the accessing lexicon was faster when the time they must produce is shorter. This could imply that time pressure has an impact on one's capacity of accessing mental lexicon. It is recommended that similar research be done in the future with larger participant samples, considering factors like mother tongue as well as the length of the required words.

REFERENCES

- Aitchison, J. (1994). *Words in the mind: An introduction to the mental lexicon* (2nd ed.). Oxford, UK: Blackwell.

- Aitchison, J. (1997). *The language web: The power and problem of words*. Cambridge, UK: Cambridge University Press.

- Aitchison, J. (2003). *A glossary of language and mind*. New York, NY: Oxford University Press.

- Altmann, G. T. M. (1997). Accessing the mental lexicon: Words, and how we (eventually) find them. In G. T. M. Altmann (Ed.), *The ascent of Babel: An exploration of language, mind, and understanding* (pp. 65-85). New York, NY: Oxford University Press Inc.

- Bonin, P., & Gombert, M. F. J. E. (1998). An experimental study of lexical access in the writing and naming of isolated words. *International Journal of Psychology, 33*(4), 269-286. https://doi.org/10.1080/002075998400200

- Bonin, P. (2004). *Mental lexicon: Some words to talk about words*. New York, NY: Nova Science Publishers.

- Bruza, P., Kitto, K., Nelson, D., & McEvoy, C. (2009). Is there something quantum-like about the human mental lexicon? *Journal of Mathematical Psychology, 53*, 362-377. https://doi.org/10.1016/j.jmp.2009.04.003

- Coltheart, M. (1978). Lexical access in simple reading task. In G. Underwood (Ed.), *Strategies of information processing* (pp. 151-216). San Diego, CA: Academic Press.

- Dell, G. S. (1986). A spreading-activation theory of retrieval in sentence production. *Psychological Review, 93*(3), 283-321. https://doi.org/10.1037/0033-295X.93.3.283

- Farahian, M. (2011). Mental lexicon: Its organization and representation. *Broad Research in Artificial Intelligence and Neuroscience, 2*(4), 56-59. Retrieved from https://www.academia.edu/8316415/Mental_Lexicon_Its_Organization_and_Representation

- Forster, K. I., & Chambers, S. M. (1973). Lexical access and naming time. *Journal of Verbal Learning and Verbal Behavior, 12*(6), 627-635. https://doi.org/10.1016/S0022-5371(73)80041-4

- Heij, W. L. (2005). Selection process in monolingual and bilingual lexical access. In J. F. Kroll & A. M. B. De Groot (Eds.), *Handbook of Bilingualism: Psycholinguistic Approaches* (pp. 289-307). New York, NY: Oxford University Press.

- Jescheniak, J. D., & Levelt, W. J. M. (1994). Word frequency effects in speech production: Retrieval of syntactic information and of phonological form. *Journal*

of Experimental Psychology: Learning, Memory, and Cognition, 20(4), 824-843. https://doi.org/10.1037/0278-7393.20.4.824

• Kajcsa, B. (2010). The organization of early bilingual mental lexicon in light of a picture-naming task. *Acta Universitatis Sapientiae, Philologica, 2*(2), 326-336. Retrieved from https://acta.sapientia.ro/content/docs/the-organization-of-early-bilingual-ment.pdf

• Levelt, W. J. M., Roelofs, A., & Meyer, A. S. (1999). A theory of lexical access in speech production. *Behavioral and Brain Sciences, 22*(1), 1-38. https://doi.org/10.1017/S0140525X99001776

• Levelt, W. J. M., Schriefers, H., Vorberg, D., Meyer, A. S., Pechmann, T., & Havinga, J. (1991). The time course of lexical access in speech production: A study of picture naming. *Psychological Review, 98*, 122-142. https://doi.org/10.1037/0033-295X.98.1.122

• Lukatela, G., & Turvey, M. T. (1991). Phonological access of the lexicon: Evidence from associative priming with pseudo homophones. *Journal of Experimental Psychology: Human Perception and Performance, 17*, 951-966. https://doi.org/10.1037/0096-1523.17.4.951

• Murthy, L. (1989). The representation of hyponyms in the bilingual's mental lexicon: A psycholinguistic study. Unpublished M. Phil dissertation, Hyderabad: CIEFL.

• Navon, D., & Miller, J. (2002). Queuing or sharing? A critical evaluation of the single-bottleneck notion. *Cognitive Psychology, 44*(3), 193-251. https://doi.org/10.1016/S0010-0285(02)00502-0

• Pashler, H., & Johnston, J. C. (1989). Chronometric evidence for central postponement in temporally overlapping tasks. *Quarterly Journal of Experimental Psychology, 41*(1), 19-45. https://doi.org/10.1080/14640748908402333

• Schmidtke, D. S., & Schröder, T. (2011). Stress effects on declarative memory retrieval are blocked by a beta-adrenoceptor antagonist in humans. *Psychoneuroendocrinology, 36*(10), 1563-1574. https://doi.org/10.1016/j.psyneuen.2011.04.002

• Sripada, P. N. (2008). Mental lexicon. *Journal of the Indian Academy of Applied Psychology, 34*(1), 181-186.

• Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*(2), 257-285. https://doi.org/10.1016/0364-0213(88)90023-7

• Taft, M., & Forster, K. I. (1975). Lexical storage and retrieval of prefixed words. *Journal of Verbal Learning and Verbal Behavior, 14*, 638-647. https://doi.org/10.1016/S0022-5371(75)80046-1

• Wheeldon, L. R., & Levelt, W. J. M. (1995). Monitoring the time course of phonological encoding. *Journal of Memory and Language, 34*(3), 311-334. https://doi.org/10.1006/jmla.1995.1015

- Zock, M., Schwab, D., & Rakotonanahary, N. (2010). Lexical access, a search problem. In *Proceedings of the Second Workshop on Cognitive Aspects of the Lexicon* (pp. 75-84).