The Difficulties of Access to the Mental Lexicon for Children with Autism Spectrum Disorder

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Abstract: This study sheds light on the difficulties that hinder children with ASD from accessing the lexicon during verbal communication due to cognitive troubles. Such issue results in difficult retrieval of words and of their semantic images, and in a low receptive and productive linguistic balance, leading to deficits in comprehension and oral production. In addition, the study focuses on the access to the mental lexicon and on its role in receptive and productive language production and growth. In so doing, we discuss different concepts, definitions, and models that interpret the mental lexicon and access to it.
key words*:* mental lexicon; Autism Spectrum Disorder

الملخص: يهدف هذا البحث إلى التعرف على الصعوبات التي تعيق المصابين بالإعاقات التواصلية من فئة اضطراب طيف التوحد إلى الوصول إلى النفاذ إلى المعجم أثناء عملية التواصل اللفظي الشفوي وذلك بسبب الاضطرابات المعرفية المصاحبة وهذا ما يظهر على شكل عجز في استحضار الكلمات وصورتها الدلالية وكذلك نقص الرصيد اللغوي انتاجا وفهما، وهذا ما يؤدي إلى عجز في استراتيجيات الفهم وعمليات الإنتاج الشفوي،ومحاولة تسليط الضوء على عملية النفاذ إلى المعجم الذهني في ظهور اللغة ونموها على المستوى الاستقبالي والإنتاجي لدى هذه الفئة، وبالانطلاق من الطرح النظري الذي سنعرض فيه عددا من التعاريف والمفاهيم مع إبراز النماذج المفسرة للمعجم الذهني والنفاذ إليه لدى الطفل.

الكلمات المفتاحية: المعجم الذهني، اضطراب طيف التوحد.

1.Introduction:

ASD is a developmental disorder that results from problems in the nervous system. It affects the brain functions and child development, causing deficits in verbal communication and social interaction (Houari, 2021, p. 07). It is diagnosed with (criteria 01) the continuous weak social and emotional communication and interaction in different social contexts, in emotional and non-verbal communication, and in the development and comprehension of social relations. Besides, it is diagnosed with (criteria 02) the repetitive and restricted behaviors, activities, and interests (Salari et al., 2022, p. 13). Children with ASD show:

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- social troubles, including isolation and failure to understand the relations with others and respond to their feelings,
- behavioral troubles, such as the typical behaviors, resistance to change, and self-harm,
- and linguistic deficits, such as delay in language learning and development, difficulty in understanding speech, and repetition of some syllables and words due to difficulty of access to the mental lexicon. The latter refers to the knowledge and information on language and its semantic, morphological, phonological, and orthographic aspects (Akida, 2022, p. 243).

In this context, Ihilouche & Zeghiche (2022) investigated the efficiency of some training drills on phonological awareness in developing the lexical level, with its productive and receptive sides, of children with ASD and reported that the phonological awareness contributes to the development of comprehension and production. Moreover, Ben Akli (2012) assessed the linguistic balance of children with ASD and found out that they acquire the daily life vocabulary and use it based on their special needs. Furthermore, Rescola & Safir (2013) compared children with ASD's acquisition of language to that of neurotypical children and figured out that children with ASD basically acquire the same words as neurotypical children do, indicating a delay in the formation of the lexicon, not a full deviation.

Based on what was said, this study shall focus on the troubles of the mental lexicon for children with ASD by answering this problematic, "what troubles affect the mental lexicon, mainly the word, of a child with ASD?"

2. Importance and Aims of the Study:

1.2 Aims of the Study:

This study aims at identifying the receptive and productive troubles in the mental lexicon of children with ASD, and at assessing this lexicon.

2.2 Importance of the Study:

This study enriches the literature on the cognitive (mental flexibility) and linguistic (mental lexicon of the word) capacities of children with ASD, and shall provide a better understanding of the cognitive mechanisms that cause communication troubles.

3. Autism Spectrum Disorder:

3.1 Definition:

"Autism" is derived from the Greek "autos" that means the "self", and "ism" that means "enclosure". Together, the term means enclosure to the self, because children with ASD usually avoid other people and show less interest in the external world. A child with ASD is often unable to establish social relations and use language for communication, has a strong will to continue the same behaviors, loves things over people, has good cognitive capacities, and shows typical repetitive behaviors; these signs appear before the age of 30 months (Azzaz, 2016, p. 47). DSM IV-IR 2000 defines it a state of chronic disorder in development that is characterized with delay in the development of the basic psychological functions and the social and linguistic skills, such as attention, cognition, and movement before the age of 03 (Chokri, 2020, p. 38). In addition, DSM-IV destines it as a qualitative deficit in social interaction and communication that leads to repetitive patterns and limited behaviors, activities, and interests before the age of 02 (Al Malouma, 2019, p. 21).

3.2 ASD Symptoms:

ASD causes deficits in the social aspect, language, communication, and behavior, leading to:

- Low social interaction, as children show excessive isolation, withdrawal, and avoidance of social situations. Children with ASD cannot communicate with their surroundings and behave like they are in a bubble (al Qamch & al Maayta, 2007, p. 297).
- Isolation and distorted response to social stimuli, such as visual communication, focus on given visuals, and lack of smile.
- Imitating others in a distorted manner and avoiding social collective games (Chokri, 2020, p. 40).
- Not responding to their names, like they are non-hearing, but responding to other sounds in the surroundings.
- Not focusing eyes on parents and avoiding eye-contact with others.
- Not raining hands to allow others to take them.
- Delay or lack of language, even for years, as children may not speak at all, utter some words and then lose ability to speak, produce unclear language, or repeat what they hear as echoes.
- Inability to expresses their needs or respond to instructions or demands.
- Inability to distinguish family members from strangers.
- Not trying to imitate people and, thus, not learning any new (Azaz, 2016, p. 33).
- Showing odd behaviors, such as moving fingers, hands, or body, or harming the self or breaking things; they lack awareness and control of their bodies (Al Qamch & al Maaytla, 2007, p. 298).
- Extensive attraction to one activity or to given activities (al Qadi, 2008, p. 21).

4. The Mental Lexicon:

4.1 Definition:

In cognitive linguistics, it refers to part of, or the whole, linguistic knowledge. It is also known as the self lexicon or internal lexicon and is defined as a set of units that make up a community language, a language of a given human activity, or a language of a given speaker. It is a complicated structure that covers words with their phonological, semantic, syntactic, and other non-linguistic aspects. Thus, we can say it is a store for information on words, a dictionary, a list of lexical inputs, and part of the long-term memory where the semantic, phonological, an orthographic aspects intersect.

The mental lexicon differs than the lexicon in the fact that it is individual because it is developed by one speaker while a lexicon is a set of words of a community language. This individual nature makes words of a person representations of given things, as if we speak about an organized list of lexical inputs that contain sets of necessary information to understand the signifiers and use them in given contexts (Al Hassan, 2018, p. 150). Moreover, it is a set of lexical units, including the productive words used by a learner in learning, communicating, and expressing his self and his external world.

In general, the mental lexicon is the study of the mental aspects of the verbal balance of a given speaker or learner. It includes a number of secondary fields that have tight relations with writing. Since the mental lexicon is an interdisciplinary issue, pedagogues tackled it to

focus on the strategies of acquiring, storing, and retrieving new lexical units, and on the generation of new meanings (Baalawi, 2021, p. 78).

4.2 The Mental Lexicon Parts:

It covers the receptive and productive aspects that are tightly related to word recognition. A word production requires multilateral knowledge that covers the vocal, morpho-syntactic, semantic, lexical, contextual, and stylistic data, what makes it familiar and usable in speech or writing. In return, a word reception requires knowing its meaning when reading or listening. In this regard, word production is harder than reception, and reception comes before production, as the memory may include receptive words that are not used in production. Thus, studying the shift from reception to production or vice versa is very complicated. Some studies state that the shift from reception to production is not stable and covers different overlapping aspects. In this context, Melaka (1997) introduced some phases to show the distance between the receptive and the productive lexicons, which is governed by the degrees of familiarity, namely:

- The reemployment of words without comprehension.
- Word comprehension.
- The reemployment of words with comprehension.
- Production of words in a different communicative situations and contexts (Al Hassan, 2018, pp. 113-114).

4.3 Building and Developing the Mental Lexicon:

Psychologically speaking, a child cannot reach speaking and use sounds with given meanings to express himself before having a clear concept about things' permanence; i.e., that things permanently exist even if they do not exist in his cognitive scope. Piaget noticed that this concept develops by the age of 18 months, and that it is vital for speech. Sounds cannot have meaning or be linguistic symbols if the signified (concept they refer to) does not permanently exist in children minds, regardless of their existence in their sensor scope (al Houari, 2021, pp. 40-41).

Boysson-Bardies (2005) found out that the first aspects of comprehension appear in the age of 08 to 10 months, that comprehension comes before production, and that phonology, tone, morphology, and context are the first basis for comprehension. Moreover, he suggested an average of 40 to 50 receptive words and about 10 productive words at the age of 12 months; the productive words may increase to 50 after about 04 to 06 months. In addition, Buckley & Oliver (1994) summed up the phases of lexical development in two phases. The first is from 10 to 18 months and is characterized with slow acquisition of new words, followed by the second phase that marks the lexical explosion at the age of 18, where children learn many new words (Akida, 2022, p. 245) to reach 100 or 200 at the age of 24 to 30 months, and 2000 to 25000 at the age of 06 years. Such explosion has a strong relation with the qualitative and quantitative cognitive development, mainly the semantic categorization. It witnesses a qualitative reorganization, where the overgeneralization errors disappear (Boulahia, 2014, p. 23).

In acquiring words' meanings, the child goes through three phases. First, the meaning of the first words is linked to one given thing or event, not to things or events of the same category; this is misgeneralization. Second, the child remarks the similarities between things and starts generalization on all things of the same category and other similar things outside the category,

marking over-generalization. Finally, he gradually reduces over-generalization to reach adults' generalization (al Houari, 2021, p. 43).

4.4 The Strategies of Building the Mental Lexicon:

4.4.1 The Fast and the Extended Mapping:

Neurotypical children usually acquire the lexicon rapidly, just after one exposure to the word, and manage to link the new shape with its signifier; this is fast mapping. After one exposure, the child is not only supposed to have learned it; rather, he must form a primary semantic and lexical representation, which is later refined after recurrent exposure; this is extended mapping (Strokel, 2011, p. 06).

4.4.2 The Quick Incidental Learning:

Neurotypical children can build primary semantic and lexical representations of words after little exposure in natural contexts (such as TV programs), marking the quick incidental learning, which allows them to rapidly build a lexicon (Strokel, 2011, p. 06).

4.5 The Factors Affecting Fast Learning:

Fast learning of words is affected by the phonological, prosodic, lexical, semantic, syntactic, and pragmatic cues. Therefore, we shall tackle some studies that focused on the phonological, lexical, and semantic cues that intervene in words learning.

4.5.1 The Phonological Cues:

The phonotactic probability is one of the cues that have gained modern interest. It refers to the frequency of given sounds occurrence in language, and allows for classifying some vocal sequences as frequent or rare.

4.5.2 The Lexical cues:

Studies reported a relation between the phonotactic probability and the neighborhood density; the latter refers to the number of words whose sound resembles that of a given word. Usually, words that have common sounds are in extensive neighborhoods that include a big number of similar vocal words while those that have rare sounds are in rare neighborhoods with less vocal neighbors. This relation shows that words with the common vocal sequences are usually surrounded by a bigger number of similar words.

4.5.3 The Semantic Cues:

The semantic set size refers to the number of words related to a given word regarding meaning, or those recurrently linked to it. Some studies showed that children achieve a similar advance in learning big or small semantic set words. However, the smaller semantic set size words are more likely to be retained in the long term (Strokel, 2011).

4.6 The Lexical Access:

According to Neely (1991), the lexical access is the activation of a lexical unit that already exists in the memory, while words' identification is access to their semantics. Lexical access takes place according to different models (Baalawi, 2021, p. 153), as we shall discuss:

4.6.1 Morton's Logogen Model:

It explains the phases of processing the information intervening in the verbal naming, as follows:

- The visual analysis of the image: it marks the cognition of the image and the seen thing.
- Classification of the visual stimulus: classification is according to pictogen that allows for extracting the main features of the stimulus.

- The activation of the semantic representation: the information is processed and the semantic representation of the image is activated at the Logogen system, as Morton puts it.
- Activating the outputting phonological lexicon to retrieve the phonological image of the semantic representations activated in the previous phases.
- The vocal and articulatory mechanisms by transforming symbols into the tampon memory or buffer. The phonological memory retains what was processed before until uttering it. Thus, it ensures retaining the order of phonemes until uttering and production (Norine, 2016, pp. 166-167).

The Interactive Model (Dell et al.):

Dell et al. introduced an interactive model that covers 03 levels of procession, namely the semantic level that focuses on the semantic features, the lexical level that focuses on words, and the phonological level that focuses on phonemes. These levels have a dual activating relation and interact with the neighboring levels due to the relations coming down from the semantic level into the lexical and phonological levels. As for the ascending relations, they go in the opposite direction, allowing for interaction inside the model. Such activation helps code the representations according to their activation value that allows for retrieving words, as shown in figure 01 (Brahimi, 2023, p. 176).

4.6.3 The Independent Network Model (Caramazza et al., 1997):

This model was introduced by Caramazza (1977) and Hills & Caramazza (1991) to show that the stimulus goes in parallel from one procession level to another. The model introduces 06 levels, as follows:

- The visual analysis that includes the cognitive analysis.
- Activating the visual structural cognitive representation and the recognition of the sensory stimulus as a real thing.
- Activating the semantic features, such as strawberry- sweet.
- Activating the suitable phonological representation at the outputting phonological lexicon.
- Retaining the information at the phonological memory that plans for the word.
- Turning the phonological units into articulation models at the articulatory programming and execution systems related to the motor-nervous coordination of the glottal movements (Brahimi, 2023, p. 176).

5. The Mental Lexicon Troubles for Children with ASD:

The mental receptive lexicon is one of the main aspects of linguistic development, as receiving a word requires knowing its meaning through listening or reading without production (al Hassan, 2018, p. 113). Some studies show such difficulties in the lexicon, which may affect the linguistic and communicative competency of children with ASD. In this regard, Soknic & Tuller (2021) conducted a study titled “the lexical semantic knowledge of children with ASD: reference study” and found out that the semantic lexical knowledge of children with ASD varies and that its weakness or strength cannot be generalized; these findings go with those of our study. In addition, the receptive mental lexicon intervenes in words and meanings’ comprehension without production, and is the cornerstone for the development of the linguistic capacity because it comes before production.

In this context, Ben Akli (2022) assessed the linguistic balance of children with ASD based on the concepts of the perquisites, which are concepts acquired by children through daily interactions and relations with the surroundings. They are the first gate towards building meaning and setting the semantics of words. The author designed a special assessment protocol that covers a set of instructions to assess the linguistic balance, including the demonstration instruction that requires understanding the concept and the significance of the word when hearing it, without need for the verbal production. The study showed that children succeed in understanding the primary concepts that suit their needs.

Besides, the study of Lizli (2013) "the lexical formation of children with ASD" showed a delay in the acquisition of words, without big deviation from the typical pattern of neurotypical children. The productive mental lexicon is the linguistic balance that we use to express notions and feelings. It is a cornerstone for language development and communication. For children with ASD, we notice limited vocabulary, typical repetition, and difficulty of retrieval in need (Azzaz, 2016, p. 95). In this regard, Riddel et al. (1995) and Mirinda (1994) reported that speech repetition for children with ASD results from the difficulties in self-expression and inability to find the suitable words to explain their needs (Akida, 2022, p. 30).

The development of the mental lexicon for children with ASD is one of the main goals for linguistic interventions because they suffer in production. In this context, Halilouch & Zeghiche (2022) examined the efficiency of training activities to raise phonological awareness in developing the productive lexical level of children with ASD and found out that the phonological awareness contributes to the development of the productive lexical level of children with ASD, and that it is possible to develop their linguistic balance (vocabulary). Besides, the assessment of their linguistic balance is key for understanding their communicative capacities, mainly in daily life.

Ben Akli (2012) assessed the linguistic balance of children with ASD and designed a special protocol that involves a set of instructions to assess their linguistic level, including naming that requires children to retrieve the word according to different models, including Morton's logogen that explains the phases of processing the information intervening in the verbal naming as follows: the visual analysis of the image, the visual stimulus classification, the semantic representation activation, and the outputting phonological lexicon activation (Norine, 2016, p. 167). Furthermore, the study showed that children with ASD can use the daily life vocabulary and the prerequisites that suit their needs. Thus, we can say that the mental flexibility affects the lexical production of children with ASD and confirm the second sub-hypothesis on the statistically significant correlation between the mental flexibility and the productive mental lexicon (words naming) for children with ASD.

6. Conclusion:

This study focused on children with ASD, who suffer cognitive and linguistic development troubles. We shed light on the troubles in the mental lexicon that is responsible for linguistic and cognitive development. In this regard, language acquisition for children with ASD is slow and difficult due to the low linguistic procession capacities; therefore their linguistic balance is very poor. Besides, they suffer other troubles in the cognitive processes that slow down the transmission of information into the brain, hinder fast response, and weaken the linguistic activity that is the outcome of interrelation between phonemes that make up the language

sounds, semantics that covers words' meanings, morphosyntax that allows organizing these words into sentences, and pragmatics that governs the social aspect of language. These systems are interrelated inside the mental lexicon that covers the speaker long-term information on each word that allows for producing and understanding language words

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