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STUDY THE RELATIONSHIP BETWEEN THE COGNITIVE ASPECT OF THEORY OF MIND AND UNDERSTANDING IN ORAL LANGUAGE IN ALZHEIMER'S PATIENTS DURING THE MIDDLE STAGE OF THE DISEASE

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ABSTRACT

The ability to infer internal mental states through the behavior is related to the understanding of implicit language statements in interactive situations where the speaker's intention is public. This study looked at that relationship by answering whether this association persists during aging and after Alzheimer's. Apply some of the terms of the Theory of mind (Toma) battery and the Oral Language (OLTA) battery designed for the adult. A group of 5 individuals with Alzheimer's disease during the middle stage. The results found that the impact relationship is not limited to the group of individuals below the age of maturity, but continues into old age. it would explain the nature of language and cognitive disorders in understanding metaphors such as folk proverbs and the attribution of mental states either through behavior or through language in intermediate Alzheimer's patients.

Keywords: Cognitive side, theory of mind, understanding, oral language, Alzheimer's.

INTRODUCTION

The term "theory of mind" (Tom) as Permack & Woodruff 1978 refers to the set of mental processes involved in understanding and perceiving mental states of self and others in order to predict their behavior (Lin et al, 2018) by attributing these states to their owners. The two types of mind theory can be distinguished from the "emotional dimension" (Tom) and is shown by an individual's ability to know and understand the inner or false feelings and emotions of others in situations where facial expressions or tone of voice do not reflect true

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emotion, such as situations of exposure to an embarrassing situation. the facial expression is joy, while the inner emotion is sadness. External emotions that appear in situations where the facial expression corresponds to the inner feeling, such as receiving a beautiful gift, in which all apparent behaviors express joy. The "cognitive dimension" of (Tom) is considered the second type and is called the cold dimension.

Cognitive theory of mind is related to the ability to read and attribute thoughts and beliefs to one or the other. This type represents the high level and complex part of the theory of mind, due to the sharing of other cognitive and epistemological aspects (Beuriat et al, 2022). The cognitive aspect has been studied in many neuropsychology and social cognition studies under the name "perspective adoption". It develops in the early stages of life through the indicator of "shared attention" when the child begins to shift his gaze between the object and the other person and understands that they are looking at the same thing, and this moment marks the beginning of the child's understanding of the mind (Farrar & Maag, 2002). The theory of mind continues to develop during the later stages of development from the terminology expressed, where linguistic growth has been associated with the growth of (Tom) from the point of view of social constructivism in many studies, arguing that the motivation for learning language is the desire to express the content of thought. Experimental studies have demonstrated this overlap after testing the relationship between performance in the false belief task and performance in the language test (TLD) in Browning & H. Lonergan (1998) in terms of semantic and grammatical vocabulary quality (Villiers & College, 2000).

People use language to express their desires such as saying "I crave cakes", their emotional states such as "I am so happy" and their beliefs and thoughts such as "I didn't think I would see you today." Just like Villiers & Villiers (2014), any conversation, whatever its content, expresses mutual beliefs and ideas, someone says, "My class needs cheese, give me the box in front of you." Once you hear this phrase, the listener will immediately realize that the speaker does not know that the box of cheese is empty; only "Villiers" can language reveal our ignorance of the content of things, i.e., one has a mistaken belief about the identity of the object. Language is the truest expression of the content of the mind, as are other expressive behaviors such as eye sight or facial gestures.

Just as language expresses our mental capacity, it can also be a barrier to its progress, so that language's poor understanding of complex sentences and structures hinders one's understanding of the other's beliefs. Given this idea, several studies have been concerned with the quality of the link between mind theory and language at the beginning of cognitive and linguistic development, with recent longitudinal studies indicating a strong correlation between semantic grammatical aspects and the development of (Tom) during middle childhood and weakening this association during early adolescence (Ebert, 2020).

Although the growth, influence and influence between the two abilities continued into middle childhood, the full maturity of language abilities supports the continuation of the maturation of the theory of mind until the later stages, since the arrival of the individual to understand implicit language expressions such as jokes, sarcasm, metaphor, folk proverbs ... Only the theory of mind has reached a stage of development that allows it to be understood that it is possible for the speaker to say an explicit linguistic statement that has another meaning that is opposite to the true and direct meaning of the phrase. Moreover, the theory of mind is not

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judged to have evolved during these interactive situations without the presence of verbal communication between persons. This is supported by evidence of the strong relationship between sentence comprehension and the development of theory of mind. But the question remains whether this relationship will continue even after these abilities mature at an advanced age.

Studies in neuropsychological and cognitive psychology have indicated a double cognitive impairment of mind and language theory during the application of mental reading and verbal proficiency tests to older adults and people with aging diseases such as Alzheimer's (Wardlow et al, 2014; Laisney et al, 2013; Bittner et al, 2022). the disease group performed worse than the healthy elderly group. Patients showed impaired linguistic fluidity and verbal fluency, along with difficulties in lexical invocation of names and actions (Zein & Tribash, 2021), poor grammar control during speech, use of simple and incomplete sentences with the use of the typeface (Kave & Levy, 2003), poor understanding of metaphors, metaphor and metaphor due to difficulty in understanding the meaning of non-literal phrases of language (Konig et al, 2015) as well as popular proverbs and abstract expressions (Kempler et al, 1988). The results of the language tests were not the only ones where other results showed a clear weakness in the false belief tasks on the Cognitive Theory of mind tests during the intermediate stage, as opposed to the patients of the first stage (Duque et al, 2009; Laisney et al, 2013; Wardlow et al, 2014). This impairment has been explained not by patients' inability to attribute mental states to others but by the effect of declining other cognitive abilities such as working memory, executive function, linguistic impairment in understanding stories, and cognitive processing impairment associated with verbal ability (Laisney et al, 2013). Tiffany et al, (2023) refers to the deterioration of the brain's organic structure in areas of the brain involved in perspective and empathy, where tau clusters in the temporal lobe predicted poor performance in adopting views. Atrophy of the cerebral cortex in the amygdala region predicted poor understanding of views.

The results of these studies are analyzed in terms of explaining the impaired abilities of patients in cognitive theory tasks and their language performance. It is based on the influence of cognitive and neurological factors related to the disease. It was interesting to look at the effect of the relationship between the two abilities in justifying this weakness. The motivation for this study is to look at the relationship between the ability to attribute mental states and false beliefs and language proficiency while receiving and understanding language situations. Especially since the evolutionary studies of the growth of the two capabilities have proved the strong effect between them. Even if it is to varying degrees during some stage, it cannot be ignored during old age, especially in cases of brain injury resulting in cognitive and behavioral problems that continue to develop and appear to the point of near-total disability at the end of the disease.

Therefore, it is important to highlight this aspect in Alzheimer's disease specifically after some studies have been interested, which are few and perhaps insufficient in talking frankly about the existence of an actual relationship between the two abilities during cognitive decline. Accordingly, it was assumed that the weakness of semantic linguistic aspects predicted poor perception, as he explained (Wardlow et al, 2014) that the patient's disability during perspective-taking and mental-status-attribution tasks occurred at the speech-planning stage rather than at the stage of induction or lexicon entry. That is, before the patient

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searches for the appropriate words to express mental states, he or she has shown weakness in adopting the other person's perspective while thinking about "to whom the mental state is based" or what the mental state of the speaker is." In both cases, the weakness is still related to the impairment of language processing, why? Because the decision-making stage to base mental status was associated with poor understanding of the story and deteriorating receptive language levels (Konig et al, 2015) where justified the weakness of (Tom) patients' poor understanding of metaphors that require greater linguistic effort because reaching the true meaning of the phrase requires a bypass of the literal and direct meaning, especially since Alzheimer's clearly affects the linguistic abilities of patients in understanding grammatically complex or long sentences in terms of numbers small et al. (1997) in addition to the implicit aspect of language phrases such as folk proverbs and sarcasm, they require the sharing of mental functions that make the non-literal meaning inferred rather than direct, which coincided with the patients' weakness in inhibiting the literal meaning in order to infer the implied meaning (Papagno et al, 2003) due to impaired neurocognitive abilities.

As discussed in the results of the research presented, we will try to answer carefully in this research the questions raised about the shift of the relationship from the influence of the growth of the theory of mind on the acquisition of language (Hou et al, 2020). when he talked about the daily conversations between mother and son that contained the consciences (I) and (you), I foretold the existence of the theory of mind. To the effect of supporting linguistic maturity in the understanding of direct and indirect language statements during social situations in which the listener is required to infer the mental state of the speaker in order to choose the appropriate phrase to respond as indicated by the answers of the middle-stage patients in the attribution of the second-level mental states of the failed false belief even after reminding the patients the content of the story in a study (Barneti et al, 2019). This proves what Wardlow et al. (2014) previously suggested in his study that the problem of perspective adoption occurs during the planning stage and not during the induction, i.e. the patient fails to attribute the mental state before producing the language phrase while answering the questions of the story due to poor understanding of the linguistic situation in the story event.

MATERIAL AND METHODS

Participants

The research group included 5 individuals from Algiers, including 4 females and one male, aged between 67 and 83. People with intermediate-stage Alzheimer's disease do not have any associated cognitive or neurological disorders and are still able to communicate using language.

Measuring instruments

Two types of tests were used from within the battery (Toma) of the theory of mind and the battery (OLTA) of oral language designed by the researcher in preparation for the doctoral thesis specializing in Artuvonia.

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Oral Language Testing

Items "B" and"C" were used from test number (7). Item "D" of Test No. (8) out of the eight tests that measure oral language levels (phonological, phonological, lexical, semantic, morphological, and linguistic, grammatical, syntactic, pragmatic) in the Oral Language Battery (OLTA); Oral Language Test Adult directed to adults. By applying the third question of item "B" and the first question of item "C" to assess the ability of patients to understand explicit and direct language phrases. The first and second questions of the item "D" use the metaphor and implied phrases of the language by applying a set of phrases in the style of the noun and the folk proverbs of the Algerian heritage.

Testing the Theory of mind

4 cognitive mind theory tasks were applied out of 9 battery (Toma) tasks; Theory OF Mind Adult. It measures the cognitive and emotional aspect of mental status attribution. In order to achieve the goal of the study, a task (first-degree implicit attribution and perspective adoption) was used to assess the ability to attribute the mental state of the protagonists based on their behavior. The task (to read the thoughts and ridicule) is to infer the field state of the hero based on the linguistic phrases mentioned by one of the characters of the story.

Data processing methods

Program was used Statistical package (SPSS) in data processing, Through an account Pearson coefficient value.

RESULTS AND DISCUSSION

The table below display the participant's results on the theory of mind and oral language test items, it is represented by the value of the Pearson coefficient.

Table 1. Showing the value of the correlation coefficient between non-linguistic tasks and explicit phrases.

& Level of significance	Person's Laboratory	Total degree	N.B.	Items	Testing
0.18	0.70	65	05	Non-linguistic tasks	Theory of mind
		36		Explicit words	Language

We find that the value of the Person correlation coefficient between the results of Participants on non-linguistic task items and explicit statement items, where the value R = 0.70 at & = 0.18 represents a statistically non-functional value that expresses the lack of relationship between the ability to infer mental states through behavior and the understanding of direct language statements (table2).

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Table 2. Showing the value of the correlation coefficient between non-linguistic tasks and metaphors.

& Level of significance	Person's Laboratory	Total degree	N.B.	Items	Testing
0.01*	0.95	65	05	Non-linguistic tasks	Theory of mind
		37		Figurative words	Language

We find that the value of the Person correlation coefficient between the results of Participants on non-linguistic task items and between metaphorical phrase items, where the value R = 0.95 at &=*0.01 is a statistical function value that expresses a relationship between the ability to infer mental states through behavior and understanding the linguistic meaning of implicit phrases (table 3).

Table 3. Showing the value of the correlation coefficient between language tasks and explicit statements.

& Level of significance	Person's Laboratory	Total degree	N.B.	Items	Testing
0.01*	0.94	33	05	Linguistic tasks	Theory of mind
		36		Explicit words	Language

We find that the value of the Person correlation coefficient between the results of Participants on language task items and between explicit phrase items, where the value of R = 0.94 at &=*0.01, which represents a statistical function value that expresses a relationship between the ability to infer mental states based on the verbal phrase and the understanding of direct language phrases (table 4).

Table 4. Showing the value of the correlation coefficient between language tasks and metaphors.

& Level of significance	Person's Laboratory	Total degree	N.B.	Items	Testing
0.19	0.69	33	05	Linguistic tasks	Theory of mind
		37		Figurative words	Language

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We find that the value of the Person correlation coefficient between the results of Participants on language task items and between figurative phrase items, where the value R = 0.69 at &= 0.19 represents a statistically non-functional value that expresses the lack of relationship between the ability to infer mental states based on the verbal phrase and the understanding of the linguistic meaning of the implied phrases.

By looking at the results of the participants in the tasks of the theory of mind and the terms of expressed language at the value of the Person correlation coefficient, we find that the relationship between language and the theory of the mind during the cognitive decline as a result of Alzheimer's is an impact relationship.

The ability to infer the mental states of others based on their own behavior is considered a high-level ability in cognitive theory of mind (Beuriat et al, 2022), while supporting the level of linguistic understanding in social situations which is also a complex aspect of language because it includes verbal phrases that have an indirect meaning such as sarcasm or metaphor according to Konig et al (2015). These are vague verbal postures that call for the involvement of both the nervous inhibition and cognitive processing as stated previously by Laisney et al (2013) in Their study, with the aim of infer the true meaning of the phrase by going beyond the literal meaning of the words (Papagno et al, 2003). So that the inhibition of an apparent meaning in order to adopt an invisible meaning is not done if the patient is unable to stop the ability to activate the activity of another capacity. This is exactly what happens when you suppress your self-evident perspective and adopt someone else's inner or implicit perspective.

The common part of the two is not only the ability to be inhibition and activation, because neural processing here will in any case occur in the same way due to the interference of executive functions, but language shares with theory of mind another complex aspect that occurs indirectly. It must precede the occurrence of cessation and activation because it is linked to an understanding of the general social context of the dialog or the interactive situation, which is the knowledge that visible objects or actions do not necessarily reflect the internal implicit aspects that are a real motive behind the speaker's action or statement. It is a condition that the listener or patient must know before discouraging or adopting meaning.

This knowledge develops early in children during cognitive development as a physical component of the theory of mind, called the ability to distinguish between real and ambiguous content, and later develops as an ability associated with knowledge of people's true and false beliefs. It is the epistemological part of the theory of mind that rests on the linguistic ability to know that what is apparent does not necessarily reflect what is internal or implicit, as is the understanding that the literal meaning of a phrase does not necessarily reflect its true meaning. Therefore, in such situations, the ability to base implicit states and to adopt perspective through understanding behavior is what influences and supports the ability to understand and infer indirect language statements, not the other way around.

Just as the theory of mind had an impact on language, so did language. In situations where the attribution of the mental state to others is based on the linguistic understanding of their speech, that is, reading the speaker's mind and understanding the sarcastic phrase does not occur without the patient being a member of the co-speaker or listener in the interactive language situation along with other speakers.

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Consequently, these findings emphasize that the interrelationship between the two capabilities can be dual by supporting each other depending on the nature of the situation. This relationship varies due to different social attitudes. The idea of studies applied to the children's category was that the theory of reason had an influence on language and that it differed in adolescence from being influenced to being influence according to Ebert (2020). is a constant relationship throughout development to maturity and beyond, not only during childhood and adolescence, and that it remains a changing or differentiated relationship not based on development but on the social context in which it is stated. That is, the different nature of the relationship is governed by the different nature of the situation and not by the nature of the age stage.

But on the other hand, according to the results of this study, the research is between the understanding of explicit terms and the conclusion of mental conditions or between the conclusion of mental state through language and the understanding of implicit expressions. The relationship of vulnerability and influence between the two capabilities in Alzheimer's disease does not support the association between the ability to understand and deduce implicit behaviors during communicative situations that contain explicit terms. That is, the decrease in the ability to attribute mental condition does not affect the patient's ability to understand direct language phrases. It is the same for the degree to which the ability to understand or lose metaphors is retained, as it does not affect patients' ability to attribute mental state based on what has been said.

CONCLUSTION

Thus, it appears that the association between the cognitive aspect of theory of mind and understanding in oral language in Alzheimer's is in the form that each one supports the other during situations where the attribution of mental state and the understanding of high-level or lower-level phrases meets during the understanding of explicit phrases and the attribution of a direct situation. But they are considered weak in Alzheimer’s disease if the ability of high-level theory of reason converges with a direct understanding of phrases or an implicit understanding of situations based on simple language. That is, in some situations, this relationship is weak because of; An understanding of direct expressions does not require the sharing of high-level theory of reason (a conclusion of intention or of the speaker’s intention through conduct or context), since the meaning is clear and public, since the literal meaning is identical to the semantic meaning. If patients show difficulty in understanding the meaning of direct phrases, it is not due to the weakness of the cognitive theory of mind, but rather to the weakness of semantic memory and the difficulty of access to a word dictionary, as shown by the results of the studies. It is the same in the case of mental effort to understand linguistic figurative expressions that do not require the participation of the first-level theory of reason (the conclusion of the intention and purpose of the speaker through the phrase), but rather calls for knowledge that the conclusion of the speaker’s intention occurs by inferring the general context of the linguistic situation. It is a high degree of theory of mind along with other mental abilities because the meaning here is inferred and indirect. This results Open wide horizons for researchers in the field of rehabilitation to consider new study topics on a larger group of patients at different developmental stages or on a sample of disease similar to

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Alzheimer's, by searching for the relationship between understanding in social situations and the emotional side of theory of mind considering that it has Two side. Which can be exploited to explain patient's understanding of social communicative situations. Despite the results of previous studies, but they not explain nature of the relationship between to Two abilities and at what level they occur.

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