

## Linguistic Expression of Elderly with and without Dementia

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### Abstract

During the aging process, cognitive changes occur, including changes in a person's speech and language skills. These changes can affect the daily communication and quality of life of the elderly, with and without dementia. The aim of this research was to examine the expressive linguistic abilities of elderly with and without dementia. The sample consisted of 40 subjects with dementia and 30 subjects without dementia, older than 60. The subjects' linguistic expression abilities were assessed on the tasks of the Linguistic Expression subtest from the Arizona Battery for Communication Disorders of Dementia (ABCD). The study results showed that the elderly without dementia manifest subtle changes in the linguistic expression domain. Their results were significantly different from the results of subjects with dementia on all four test tasks of linguistic expression: object description, generative naming, confrontational naming, and conceptual definition.

In conclusion, language tasks are an important part of the cognitive assessment of the elderly, especially people with dementia. Knowing the decline of abilities in certain cognitive domains in the elderly allows for the targeted creation of intervention strategies to improve the communication abilities of the elderly with and without dementia.

**Keywords:** Linguistic Expression; Dementia; Elderly

### Introduction

The number of people over the age of 60 is globally increasing. In 2019, the number of people aged 60 and over was 1 billion, and this number is estimated to increase to 1.4 billion by 2030 and 2.1 billion by 2050, especially in developing countries [1]. Aging at the biological level occurs as a result of the accumulation of the effects of various molecular and cellular damages that occur over time [2]. Normal cognitive changes that occur in the elderly can affect daily function and quality of life, and a better understanding of this process can help clinicians distinguish between normal and disease states [3]. Several cognitive changes occur during aging, which should be taken into account in communication with older people [4]. Cognition is important for a person's functional independence as they age. In addition, preserved cognition is the basis of successful human communication, i.e. successful processing and integration of sensory information and adequate response to others. It is very important to understand the impact of aging on cognitive abilities, taking into account that cognitive abilities begin to decline with age. Considering today's trend of increasing the number of elderly people over 65, there is also an increased prevalence of age-related neurodegenerative dementia [5].

Age-related neurological changes allow language skills to change over the years. Any deviation in communication is a sign of a disorder of neurological or cognitive processes involved in speech [6,7]. Older adults manage the microstructural aspects of language (phonology, lexis, and morphosyntax) and are able to understand discourse [8]. However, language impairments affect an individual's level of functioning, interfere with effective communication, and may result in the development of disruptive behaviors. Even those without dementia or mild cognitive impairment may experience subtle cognitive changes associated with aging [3].

There are several common conditions that occur in old age, among which is dementia [2]. Etiological factors for the onset of dementia are only partially known and it seems to be a combination of several of them. It is assumed that there is probably a common basis of various neurodegenerative processes, which affects the increased generation, misreproduction, and pathological accumulation of peptides and proteins [9]. Multiple studies have shown that risk factors commonly associated with coronary heart disease, stroke, and other vascular disorders are also risk factors for dementia [10]. Many researchers consider stroke to be a highly frequent cause of dementia, especially in people who have recurrent episodes of stroke [11]. Patients with diabetes are at increased risk for any type of dementia, including Alzheimer's disease and vascular dementia [12]. Overweight and obesity as causes of dementia can be the main factors that can be prevented, and thereby prevent the development of dementia [10].

One way of understanding dementia, especially in the earlier stages, is as a change in the brain, where a disease process or condition causes changes in the structure and function of the brain. These brain changes produce the symptoms associated with dementia [13]. Dementia implies a disorder of cognitive activities caused by changes in brain function [14]. Dementia is mainly diagnosed when the acquired cognitive impairment has become severe enough to threaten a person's social and/or professional functioning [15]. The diagnosis of dementia is based on case history (anamnesis), physical examination, and cognitive assessment [16]. Medved and Petrović [17] also state that the application of brain imaging methods is crucial for dementia diagnosis. When it comes to people with dementia, they show changes in several cognitive domains: memory, attention, executive functions, visuospatial skills, perceptual speed, and language [18]. Impairment of language skills is a prominent clinical feature of dementia [19]. Numerous researchers state that, in addition to other signs, people with dementia show a decline in lexical knowledge, especially problems in finding words, show more lexical errors in their discourse, then deficits in sentence comprehension, and reduced verbal fluency [8,20]. People with dementia show difficulties in the field of linguistic expression, and problems in the field of semantics stand out in particular [21]. Speech disorders can be characterized by articulation disorders, and language disorders imply damage to the language system, i.e. the processing of linguistic information [22]. Early recognition of language dysfunction can aid in accurate diagnosis, management, and prognosis [23]. Verbal deficits, considering dementia, often occur in the context of multiple cognitive impairments [24].

There is great interest among researchers in studying the language of people with dementia because language disorders can be found both in the early and late stages of the disease [18]. A better understanding of the differences in cognitive-linguistic deficits among people with dementia will also allow speech therapists to design and evaluate interventions that will better match a specific dementia phenotype. In this way, it will contribute to improving the quality of life of both people with dementia and their caregivers [25]. Moreover, speech and language analysis can be necessary components in establishing a differential diagnosis of dementia, keeping in mind that various types of dementia affect the speech and language of the affected person differently [26].

As a major cause of disability and dependency in the elderly, dementia affects the social and economic burden of patients and their families and affects healthcare systems worldwide [27]. Although the definition of dementia is simple in theory, in clinical practice it is sometimes especially difficult to assess when neurological disorders cause socio-professional handicap [28]. The connection between brain and behavior research across the lifespan will result in critical knowledge that will enable individuals to take control of their cognitive future [29].

### Aim of the Study

The aim of this research was to examine the expressive linguistic abilities of elderly people with and without dementia.

### Materials and Methods

#### Participants and procedures

The sample consisted of 70 subjects over the age of 60. The subjects were divided into two groups equalized by age and gender, subjects with dementia (N = 40) and subjects without dementia (N = 30).

The average age in the entire sample of subjects was 79 years, ranging from 69 to 89 years. The average age in the group of subjects with dementia was 80 years and one month, while in the group of subjects without dementia 78 years and one month. The subtest Linguistic Expression from the Arizona Battery for Communication Disorders of Dementia (ABCD) [30] was used to assess language expression abilities. The Linguistic Expression subtest consists of four tasks: object description, generative naming, confrontational naming, and conceptual definition. During the "case description" the subject is instructed to describe the case in detail. The only help/clue provided is in the form of the sentence "Can you tell me something else?" Each meaningful answer is scored with 1 point. In the "generative naming" task, the subject has 60 seconds to list as many examples as possible for a certain category, e.g. "List as many animals as you can in one minute." Each answer is scored with 1 point. Synonyms are not scored with 2 points, only 1 point for one species. The "confrontational naming" task tests the subject's ability to name the objects shown in the picture. 20 items are displayed, and each correct answer is scored with 1 point. The maximum number of points is 20. There are no exclusion criteria. The task of "conceptual definition" involves defining by the subjects for the offered stimulus word. The answer can be recorded and then verified, and points from 0 to 3 are assigned - for each part of information about the object - use, function; attribute; and or another use or attribute. It is very important to monitor that the information given by the subject about the object really makes sense. If the subject use a sentence in which there are two parts of information about the object, only one that makes sense is scored, while the other is excluded. The maximum number of points is 60 (20 presented stimulus words).

During the examination, special attention is paid to conditions that can affect the test results: auditory word discrimination deficit, visual-perceptual problems, visual agnosia, illiteracy, depression, and/or apraxia. To determine these difficulties, the ABCD contains screening tasks: Speech Discrimination, Visual Perception, and Literacy, Visual Field and Visual Agnosia. The Hamilton Depression Rating Scale [31] was used to screen depression, and the Western Aphasia Battery-Revised [32] was used to scan apraxia.

Subjects with dementia, by the propositions of the ABCD test, who had a deficit in auditory discrimination of words, visual-perceptual problems, visual agnosia, who are illiterate, depressed, or apraxic were recorded separately, and the listed conditions taken into account while testing with the ABCD Test and interpretation of test results used to assess the linguistic expression of the examinee. All subjects were individually examined. Due to the fatigue of the subjects, it is possible to take shorter pauses. Subjects without dementia, by the propositions of the ABCD Test, had no history of neurological and psychiatric diseases, and no history of alcohol and drug abuse.

The research was conducted in institutions of health, social, and protection care (retirement homes) at the territory of Bosnia and Herzegovina.

#### Statistic analyses

Statistical analysis was performed in the SPSS 24.00 software package (IBM Corp. Armonk, NY). Basic statistical parameters were calculated. The  $\chi^2$  test was used to test the significance of the differences in summary results between subjects with and without dementia on the "linguistic expression" subtest. The Mann Whitney test was used to test the significance of differences in mean values (median) on the tasks of linguistic expression.

### Results

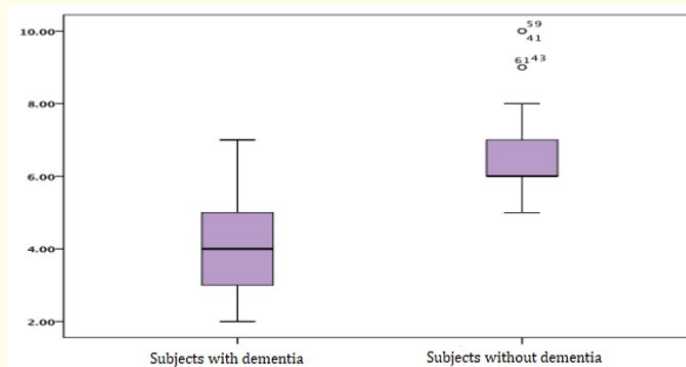
The results of the ABCD test on the “linguistic expression” subtest were evaluated by task and compared between the group of subjects with dementia and the group of subjects without dementia.

On the “object description” task, 20% of subjects with dementia achieved a minimum score of 1, while among subjects without dementia, there were no subjects with a minimum score. Also, not a single subjects with dementia achieved the maximum score (5 points) on this task, but 13.3% of subjects without dementia did so (Table 1). The summary results on the “item description” task differed significantly between subjects with and without dementia ( $\chi^2 = 40.31$ ;  $df = 3$ ;  $p < 0.001$ ).

2 (1) 3 (3-5)			Summary result “object description”			
			4 (6-8)	5 (more than or equal to 9)		
Group	Subjects with dementia	N	8	25	7	-
		%	20%	62.5%	17.5%	-
	Subjects without dementia	N	-	2	24	4
		%	-	6.7%	80%	13.3%

**Table 1:** Distribution of summary results on the “object description” task of subjects with and without dementia.

On the “object description” task, the median value in the group of subjects with dementia was 4 (IQR: 3 to 5), while in the group of subjects without dementia, it was 6 (IQR: 6 to 7.25). This difference in results was statistically significant ( $Z = - 6.27$ ;  $p < 0.001$ ) (Figure 1).



**Figure 1:** Display of the results on the “subject description” task.

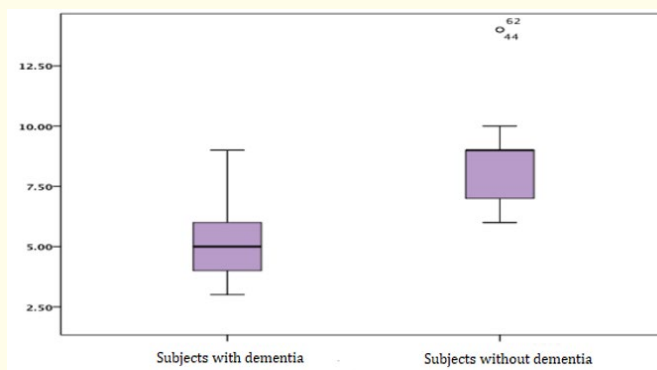
Similar results were achieved by the subjects on the “generative naming” task. Not a single subject with dementia achieved the maximum summary score, in opposition to not a single subject without dementia had a minimum score. It is evident from table 2 that subjects with dementia achieved lower results on the “generative naming” task.

A comparison of the results of subjects with and without dementia on the “generative naming” task showed a significant difference ( $\chi^2 = 46.02$ ;  $df = 3$ ;  $p < 0.001$ ).

2 (1-3) 3 (4-6)			Summary result "generative naming"			
			4 (7-10)	5 (more than or equal to 11)		
Group	Subjects with dementia	N	8	26	6	-
		%	20%	65%	15%	-
	Subjects without dementia	N	-	1	27	2
		%	-	3.3%	90%	6.7%

**Table 2:** Distribution of summary results on the "generative naming" task of subjects with and without dementia.

The Mann Whitney test results showed a significant difference between subjects with and without dementia on the "generative naming" task ( $Z = -6.13$ ;  $p < 0.001$ ). Figure 2 shows the median score of subjects with dementia on the generative naming task, which was 5 (IQR: 4 to 6), while the median score of subjects without dementia was 9 (IQR: 7 to 9).



**Figure 2:** Display of results on the "generative naming" task.

On the "confrontational naming" task, 62.5% of subjects from the group with dementia achieved the minimum score, in contrast to 80% of subjects without dementia who achieved the maximum score (Table 3). The summary results on the "confrontational naming" task differed significantly between the groups of subjects with and without dementia ( $\chi^2 = 39.3$ ;  $df = 2$ ;  $p < 0.001$ ).

2 (2-11) 3 (12-13)			Summary result "confrontational naming"		
			4 (14-18)		
Group	Subjects with dementia	N	25	12	3
		%	62.5%	30%	7.5%
	Subjects without dementia	N	2	4	24
		%	6.7%	13.3%	80%

**Table 3:** Distribution of summary results on the "confrontational naming" task of subjects with and without dementia.

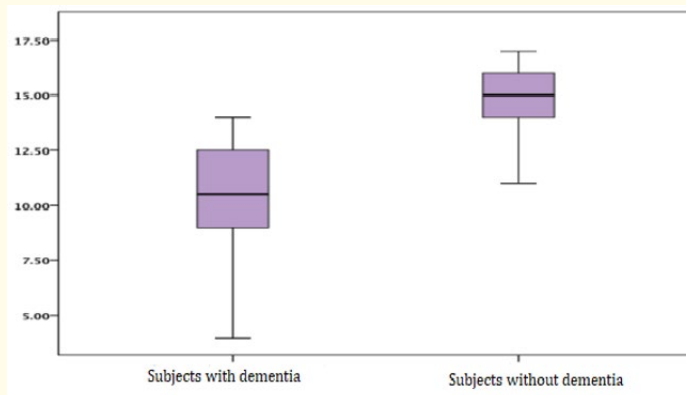


Figure 3: Display of results on the “confrontational naming” task.

The median value on the “confrontational naming” task in the group of subjects with dementia was 10.5 (IQR: 9 to 13), while in the group of subjects without dementia, it was 15 (IQR: 14 to 16). This difference was significant ( $Z = -6.29$ ;  $p < 0.001$ ).

The task “conceptual definition” was the most difficult for subjects with dementia and even 90% of subjects achieved the lowest summary result (1). Not a single subject with dementia achieved the maximum score on this task. The distribution of the results of subjects without dementia is different, which can be seen in table 4. In this group, the minimum number of subjects achieved the lowest result (6.7%). The summary results on the “conceptual definition” task were significantly different ( $\chi^2 = 49.01$ ;  $df = 3$ ;  $p < 0.001$ ) between the observed two groups of subjects.

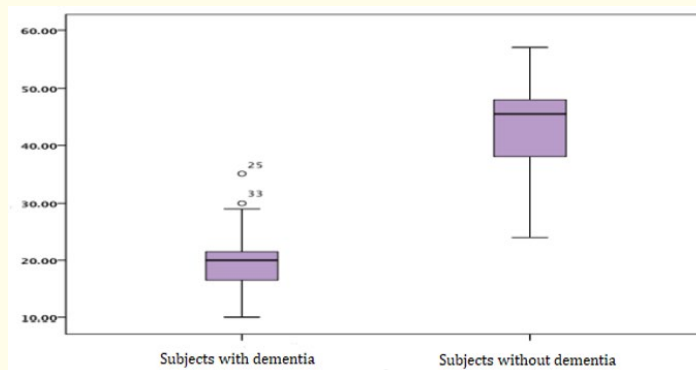
2 (1-27) 3 (28-43)			Summary result “conceptual definition”			
			4 (44-58)	5 (59-60)		
Group	Subjects with dementia	N	36	3	1	-
		%	90%	7.5%	2.5%	-
	Subjects without dementia	N	2	10	15	3
		%	6.7%	33.3%	50%	10%

Table 4: Distribution of summary results on the “conceptual definition” task of subjects with and without dementia.

In the group of subjects with dementia, the median score on the “conceptual definition” task was 20 (IQR: 16.25 to 21.75), while in the group of subjects without dementia, the median score on the “conceptual definition” task was 45.5 (IQR: 37.75 to 48.75) (Figure 4). This difference was statistically significant ( $Z = -6.94$ ;  $p < 0.001$ ).

Discussion

Negative changes occur in the brain during aging. These changes imply the deterioration of neurons and neuronal connections and leave consequences on various cognitive domains, including communication and language abilities. This was also shown by the results



**Figure 4:** Display of results on the “conceptual definition” task.

of this study, from which is evident that subjects without dementia achieved average results on all tasks examining linguistic expression, with a very low number of subjects achieving the maximum result. Contrarily, the majority of subjects with dementia achieved minimal and lower results compared to the group of subjects without dementia. Not a single subject with dementia achieved the maximum result. In summary, subjects with dementia showed significantly lower results on all tasks of the “linguistic expression” subtest compared to subjects without dementia.

Diagnosing speech and language disorders due to dementia is a challenge and not an easy task. There are few standardized test methods and it is occasionally difficult to make a differential diagnosis between dementia and other neurologically based language disorders. Linguistic expression is precisely one of the more pronounced difficulties due to dementia [33] where people experience difficulties in naming and finding the right or adequate words [34,35]. The assessment of spontaneous language skills through picture description tasks is useful for detecting subtle language disturbances caused by dementia [36]. Anomia, or difficulty naming, is considered one of the most common symptoms of dementia [37]. Semantic-lexical and pragmatic difficulties appear as an early speech-language symptom of dementia [35]. As dementia progresses, expressive language abilities decline, which eventually leads to the inability to produce a verbal statement [38].

On the “object description” task, subjects without dementia showed good verbal description skills. Not a single subject without dementia in this study was unable to perform the mentioned task, while 20% of subjects with dementia achieved the minimum result. Bozeat., *et al.* [39] state that persons with dementia show difficulties when describing objects. Difficulties are manifested in finding appropriate words during verbal descriptions. Their verbal descriptions are shorter and with less details than in persons without dementia [40]. Furthermore, when describing a picture of an object, subjects with dementia do not vary in sentence length and complexity, nor semantic complexity [41]. The sentences of people with dementia are simpler, with fewer words and shorter [42]. Also, object use is significantly impaired and strongly related to naming and semantic knowledge [43].

Verbal fluency, verbal recall (retrieval), and some confrontational naming tasks are reported to decline with increasing age. Older adults were less verbal, more repetitive, and less specific in their choice of words in spontaneous speech than younger adults [44]. The naming abilities of persons with dementia are poorer than the naming abilities of people without dementia [45]. In the study by Krishner., *et al.* [46] subjects with dementia due to Alzheimer’s disease showed impairments at naming tasks, even when their language functioning was normal on other measures. Numerous studies report greater impairments in the category of naming fluency (e.g. naming animals) compared to letter naming fluency (e.g. naming words that begin with a certain letter [47]. Thus, in the study of Jokel., *et al.* [48] the

results showed that even subjects who are at risk or suspected of dementia due to Alzheimer's disease showed a more serious decline in semantic fluency compared to phonemic fluency. In the study conducted by Hodges, *et al.* [43] all subjects, except for the patient with the mildest form of dementia, showed significant difficulties in the naming task. The results of the mentioned research and conclusions are in accordance with the findings obtained in this research. On both naming tasks (generative naming and confrontational naming), subjects with dementia achieved significantly worse results than subjects without dementia. The "generative naming" task seems to be somewhat easier for subjects with dementia than the "confrontational naming" task. Recalling words from the same semantic group (generative naming) represents a greater challenge to a person's semantic knowledge than to strategic word searching [49].

Lexical deficits are one of the most pronounced linguistic impairments in dementia due to Alzheimer's disease [50]. In research, mistakes are often reported during confrontational naming, where the patient recognizes the object, but cannot name it. Patients are able to identify which semantic class the target word belongs to, but cannot provide a lexeme for a specific member of the class (e.g. animal for dog). Deterioration in patients with dementia due to Alzheimer's disease is more pronounced in the verbal than in the visuoperceptual semantic network. One of the most common mistakes is the use of more general terms than specific ones for individual items (e.g. woman for mother). Another mistake is using words from the same semantic category as the target word. Lexical-semantic difficulties can affect the reduction of the informational content of the description of the picture given by the speaker. It is thought that naming may have even better predictive value than memory, although naming may initially appear intact in MCI [48].

The "conceptual definition" task was completed by 90% of subjects with dementia with the lowest overall score. The results of subjects without dementia on this task were mostly evaluated with central scores, and 10% of them achieved the maximum score. A low score on this task indicates reduced idea generation [51].

Elderly, including elderly with dementia, have a need for independence and often fear that they are a burden to their loved ones and the community in which they live. Ensuring good communication gives older people the opportunity to express various social, physical, and psychological needs [52]. Difficulties in the field of linguistic expression in people with dementia lead to increased discomfort and behavioral problems. The inability of a person with dementia to adequately convey a message to an interlocutor can lead to the development of discomfort, which can gradually turn into frustration and cause behavioral problems [53-55].

## Conclusion

The results of the conducted study suggest subtle changes in persons without dementia, but noticeable changes in the domain of linguistic expression in persons with dementia. Language tasks are an important part of the assessment of people with dementia because they can provide rich information about semantic storage and semantic recall. Linguistic abilities in different types of dementia were not investigated in this research, which can be the subject of research in future studies with the aim of better understanding the changes that occur in certain types of dementia, and in this connection also developing appropriate management and intervention strategies for persons with dementia with the aim of improving their communications. When examining the ability of linguistic expression, persons with dementia often deviate from the topic and interrupt the flow of the conversation, and they need more time to complete tasks. They also need assistance in the form of reminders and guidance on the task, contrary to persons without dementia. Persons with dementia have poorer language expression, and show difficulties in naming tasks and difficulties in describing and defining objects. When naming without a presented stimulus, persons with dementia are slower than elderly without dementia, and it also happens that they forget what the task is. The description of objects from persons with dementia is shorter than those from people without dementia, and persons with dementia most often state the function of a known object. The results of this research represent a good basis for future studies with the same or similar topic, taking into account a low number of researches in this area. In the process of planning treatment and rehabilitation programs for the elderly with and without dementia, it is essential to include speech therapists as team members.



The results obtained in this paper can be implemented to improve the communication skills of the elderly with and without dementia through the employment of speech therapists in institutions for care and nursing, such as retirement homes. Also, presenting the results of this research at scientific and professional meetings can help raise the awareness of the general public about the importance of communication and speech-language treatment as a measure to improve the functional linguistic communication abilities of the elderly with and without dementia.

### Conflicts of Interest

The authors declare no conflict of interest.

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