Naming Nouns and Verbs in Older Adults – Age-Related Changes

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Abstract

Research data on pathological language degradation suggest noun-verb dissociation, which prompts research in the field of normal aging in this direction. However, there are few studies in the literature that address semantic deterioration in the domain of verbs and the relationship between difficulties in naming these two types of content words during normal aging. The aim of the research was to compare the naming of verbs and nouns in healthy older adults and to qualitatively analyse the differences and errors in naming. The sample consisted of 101 participants without a history of neurological diseases, divided into 3 age decades. The Boston Naming Test was used as an instrument to assess noun naming, and the Action Naming Task was used to assess verb naming. Results from the whole sample showed that males performed better on both noun and verb naming ($p<.05$), and that higher educational level had an effect on the older adults' better performance. Comparative analysis revealed that participants had more difficulty naming nouns than verbs. Analysis of changes between age groups showed significant differences in the number of correct and omitted responses only in the area of naming objects ($p<.05$), while these differences were not found in the naming of verbs ($p>.05$). The results of our study show a significant semantic deterioration with age in the noun domain, but not in the verb domain. This could be a consequence of the different organization of nouns and verbs in the mental lexicon, supported by different brain regions and neural networks.

Keywords: Noun Naming, Verb Naming, Healthy Aging, Semantic Deterioration

1. Introduction

The lexicon is a kind of repository of lexical and conceptual representations consisting of organised networks of semantic, phonological, orthographic, morphological and other types of linguistic information. In addition to the store of words, the lexicon also includes the way in which they are stored in semantic memory and the processes that enable words to be accessed (Collins & Loftus, 1975). Long-term studies in children have shown that an intensive phase of reorganisation of the lexicon takes place during development at the age of six to nine years. After that, the organisation of the semantic network is similar to that of adult speakers (Nelson, 1977). Vocabulary enrichment is individual and takes place throughout life, but the organisation of the developed semantic network is similar for all speakers. What happens to the lexicon in adulthood, on the other hand, is a topic that has been investigated in relatively recent studies. In recent decades, ageing research has made considerable progress in quantifying age-related changes in semantic cognition. This includes the large increase in the size of knowledge stores during adulthood, which is perhaps best documented by the large differences in vocabulary size between older and younger adults (Verhaeghen, 2003). However, new methodological approaches point to possible quantitative and qualitative changes in the aging lexicon (Morais et al., 2013).

2. Literature Review

In the literature, it is assumed that normal aging has little effect on language function per se (Wingfield & Stine-Morrow, 2000). In fact, some aspects of language fall within the domain of preserved cognitive abilities, which may even be better in late adulthood (Verhaeghen, 2003). However, older people often complain of difficulties in naming or experience tip-of-the-tongue phenomenon. Difficulties in finding words, which increase significantly with age, have been confirmed in numerous older studies (e.g. Albert et al., 1988; Ardila & Rosselli, 1989; Au et al., 1995). On the other hand, the results of more recent studies using specific measures to assess lexical-semantic abilities indicate that both quantitative and structural aspects of semantic representations change over the lifespan. The results of these studies suggest that the semantic network of older people is less connected, less organized and less efficient (Dubossarsky et al., 2017; Wulff et al., 2019).

Studies on age-related changes in the organization of the semantic network have mainly investigated difficulties in the naming and processing of nouns. However, research in the field of acquired language disorders has pointed to a noun-verb dissociation in individuals with aphasia (acute acquired language disorder) and some types of dementia (progressive acquired language disorder) (for a review, see Vigliocco et al., 2011). Qualitative differences in the types of errors in naming objects and actions have also been observed, leading to the conclusion that there may be subtle but real age-related differences in the recall of these two classes of words (Barresi et al., 2000).

There are only a few studies in the literature that have addressed difficulties in naming verbs in the older population (Barresi et al, 2000; Goral et al, 2007; MacKay et al, 2002; Nicholas et al, 1985; Obler et al, 2010; Ramsay et al, 1999), and even fewer studies that have compared the naming of verbs and nouns (Barresi et al, 2000; Goral et al, 2007; MacKay et al, 2002; Nicholas et al, 1985; Obler et al, 2010). The data from the available studies are inconsistent. Some studies found a difference in age-related difficulties in naming verbs and nouns (Barresi et al., 2000; Nicholas et al., 1985), while others did not confirm this result (Goral et al., 2007; Mackay et al., 2002; Obler et al., 2010).

To summarise, the few existing studies on lexical retrieval in normal ageing suggest a possible dissociation consistent with the possibility that age affects the naming of objects and actions to varying degrees, although the data to date are quite contradictory. Furthermore, studies of object and action naming in brain-damaged individuals report marked differences between patients, supporting the notion that grammatical classes are differentially distributed in the brain. Since we do not yet have sufficient evidence to determine whether or not the aforementioned dissociation exists in healthy older people, in this study we will directly test the hypothesis that age affects the naming of objects and actions differently. In addition, we will conduct a detailed qualitative analysis to investigate whether there are differences in the semantic processing of these two word classes in older people. The resulting research questions are:

1. Are there age-related differences in the naming of nouns and verbs?

2. What characterises difficulties in naming two word classes: semantic decline or impaired lexical access?

3. Research methodology

3.1. Participants

The sample consisted of 116 participants aged 60 to 85 years, including 43 (37.07%) men and 73 (62.93%) women, without a history of stroke or other neurological disease and without dementia or mild cognitive impairment. In order to analyse the age-related changes in naming, the sample was divided into three age groups: 60 to 69 years, 70 to 79 years and 80 years and older. The distribution of participants by age group and level of education are shown in Tables 1 and 2.

Table 1

Distribution of participants by age group

Age group	N	%
60–69	45	38.80
70–79	55	47.40
≥80	16	13.80
Total	116	100.00

Table 2

Distribution of participants by level of education

Level of education	N	%
Elementary	32	27.59
High school	58	50.00
Faculty	26	22.41
Total	116	100.00

The analysis of age group congruence by educational level showed that the youngest group of participants had a significantly higher educational level compared to the two older groups (60–69 vs. 70–79, Mean Difference=1.838, St. Err.=0.608, p=.012; 60–69 vs. ≥80, Mean Difference=2.211, St. Err.=0.881, p=.047), while the two older groups did not differ significantly from each other (70–79 vs. ≥80, Mean Difference=0.372, St. Err.=0.860, p=.910). On the other hand, the comparison of the age groups according to gender distribution showed no significant differences ($\chi 2$=2.904, df=2, p=.234), which means that the groups were balanced according to gender. Women and men also did not differ in terms of education (F=0.759, df=1, p=.385).

3.2. Instruments

The Boston Naming Test (BNT – Kaplan et al., 1983) was used to assess the naming of objects. The test was originally developed in 1973 in an experimental version with 85 items.

In 1983, the authors revised the test to a version with 60 pictures, which is still used today. The test contains 60 black and white drawings of objects and measures the ability of confrontational naming (visually induced naming). The pictures of the objects are organised according to the frequency of use in language, from more to less frequent terms. The test is used to assess the naming ability of children and adults with and without developmental or acquired speech and language disorders. The Action Naming Task (ANT – Drljan, 2017) was designed to be similar to the BNT and is used to assess the naming of action verbs. The task consists of 40 pictures of actions arranged from more frequent to less frequent verbs in the Serbian language. If a person could not name a particular object of action, a semantic hint (cue) was given (partial description of the object or action). In the final evaluation of the correct answers, both the correct answers without semantic cueing and the correct answers with semantic cueing were taken into account. For the error analysis, a system developed by Goodglass et al. (Kohn & Goodglass, 1985) was used for both tasks and presented in Table 3. Due to the discrepancy in the number of items, the percentages of correct answers and errors in both tasks were calculated for the data analysis.

Table 3

Picture naming errors coding scheme

Type of errors	Explanation	Noun Example	Verb Example
semantic errors	production of a word that is semantically related to the target word or is a hyperonym	*guitar* instead of *harp* *instrument* instead of *harp*	*write* instead of *read*
unrelated errors	production of a real word that is not semantically related to the target word	*glass* instead of *pencil*	*play* instead of *dig*
phonological errors	production of the target word, but phonologically changed	*volcaco* instead *volcano* *hornicorn* instead of *unicorn*	*splode* instead of *explode*
circumlocutive errors	a description of the action without correct naming	*this is what you play* instead of *accordion*	*throwing snow at each other* instead of *snowballing*
pseudowords	production of words or syllable combinations that do not correspond to any word in the native language corpus	*gluska* instead of *harp*	*vising* instead of *clamping*
omissions	when the person did not produce a word despite assistance		

3.3. Data analysis

The method of descriptive and inferential statistics was used to describe and analyse the data obtained. The arithmetic mean and standard deviation were used as descriptive statistical measures. Differences in achievement on the applied tests by defined independent variables were analysed using inferential statistical methods, the One-factorial Analysis of Variance

(ANOVA) and the Paired-Samples T-Test, while in the case of an independent variable with more than two levels (age groups), the Scheffe post-hoc method was used.

An α-level was set at 0.05 ($p < 0.05$). The SPSS 26.0 statistical package was used for data processing.

4. Results

We used ANOVA analysis to examine gender differences in the naming of objects and actions (Table 4).

Table 4

Gender-specific differences in the total score for BNT and ANT

	Gender	Mean	SD	F	p
BNT total score	Male	87.618	8.665	8.624	**.004**
	Female	80.797	13.437		
ANT total score	Male	95.875	7.937	4.396	**.038**
	Female	91.014	13.342		

BNT – Boston Naming Test; ANT – Action Naming Task

The comparative results showed that men performed significantly better on both tests for naming objects and actions ($p<.05$).

In a next step, we wanted to investigate whether there were differences in the naming of nouns and verbs based on educational level. To this end, post-hoc Scheffé tests were conducted to examine the differences between the three groups (Table 5).

Table 5

Differences in total BNT and ANT scores in relation to educational level

			Mean Difference	St. Err.	p
BNT total score	Elementary	High school	-15.480	2.284	**.000**
		Faculty	-15.312	2.774	**.000**
	High school	Faculty	0.168	2.490	.998
ANT total score	Elementary	High school	-5.348	2.655	.137
		Faculty	-5.750	3.203	.205
	High school	Faculty	-0.401	2.861	.990

BNT – Boston Naming Test; ANT – Action Naming Task

The comparison results showed that participants with high school and faculty degree performed better than participants with a primary school education ($p=.000$). However, no differences were found between the performance of participants with high school and faculty degrees ($p>.05$).

Post-hoc analysis was used to examine differences in the naming of objects and actions between the three age groups as well as differences in the types of errors in the naming tests (Table 6).

Table 6

Differences between the age groups in BNT and ANT

			Mean Difference	St. Err.	p
		70–79	4.915	2.451	.139
BNT-CA	60–69	≥80	10.921	3.467	**.009**
	70–79	≥80	6.005	3.393	.214
		70–79	2.711	2.451	.544
ANT -CA	60–69	≥80	7.401	3.435	.103
	70–79	≥80	4.690	3.378	.385
		70–79	-2.805	1.546	.198
BNT-SE	60–69	≥80	0.862	2.187	.925
	70–79	≥80	3.668	2.140	.235
		70–79	-0.880	1.082	.719
ANT -SE	60–69	≥80	-4.273	1.517	**.022**
	70–79	≥80	-3.392	1.492	.080
		70–79	-0.247	0.314	.733
BNT-UE	60–69	≥80	0.087	0.444	.981
	70–79	≥80	0.335	0.434	.744
		70–79	0.303	0.541	.855
ANT -UE	60–69	≥80	-0.904	0.758	.494
	70–79	≥80	-1.208	0.746	.274
		70–79	-0.787	0.693	.527
BNT-CE	60–69	≥80	0.392	0.981	.923
	70–79	≥80	1.180	0.959	.472
		70–79	-0.255	0.267	.635
ANT -CE	60–69	≥80	-.0625	0.374	.253
	70–79	≥80	-0.369	0.368	.605
		70–79	-1.132	1.853	.830
BNT-OM	60–69	≥80	-12.480	2.621	**.000**
	70–79	≥80	-11.347	2.564	**.000**
		70–79	-0.100	1.043	.995
ANT -OM	60–69	≥80	-1.656	1.462	.528
	70–79	≥80	-1.556	1.438	.559

BNT – Boston Naming Test; ANT – Action Naming Task; CA – correct answers; SE – semantic errors; UE – unrelated errors; CE – circumlocutive errors; OM – omissions

With regard to the number of correct answers, differences were only found between the youngest and oldest participant groups, particularly in the test assessing the naming of objects. However, some peculiarities were found in the error analysis. Regarding naming actions, significant differences were only found in the number of semantic errors, with the participants in the oldest group making a significantly higher number of these errors than those in the youngest group. In addition to the differences in the number of correct answers, the analysis of noun naming showed significant differences in the number of omitted answers between the three groups of participants. Participants aged 80 years and older omitted significantly more answers than the two younger participant groups (60–69 and 70–79 years), while differences between the younger (60–69 years) and the middle group (70–79 years) could not be detected (Table 6). No differences were found with regard to unrelated and circumlocutive type of errors in either task. Phonological errors and pseudowords did not occur in any of the assessment tasks and were therefore excluded from further analysis.

In the following procedure, we examined the differences in the number of correct answers and errors between the naming of objects and actions using a paired-samples t-test and a direct comparison (Table 7).

Table 7

Direct comparison of BNT and ANT performance

		Mean	SD	χ^2	p
Pair 1	BNT-CA	83.256	12.300		
	ANT -CA	92.798	11.847	0.474	**.000**
Pair 2	BNT-SE	5.764	7.605		
	ANT -SE	2.981	5.308	0.324	**.001**
Pair 3	BNT-UE	0.611	1.515		
	ANT -UE	0.702	2.588	0.126	.086
Pair 4	BNT-CE	1.758	3.362		
	ANT -CE	0.206	1.278	-0.085	.378
Pair 5	BNT-OM	8.511	9.834		
	ANT -OM	2.362	4.963	0.202	**.036**

BNT – Boston Naming Test; ANT – Action Naming Task; CA – correct answers; SE – semantic errors; UE – unrelated errors; CE – circumlocutive errors; OM – omissions

The analysis of the comparison between the naming of nouns and verbs in the group as a whole showed that the participants had a significantly higher number of correct answers in the task of naming actions than in the naming of objects. In addition, participants omitted significantly more answers and made more semantic errors when naming objects than when naming actions (Table 7).

5. Discussion

5.1. Gender and educational differences

The results of the comparison of the differences in the variables that can influence naming ability show that men perform better in naming both word classes, nouns and verbs. On the other hand, the possible influence of educational level on naming was only observed in the naming of objects, and only between participants with the lowest level of education (primary school) and those with a higher level of education (high school and university). No differences were found in the naming of objects between participants with high school and those with a university education.

Our results confirm some previous studies that have found a significant advantage for men over women in the ability to name objects in healthy older participants (e.g. Connor et al., 2004; Hall et al., 2012; Randolph et al., 1999). However, other studies have found no differences between women and men in object naming (e.g. Kent & Luszcz, 2002; Patricacou et al, 2007; Tsang, H.-L & Lee, 2003). Patricacou and colleagues (2007) found a significant interaction between gender and educational level in relation to performance on the BNT. They explained this with a greater influence of educational level on performance and cultural influence. Older participants in the sample were educated at a time when higher education was more accessible to men, resulting in higher levels of education among men, which may also be the case in our study. Although Connor and colleagues (2004) initially found better performance by men than women on the BNT, subsequent analyses cast doubt on the interaction between gender and educational level, with educational level having a greater influence on object naming performance than gender. On the other hand, only few studies have investigated the influence of gender on verb naming. Our results are consistent with the findings of Goral and colleagues (2007), who indicated better performance by men in naming actions regardless of the level of

education. However, some studies suggest that women may perform better in naming verbs (Macoir et al., 2023), while studies using the action fluency paradigm (the ability to generate verbs in a unit of time) found no significant differences in performance between men and women (Piatt et al., 2004). The impact of gender on naming nouns and verbs is challenging to interpret because few studies have compared the influence of gender on naming these two types of word and there are studies that have found support for male advantage in naming pictures and those that have not. Regardless, the discrepancy in the results regarding whether the recall of nouns and verbs is influenced differently in males and females may be partly explained by the choice of tasks used to assess the naming of objects and actions. Goral and colleagues (2007) used a 60-item BNT and a 55-item ANT, Macoir and colleagues (2023) used a 30-item ANT without comparison to object naming, while Piatt and colleagues (2004) used a different paradigm for verb naming (action fluency), which is highly dependent on other cognitive abilities such as processing speed and executive functions. In addition, Piatt and colleagues (2004) did not directly compare the gender differences in the two tests for noun and verb naming.

In contrast to gender, the influence of education on the naming of nouns is well documented in the literature from different cultural contexts (e.g. Kent & Luszcz, 2002; Kimbarrow et al, 1996; Mariën et al, 1998; Olabarrieta-Landa et al, 2015; Patricacou et al, 2007; Sulastri et al, 2019), which is also confirmed by the results of our study. However, there are differences in the way the influence of education on the naming ability is analysed. In most studies, the analysis was conducted in relation to the number of years of education (as a linear variable). Due to the specifics of the education system in Serbia, we were interested in what influence the level of education might have on the naming ability of older people. This is because primary education is compulsory in Serbia, while secondary and higher education is optional. For this reason, the data from our study, which indicate that differences occur only between people with a primary school degree and people with a higher level of education, but not between people with a lower high school degree and people with a higher education degree, have implications for countries with a similar formal education system (such as Balkan countries).

On the other hand, there is not much data in existing research on the influence of the level of education on verb naming. In studies by Goral and colleagues (2007) and Macoir and colleagues (2023), no significant relationship was found between the level of education and the naming of verbs, which is also confirmed by the results of our study. However, in Piatt and colleagues' (2004) study on action fluency in older participants, a significant correlation was found between education level and verb naming in older individuals, which is not consistent with our results.

These differences in the research can be explained by the use of different tasks to assess verb naming and the underlying cognitive processes. In particular, studies that found no significant relationship between the level and verb naming (Goral et al., 2007; Macoir et al., 2023) used a similar methodological approach to assess verb naming, namely a

visually evoked actions naming instrument. Piatt and colleagues (2004), on the other hand, used the Action Fluency Test, in which respondents have to name as many actions as they can remember. However, instruments using the semantic fluency paradigm are heavily dependent on executive abilities, as respondents must name as many concepts as possible in a given time frame (Whiteside et al., 2016). In contrast, visual naming and the analysis of errors during naming provide better insight into the isolated organisation of the lexical-semantic network.

5.2. Age-related changes in the naming of nouns and verbs

The results of our study have shown that significant changes in the number of correctly named objects can only be observed between the youngest group (60–69) and the oldest group (≥80). However, both the youngest and the middle age group (70–79) omit significantly fewer answers compared to the oldest group. This indicates that significant difficulties occur in our sample of participants after the age of 80. On the other hand, age-related differences in the naming of verbs are only evident in a higher number of semantic errors in the oldest group compared to the youngest group. Linguistic analysis revealed that the fewer correct and more omitted answers indicate difficulties in accessing the lexicon and retrieving words, while semantic errors may indicate difficulties in organising the semantic network (e.g. Barresi et al., 2000).

The age-related difficulties in accessing the lexicon during object naming confirm the findings of some previous studies (Barresi et al., 2000; Goral et al., 2007; Nicholas et al., 1985), with the decline being most pronounced after the age of 80, whereas in some previous studies a significant decline was observed earlier, after the age of 70 (Barresi et al., 2000; Nicholas et al., 1985). The discrepancies in the data on when a significant decline in object naming occurs can be explained by the age of the participants. In the aforementioned studies, the participants were younger, ranging in age from 50 to 79 years (Barresi et al., 2000) and between 30 and 79 years (Nicholas et al., 1985), resulting in a different number of decade groups and a different group range, which may influence different results regarding the time of occurrence of a significant decline. Furthermore, these differences may be attributed to limitations in our study. In our sample, participants in the youngest group had a significantly higher level of education compared to the other two groups, which could influence the better performance on the object naming tasks. Future research with better matched groups according to demographic variables that influence naming ability would certainly clarify the differences between our results and those of some previous studies.

On the other hand, the data on age-related difficulties in verb naming are quite contradictory. While data from some studies suggest that age-related changes in verb naming are not significant (Barresi et al., 2000), which is consistent with our findings, other studies indicate that older people may have considerable difficulty in naming both verbs and nouns (Goral et al., 2007; MacKay et al., 2002; Ramsay et al., 1999). However, it is important to note that although our participants did not show significant age-related

difficulties in recalling verbs from the lexicon, age-related changes were found in the form of an increased number of semantic errors, which is consistent with the findings of Ramsay et al. (1999). An increase in semantic errors indicates difficulties at the semantic network level, where individuals have difficulty finding the correct word and instead name a semantically related concept or category to which the word they are looking for belongs.

Experts agree that it is quite a challenge to construct an action naming task that sensitively maps the changes associated with ageing (for a review, see Vogel-Eyny et al., 2016). This challenge arises from the semantic properties of verbs, as they are less imaginative than nouns. This makes it difficult to develop an instrument that contains a sufficient number of less frequent terms, as is the case with instruments such as the Boston Naming Test (BNT). Some recent research attempts have utilised video technology to present actions (Macoir et al., 2023), which may provide a more accurate way to present a larger number of less frequent verbs and allow for a better understanding of age-related changes in the naming of this word class in the future.

5.3. Differences between the naming of nouns and verbs

A direct comparison of performance on tasks involving the naming of nouns and verbs has shown that older participants have a significantly lower number of correct answers and significantly more omissions, but also make more semantic errors when naming nouns. These data suggest that older participants have less difficulty in naming verbs, both in terms of accessing the lexicon and semantic degradation. These results suggest a different access and semantic organisation of these two types of words, which is confirmed by studies on individuals with acquired language disorders (Vigliocco et al., 2011) and neuroimaging studies indicating different neurological mechanisms underlying noun naming and verb naming in healthy adult participants (Obler et al., 2010).

Better naming of verbs compared to nouns was also found in some earlier studies (Barresi et al., 2000; Nicholas et al., 1985). Barresi et al. (2000) suggest that older people may have difficulty accessing the lexicon and semantic breakdown of nouns, which is partially confirmed by the results of our study showing increased difficulty in accessing the lexicon. However, the authors themselves could not fully explain the differences in the naming of these two word classes and attributed the results to possible differences in the linguistic features of nouns and verbs, such as the lower frequency of complementary nouns compared to verbs (e.g., learning vs. to learn). Linguistic theorists have also attempted to explain differences between nouns and verbs at the level of representations in the lexicon and the difference between lemma and lexeme levels. Linguistic evidence for the separation of lemma and lexeme levels is provided by the grammatical gender of nouns (e.g. van Turennout et al., 1997). According to the lexicon model of Bock and Levelt (1994), the conceptual nodes for words do not differ according to their grammatical class, since the lemma level is conceptualised as a purely lexical-semantic level. On the other hand, it is possible that nouns and verbs are presented separately at a lower level of word form or lexeme level (orthographic and phonological lexicons) (Hillis & Caramazza, 1995; Rapp & Caramazza, 2002). However, even these differences in the representation of verbs and nouns

in the lexicon are not sufficient to explain why some data suggest that the ageing process has less of an effect on verbs than on nouns. Furthermore, the results of some studies show no significant age-related differences in the naming of these two word classes (MacKay et al., 2002; Goral et al., 2007).

Inconsistencies in the investigation of the ability to name nouns and verbs may be also due to methodological discrepancies between different studies. In particular, the choice of BNT test version and ANT task varies considerably from study to study. Nicholas et al. (1985) used the original version of the BNT test with 85 items and the ANT with 63 items, Barresi et al. (2000) also used an older version of the BNT (85 items) and the ANT with 55 items, Goral et al. (2007) used a newer version of the BNT test with 60 items and 55 items for the ANT, and MacKay et al. (2002) used 14 items from the BNT test and matched them with the ANT with 14 items, while in our study we used a new version of the BNT (60 items) and the ANT with 40 items. In addition, MacKay et al. (2002) and Goral et al. (2007) investigated accuracy before and after semantic cueing, while Nicholas et al. (1985) used a similar analysis to ours (number of correct answers and errors) and Barresi et al. (2000) formed a pattern of analysis indicating difficulty in accessing the lexicon or semantic deterioration based on failure to name an item before or after semantic and phonological cueing. It is clear from the above that both the difficulty of the task and the mismatch of instruments can influence different findings. Future research needs to better align the instruments used to assess the naming of verbs and nouns in order to better understand the differences in naming difficulty for these two word classes that occur in healthy ageing.

6. Conclusion

The results of this study indicate that older people have greater difficulty naming nouns than verbs, both in terms of access to the lexicon and semantic degradation. In addition, age-related changes in the naming of nouns are more clearly recognisable, while verbs tend to be relatively spared in the observed age range. These results contribute to the body of research that argues in favour of different neural and linguistic networks underlying the naming of nouns and verbs. In addition, the results of our research confirm the possible influence of gender on naming, regardless of word class. On the other hand, a selective influence of the level of education on naming is also possible, depending on the word class. In order to fully clarify the mechanisms of differences in the difficulty of naming verbs and nouns in older people, the measurement instruments used to assess these two word classes need to be more closely harmonised at a linguistic level, which is still a challenge for researchers. Research in this area can make an important contribution not only to understanding the naming difficulties of older people, but also for people with acquired language disorders who have a selective impairment in naming nouns and verbs.

References

Albert, M. S., Heller, H. S., & Milberg, W. (1988). Changes in naming ability with age. *Psychology and Aging, 3*(2), 173–178. https://doi.org/https://doi.org/10.1037/0882-7974.3.2.173

Ardila, A., & Rosselli, M. (1989). Neuropsychological characteristics of normal aging. Developmental *Neuropsychology, 5*(4), 307–320. https://doi.org/10.1080/87565648909540441

Au, R., Joung, P., Nicholas, M., Obler, L. K., Kass, R., & Albert, M. L. (1995). Naming ability across the adult life span. *Aging, Neuropsychology, and Cognition, 2*(4), 300–311.

Barresi, B. A., Nicholas, M., Tabor Connor, L., Obler, L. K., & Albert, M. L. (2000). Semantic degradation and lexical access in age-related naming failures. *Aging, Neuropsychology, and Cognition, 7*(3), 169–178. https://doi.org/10.1076/1382-5585(200009)7:3;1-Q;FT169

Bock, K., & Levelt, W. (1994). Language production. Grammatical encoding. In M. A. G. (Ed), *Handbook of psycholinguistics* (pp. 945–984). Academic Press.

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Peview, 82*(6), 407. https://doi.org/10.1037/0033-295X.82.6.407

Connor, L. T., Spiro, A. III, Obler, L. K., & Albert, M. L. (2004). Change in object naming ability during adulthood. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 59*(5), P203–P209. https://doi.org/10.1093/geronb/59.5.P203

Drljan, B. J. (2017). *Lexical abilities in children with specific language impairment*. [Doctoral dissertation]. Serbia, Belgrade: University of Belgrade – Faculty of Special Education and Rehabilitation; Available from: https://uvidok.rcub.bg.ac.rs/bitstream/handle/123456789/2315/Doktorat.pdf?sequence=1

Dubossarsky, H., De Deyne, S., & Hills, T. T. (2017). Quantifying the structure of free association networks across the life span. *Developmental Psychology, 53*(8), 1560-1570. https://doi.org/10.1037/dev0000347

Goral, M., Spiro III, A., Albert, M. L., Obler, L. K., & Connor, L. T. (2007). Change in lexical retrieval skills in adulthood. *The Mental Lexicon, 2*(2), 215–238. https://doi.org/10.1075/ml.2.2.05gor

Hall, J. R., Vo, H. T., Johnson, L. A., Wiechmann, A., & O'Bryant, S. E. (2012). Boston Naming Test: Gender differences in older adults with and without Alzheimer's dementia. *Psychology, 3*(6), 485–488. https://doi.org/10.4236/psych.2012.36068

Hillis, A. E., & Caramazza, A. (1995). Representation of grammatical categories of words in the brain. *Journal of Cognitive Neuroscience, 7*(3), 396–407. https://doi.org/10.1162/jocn.1995.7.3.396

https://doi.org/10.1080/13825589508256605

Kent, P. S., & Luszcz, M. A. (2002). A review of the Boston Naming Test and multiple-occasion normative data for older adults on 15-item versions. *The Clinical Neuropsychologist, 16*(4), 555–574. https://doi.org/10.1076/clin.16.4.555.13916

Kimbarrow, M. L., Vangel, S. J., & Lichtenberg, P. A. (1996). The influence of demographic variables on normal elderly subjects' performance on the Boston Naming Test. *Clinical Aphasiology, 24*, 135-144.

Kohn, S. E., & Goodglass, H. (1985). Picture-naming in aphasia. *Brain and Language, 24*(2), 266–283. https://doi.org/10.1016/0093-934X(85)90135-X

MacKay, A. J., Connor, L. T., Albert, M. L., & Obler, L. K. (2002). Noun and verb retrieval in healthy aging. Journal of the International Neuropsychological Society, 8(6), 764–770. https://doi.org/10.1017/S1355617702860040

Macoir, J., Routhier, S., Auclair-Ouellet, N., Wilson, M. A., & Hudon, C. (2023). Validation of and Normative Data of the DVAQ-30, a New Video-Naming Test for Assessing Verb Anomia. Archives of Clinical Neuropsychology, 38(1), 80–90. https://doi.org/10.1093/arclin/acac052

Mariën, P., Mampaey, E., Vervaet, A., Saerens, J., & De Deyn, P. P. (1998). Normative data for the Boston Naming Test in native Dutch-speaking Belgian elderly. Brain and Language, 65(3), 447–467. https://doi.org/10.1006/brln.1998.2000

Morais, A. S., Olsson, H., & Schooler, L. J. (2013). Mapping the structure of semantic memory. *Cognitive Science, 37*(1), 125–145. https://doi.org/10.1111/cogs.12013

Nelson, K. (1977). The syntagmatic-paradigmatic shift revisited: A review of research and theory. *Psychological Bulletin, 84*(1), 93–116. https://doi.org/10.1037/0033-2909.84.1.93

Nicholas, M., Obler, L., Albert, M., & Goodglass, H. (1985). Lexical retrieval in healthy aging. *Cortex: A Journal Devoted to the Study of the Nervous System and Behavior, 21*(4), 595–606. https://doi.org/10.1016/S0010-9452(58)80007-6

Nicholas, M., Obler, L., Albert, M., & Goodglass, H. (1985). Lexical retrieval in healthy aging. Cortex: A Journal Devoted to the Study of the Nervous System and Behavior, 21(4), 595–606. https://doi.org/10.1016/S0010-9452(58)80007-6

Obler, L. K., Rykhlevskaia, E., Schnyer, D., Clark-Cotton, M. R., Spiro, A. III, Hyun, J., Kim, D.-S., Goral, M., & Albert, M. L. (2010). Bilateral brain regions associated with naming in older adults. *Brain and Language, 113*(3), 113–123. https://doi.org/10.1016/j.bandl.2010.03.001

Olabarrieta-Landa, L., Rivera, D., Morlett-Paredes, A., Jaimes-Bautista, A., Garza, M. T., Galarza-del-Angel, J., Rodríguez, W., Rábago, B., Schebela, S., Perrin, P. B., Luna, M., Longoni, M., Ocampo-Barba, N., Aliaga, A., Saracho, C. P., Bringas, M. L., Esenarro, L., García-Egan, P., & Arango-Lasprilla, J. C. (2015). Standard form of the Boston Naming Test: Normative data for the Latin American Spanish speaking adult population. *NeuroRehabilitation, 37*(4), 501–513. https://doi.org/10.3233/NRE-151278

Patricacou, A., Psallida, E., Pring, T., & Dipper, L. (2007). The Boston Naming Test in Greek: Normative data and the effects of age and education on naming. Aphasiology, 21(12), 1157–1170. https://doi.org/10.1080/02687030600670643

Piatt, A. L., Fields, J. A., Paolo, A. M., & Tröster, A. I. (2004). Action verbal fluency normative data for the elderly. *Brain and Language, 89*(3), 580–583. https://doi.org/10.1016/j.bandl.2004.02.003

Ramsay, C. B., Nicholas, M., Au, R., Obler, L. K., & Albert, M. L. (1999). Verb naming in normal aging. *Applied Neuropsychology, 6*(2), 57–67. https://doi.org/10.1207/s15324826an0602_1

Randolph, C., Lansing, A. E., Ivnik, R. J., Cullum, C. M., & Hermann, B. P. (1999). Determinants of confrontation naming performance. *Archives of Clinical Neuropsychology, 14*(6), 489–496. https://doi.org/10.1016/S0887-6177(98)00023-7

Rapp, B., & Caramazza, A. (2002). Selective difficulties with spoken nouns and written verbs: A single case study. *Journal of Neurolinguistics, 15*(3-5), 373–402. https://doi.org/10.1016/S0911-6044(01)00040-9

Reilly, J., Peelle, J. E., Antonucci, S. M., & Grossman, M. (2011). Anomia as a marker of distinct semantic memory impairments in Alzheimer's disease and semantic dementia. Neuropsychology, 25(4), 413–426. https://doi.org/10.1037/a0022738

Sulastri, A., Utami, M. S. S., Hendriks, M., & Lutijtelaar, G. V. (2019). The Indonesian Boston Naming Test: Normative Data among Healthy Adults and Effects of Age and Education on Naming Ability. International Journal of Science and Research, 8(11), 134-139.

Tsang, H.-L., & Lee, T. M. C. (2003). The effect of ageing on confrontational naming ability. *Archives of Clinical Neuropsychology, 18*(1), 81–89. https://doi.org/10.1016/S0887-6177(01)00184-6

van Turennout, M., Hagoort, P., & Brown, C. M. (1997). Electrophysiological evidence on the time course of semantic and phonological processes in speech production. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23*(4), 787–806. https://doi.org/10.1037/0278-7393.23.4.787

Verhaeghen, P. (2003). Aging and vocabulary score: A meta-analysis. *Psychology and Aging, 18*(2), 332-339. https://doi.org/10.1037/0882-7974.18.2.332

Vigliocco, G., Vinson, D. P., Druks, J., Barber, H., & Cappa, S. F. (2011). Nouns and verbs in the brain: A review of behavioural, electrophysiological, neuropsychological and imaging studies. *Neuroscience and Biobehavioral Reviews, 35*(3), 407–426. https://doi.org/10.1016/j.neubiorev.2010.04.007

Vogel-Eyny, A., Galletta, E. E., Gitterman, M. R., & Obler, L. K. (2016). Lexical retrieval in healthy aging. Helt fabelaktig, 275–289.

Whiteside, D. M., Kealey, T., Semla, M., Luu, H., Rice, L., Basso, M. R., & Roper, B. (2016). Verbal fluency: language or executive function measure?. *Applied Neuropsychology: Adult, 23*(1), 29–34. https://doi.org/10.1080/23279095.2015.1004574

Wingfield, A., & Stine-Morrow, E.A. (2000). Language and speech. In F.I.M. Craik & T.A. Salthouse (Eds.), *Handbook of aging and cognition* (2nd ed., pp. 359-416). Erlbaum.

Wulff, D. U., De Deyne, S., Jones, M. N., Mata, R., & The Aging Lexicon Consortium. (2019). New perspectives on the aging lexicon. *Trends in Cognitive Sciences, 23*(8), 686–698. https://doi.org/10.1016/j.tics.2019.05.003