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Wydział Nauk o Zdrowiu
Collegium Medicum w Bydgoszczy

Disorders of Verbal Fluency in Individuals with Cognitive Dysfunctions from a Neuropsycholinguistic Perspective

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The International Conference

"New Perspectives in Science Education - 13th Edition"

MARCH 14-15, 2024

FLORENCE

21.03.2024



Verbal communication in individuals with cognitive disorders

- ⊙ Language
- ⊙ Verbal fluency

2. The aim of the study



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The aim of the study was to analyze the results of phonological and categorical verbal fluency tests in individuals with cognitive function disorders in the context of corpus analysis based on the National Corpus of the Polish Language.



In the study, the following research hypotheses were adopted:

- I. The degree of verbal fluency dysfunction and global cognitive impairment may be associated with demographic factors as well as clinical factors.
- II. Abnormalities in verbal fluency may be associated with the severity of cognitive disorders in various areas.
- III. The decline in verbal fluency in the participants may be relative to the results of corpus statistical analysis. Words that occur more frequently in the Polish language according to the National Corpus of the Polish Language may have a more enduring nature in individuals with cognitive disorders.

4. The research objectives include



1. Evaluation of results of phonological verbal fluency in the studied group of patients.
2. Evaluation of results of categorical verbal fluency in the studied group of patients.
3. Comparing the results of women and men obtained in individual subtests of verbal fluency.
4. Performing a correlational analysis between the results of the verbal fluency test and the scores from the MMSE assessing global cognitive functioning.
5. Conducting a correlation analysis between the verbal fluency results obtained by the participants and their age and duration of cognitive disorders.
6. Determining the frequency of the most commonly occurring words in each of the verbal fluency subtests.
7. Conducting a corpus analysis of the results of the semantic and categorical verbal fluency test.

5. The study group



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- ⦿ The study was cross-sectional in nature
- ⦿ The documentation of neuropsychological assessments of patients was taken from the Department of Clinical Neuropsychology at the Nicolaus Copernicus University Collegium Medicum
- ⦿ The study included the results of neuropsychological tests of 100 individuals aged 50-91 years, with a mean age of 72.00 ± 10.47 years.
 - 57 women (mean age: 72.18 ± 10.52 years) and 43 men (mean age: 71.67 ± 10.41 years).
 - The age of the participants and the MMSE test scores did not differ between the group of women and men.



⊙ Verbal Fluency Tests

- Letter version
- Categorical versions
- Result

⊙ Minimal State Examination (MMSE) - Screening test for dementia

- Assessment of cognitive functioning in various cognitive domains
- Results : 30-27 p – without impairment
26-24 p – mild cognitive impairment (MCI)
23-19 p - mild dementia
18-11p – moderate dementia
10-0 p – severe dementia

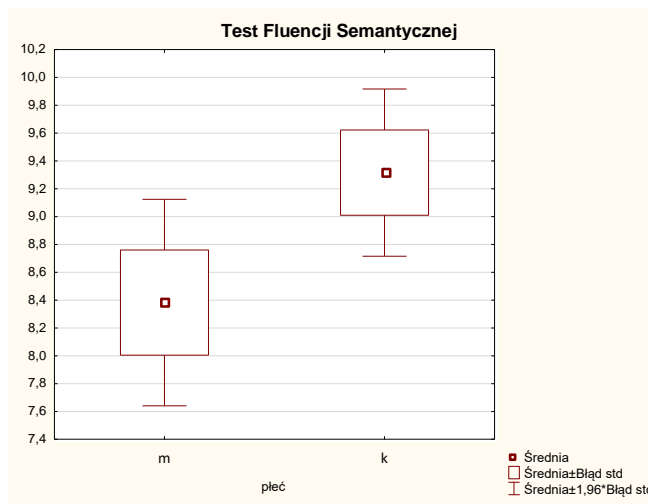


- ⦿ Contemporary definition of a language corpus (Sinclair and Mauranen, 2005)
[...] **a collection of pieces of language text in electronic form, selected according to external criteria to represent, as far as possible, a language or language variety as a source of data for linguistic research**
- ⦿ Corpus analysis: automatic extraction of words mentioned in the verbal fluency test and grouping them based on their frequency of occurrence in the Polish language

8. Research results - Verbal Fluency Test



Fluency Test	The whole group		Women N=57	Men N=43	Statistical Z-score	Test U Man's Whitneya
	Average \pm SD	Median (25-75%)	Average \pm SD	Average \pm SD		
Semantic - Letter	8,97 \pm 4,00	9,00 6,00-12,00	9,32 \pm 2,52	8,38 \pm 2,89	-2,18	0,029
Categorical - Animals	10,27 \pm 4,24	10,00 8,00-13,00	9,49 \pm 4,16	9,88 \pm 4,37	-1,52	0,15
Categorical - Sharp Objects	6,36 \pm 2,66	6,00 5,00-8,00	6,27 \pm 2,52	6,52 \pm 2,89	0,55	0,58



9. Results



TEST	Age	Duration of cognitive disorders
MMSE	-0,12	-0,12
FT letter	0,00	-0,36*
FT animals	-0,10	-0,34*
FT sharp objects	0,02	-0,21*
FT Letter- Proper Nouns	0,19	0,10
Letter Perseveration Test	0,08	0,05
Categorical Animal Perseveration Test	-0,15	0,01
Categorical Sharp Objects Perseveration Test	-0,15	0,00

Fluency Test & MMSE	group	women	men
FT letter	0,29*	0,29*	0,26*
FT animals	0,44*	0,41*	0,49*
FT sharp objects	0,35*	0,36*	0,33*

- ⊙ The longer the duration of cognitive disorders, the worse the results obtained by the participants in the Verbal Fluency Tests
- ⊙ There is no correlation between age and results in the Verbal Fluency Test
- ⊙ There is no correlation between MMSE results and age or duration of cognitive disorders
- ⊙ The results of the Verbal Fluency Test strongly correlate with the MMSE results in all parameters.



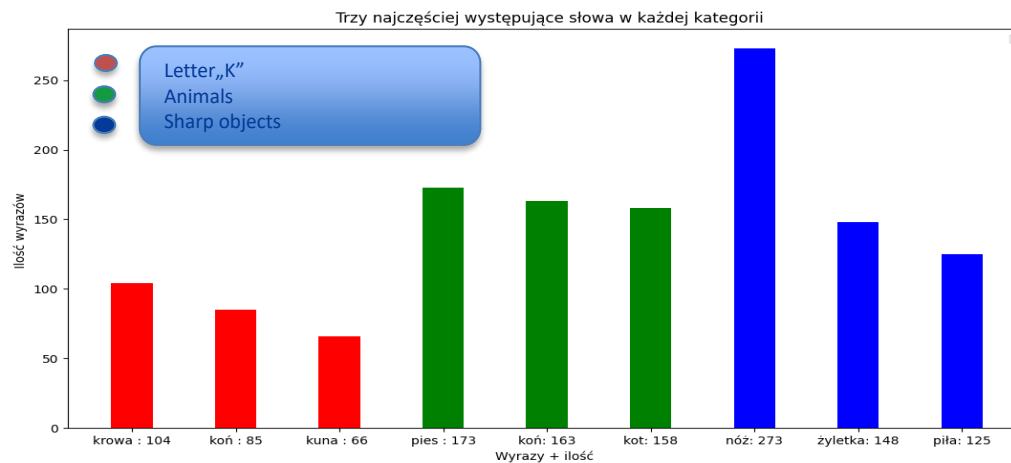
- ⊙ It was examined whether the duration of cognitive disorders has an impact on the level of results obtained by participants in the verbal fluency test.

- ⊙ Results:
 - For phonological fluency, the most significant months were 6, 8, and 9 ($p < 0.000$)
 - For categorical fluency in the "animals" category, the most significant months were: 6, 8-9, 12, 26, 31-32, and 36 ($p < 0.000$).
 - For categorical fluency in the "sharp objects" category, the most significant months were: 5-6, 9, 21-22, 26, 31-32, 35-36 ($p < 0.000$).

11. Results – corpus analysis



- ⊙ The language corpus created for this study (based on the results of the Fluency Test) contains a total of 3669 words, including 3586 correct words and 83 incorrect words, including perseverations, neologisms, and words that do not belong to a given category or proper nouns. Sometimes, incorrect words also included generally accepted vulgar terms (e.g., vulgar slang).





Based on the obtained research results, the following conclusions were formulated:

1. Greater severity of phonological and categorical verbal fluency disorders is associated with higher severity of cognitive impairment measured by the MMSE test and longer duration of cognitive disorders. Age and gender do not significantly affect this relationship in the studied group of older individuals with cognitive dysfunctions.
2. Taking into account the duration of cognitive disorders, there are critical time points associated with the exacerbation of verbal fluency disorders. Additionally, based on the MMSE test results, it is possible to predict the deterioration of phonological and categorical verbal fluency proficiency.
3. With progressing decline in verbal fluency among individuals with cognitive disorders, the most common words in the Polish Language Corpus remain the most enduring. Longer duration of cognitive disorders is associated with greater deficit in generating the most frequently occurring words in the Polish language.
4. The verbal fluency tests and MMSE exhibit high internal consistency, indicating their high utility in research involving older adults with cognitive impairments.

THANK YOU FOR ATTENTION



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