Language functions, particularly disordered lexical skills were diagnosed in the examined woman based on selected diagnostic tests of the Boston Diagnostic Aphasia Examination (BDAE). Furthermore, an experimental version of the author’s original test for assessing lexical-semantic performance in dementia was used.

The author presents a case study of a 79-year-old woman diagnosed with logopenic variant primary progressive aphasia (lvPPA) secondary to Alzheimer’s disease. The author describes the symptoms of anomie manifested by the study participant and the supplementary strategies she applied in the case of lexical deficits.

The analysis of the findings obtained in the course of language function assessment allowed the author to assess the fluency of speech, speech comprehension, repetition and naming. The study participant diagnosed with lvPPA was observed to manifest the following: an absence of motor speech disorders, absence of characteristics of evident agrammatism, preserved comprehension of individual words, preserved semantic knowledge of objects, disordered retrieval of words in spontaneous speech and in attempts to name, and disordered repetition of sentences and phrases.

The analysis of the discussed case study allowed the author to discuss the progressive lexical deficits manifested by the lvPPA patient and to record those supplementary strategies that were most frequently applied in the lexical difficulties experienced by the female patient diagnosed with lvPPA.

Key words: anomia, spontaneous speech, Alzheimer’s disease
**BACKGROUND**

Primary progressive aphasia was first described as a language impairment associated to a neurodegenerative process affecting the left cerebral hemisphere (responsible for speech and language functions) in 1892 by Pick (Pąchalska 2008; Góral-Pólrola, Pólrola, Mirska et al. 2016; Harciarek, Kertesz 2011: 271). Whereas in 1982, Mesulam characterised primary progressive aphasia (PPA) as a language impairment syndrome distinct to Alzheimer’s disease in which a gradual loss of the fluency of speech and progressive difficulties with forming grammatically correct sentences (agrammatism) are observed (Mesulam 1982, 2001, 2013). As a result of other forms of primary progressive aphasia being identified over subsequent years, namely, semantic dementia (Snowden, Goulding, Neary 1989; Hodges, Patterson, Oxbury, Funnell 1992, Pąchalska 2011) and logopenic variant PPA (lvPPA) (Gorno-Tempini et al. 2004; Gorno-Tempini et al. 2008), a new classification and diagnostic criteria for PPA has been developed.

Under the new classification of PPA, three variants are distinguished, namely, 1) non-fluent variant PPA (nf-PPA), 2) semantic variant PPA (svPPA), 3) logopenic variant PPA (lvPPA) (Gorno-Tempini et al. 2011). The first two variants are classified as frontotemporal lobar degenerations (FTLD), whereas the logopenic variant is usually related to Alzheimer’s degeneration (AD).

The aim of this article is to provide a description of the progressive naming disorders in logopenic variant PPA observed in a 79-year-old woman diagnosed with Alzheimer’s disease. The case study of the lvPPA patient presented in this paper allowed the author to characterise the symptoms of anomie (i.e. naming deficits), which is the dominant clinical symptom in neurodegenerative diseases.

**Language impairments in logopenic variant primary progressive aphasia**

In lvPPA, patients are observed to manifest disordered word actualisation in spontaneous speech and in attempts to name, as well as difficulties in repeating and comprehending sentences and long phrases. These are the main symptoms of language impairments in lvPPA that arise from impaired short-term memory and progressive cognitive disorders typical of AD.

Hence, spontaneous speech in lvPPA patients is characterised by a slow tempo due to frequent pauses related to difficulties with word actualisation. Nonetheless, in contrast to nfPAPA patients, such individuals produce speech that is correct in terms of grammar, prosody and articulation (Gorno-Tempini et al. 2011: 1011-1012). The diagnostic criteria for lvPPA are presented in Table 1.

**CASE STUDY**

At the age of 75, J. G. was diagnosed with moderate dementia. The patient scored 17 points in the Mini-Mental State Examination (MMSE), a psychiatric screening test for assessing cognitive functions. One year later she was referred to a specialist neurological clinic where further neurological, neuropsychological and neuroimaging diagnostics were conducted. The results of these specialist
tests confirmed language difficulties dominating in the clinical picture and the profile of disorders characteristic of lvPPA (see Table 1). From the age of 77 to 79, the patient attended neuropsychological therapy (one hour per week) and neurological and speech therapy (also one hour per week) at a hospital psychological and speech and language outpatient clinic. Since the age of 79, the woman has been a resident of a nursing home (located in Lodz Voivodeship), where she attends occupational therapy, speech therapy and neuropsychological therapy.

A neurological diagnosis and a speech and language diagnosis were performed in the form of three tests conducted in September 2016, March 2017 and October 2017, respectively. The examination of language functions was conducted on a female participant (J. G.) born in September 1937, with higher education (a Polish language teacher). Based on a speech therapy interview with the patient and her family, as well as on an analysis of medical records, the following information was found. The first neurological and speech test was conducted in September 2016, when J. G. turned 79 years old. The subsequent tests were repeated after six months from the beginning of the speech therapy, i.e. in March 2017, and after one year from the beginning of the speech therapy, i.e. in October 2017. Language functions were assessed by means of a diagnostic tool used for measuring aphasic disorders, specifically the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass, Kaplan 1983). In the examination selected diagnostic tests of BDAE were used, which allowed the author to assess the ability

<table>
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<th>Level I – clinical diagnosis</th>
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<tr>
<td>1. Obligatory core symptoms:</td>
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<tr>
<td>a. Disordered retrieval of words in spontaneous speech and attempts to name</td>
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<td>b. Disordered repetition of sentences or phrases</td>
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<td>2. Three of the following symptoms identified (as a minimum):</td>
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<tr>
<td>a. phonological error in spontaneous speech and in naming</td>
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<td>b. preserved comprehension of individual words and knowledge of objects</td>
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<td>c. absence of motor speech disorders</td>
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<td>d. absence of characteristics of distinct agrammatism</td>
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<th>Level II – imaging-supported diagnosis</th>
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<tr>
<td>Both criteria below must be met:</td>
</tr>
<tr>
<td>1. Clinically diagnosed logopenic variant PPA</td>
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<tr>
<td>2. One or more of the following criteria met in neuroimaging tests:</td>
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<td>a. dominant atrophy of the left-hemispheric posterior lateral sulcus or an atrophy of the parietal region (MR)</td>
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<tr>
<td>b.</td>
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<td>c. dominant hypoperfusion/hypometabolism in SPECT/PET in the said region</td>
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<th>Level III – definite pathologic diagnosis</th>
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<tr>
<td>Clinical diagnosis (level 1) and criteria 2 or 3:</td>
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<tr>
<td>1. Clinically diagnosed logopenic variant PPA</td>
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<tr>
<td>2. Histopathological results indicating a specific neuro-degenerative pathology, e.g. AD, FTLD-tau, FTLD-TDP or others.</td>
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<td>3. Identified pathological mutation</td>
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Abbreviations: AD – Alzheimer’s disease, FTLD-tau – frontotemporal lobar degeneration tau; FTLD-TDP – frontotemporal lobar degeneration with transactive response DNA binding protein, MR – magnetic resonance, PET – positron emission tomography, SPECT – single-photon emission computed tomography
to repeat, comprehend and to speak spontaneously. In the course of the examination of the ability to repeat, the patient was asked to repeat individual words and sentences after the speech therapist. The ability to comprehend was assessed on the basis of the following tests: 1) the patient indicated on a board a specific picture the name of which was said by the speech therapist, 2) the patient performed simple and complex tasks offered by the speech therapist, 3) the study participant provided answers to questions regarding a text read by the speech therapist. During the examination of the ability to speak spontaneously, J. G. was tasked with describing a situation presented in a picture (the Cookie Theft Picture).

Furthermore, the speech diagnosis was performed based on an experimental version of the author’s original test for measuring lexical-semantic performance in dementia, which allowed the author to assess the ability to name, define and comprehend the meaning of lexemes. In the lexical-semantic performance study the following diagnostic tests were proposed: 1) to name pictures showing various objects and activities, 2) to label words, i.e. to pair a label to picture of objects and activities, 3) to retrieve a lexeme based on a definition provided to the patient orally by the speech therapist, 4) to define a word by means of defining a given lexeme formed by the patient without assistance.

**ANALYSIS OF THE LANGUAGE FUNCTION**

**STUDY RESULTS**

**Spontaneous speech test**

In all three tests no disorders were observed in the female participant in regard to forming grammatically correct sentences. The utterance constructed by the patient describing a given picture was correct in terms of syntax and inflection, as confirmed by the following utterance dated September 2016 (the first test), formed on the basis of the Cookie Theft Picture of BDAE:

J.G.: Chłopiec stoi … (pause) na… (pause) krzeselku i… (pause) chce do- stać takie … (pause) dobre ciasteczka z pudelka. Ta dziewczynka, ta tutaj, (points at her in the picture) ona też chce zjeść to… yyy… (points at it in the picture) to ciastko. Tu (points at the picture) maća nie widzi no… (pause) tych… (pause) dzieci. Tak, ona dzieci nie widzi. Maća zmywa te… no te… zmywa… (pause) talerze i kubki. Wyciera talerz i no… nie widzi. Nie widzi chłopca i… no tej… dzie… (pause) dziewczynki.

However, the patient was diagnosed with difficulties with the actualisation of specific words while providing her description, as confirmed both by the above-cited utterance and other utterances produced by her, for instance (dated March 2017):

J. G.: Dzieci są no… gdzie? (a question, asking for a suggestion) [The Interviewer: Where are the children? Please take a while and give it some
The patient was noticed to have a hindered word retrieval in spontaneous speech that is characterised by a slow tempo due to the numerous pauses used by J. G. related to her difficulties with word actualisation. The frequent pauses applied by the female participant that gave her the time to think resulted most often in temporary difficulties in retrieving a given word, these being overcome by her without assistance.

In the analysed material, the following examples of compensation were observed to be used by the participant in regard to difficulties with word actualisation in spontaneous speech: 1) by means of retrieving the beginning of the word only, which indicates a partially manifested knowledge on the phonological level cf. dzie… (pause) dziewczynki; cia… ciastka, 2) by means of descriptions in which J. G. details the role and function of a given object or an item, which indicates that the patient’s knowledge of a given object and location is preserved regardless of her temporary inability to retrieve a given word cf. słodkie… no… do jedzenia… (pause) cia… ciastka; Dzieci… (pause) są tam, gdzie jemy… (pause) w kuchni. Nie zakręciła tego… (points at a tap in the picture) tego do zakręcania wody (after a while) kran. Woda… woda… (after a while) leci. [The Interviewer: Very well. Would you like to add anything more?] No… Matka ma… (pause) talerz. Ona wyciera.

In the third test (October 2017), in the very same test, which consisted of inventing a story to match the picture, the patient created a text in which her compromised retrieval of a specific word is most vivid:

J.G.: One… on i ona (points at a boy and a girl in the picture) chcą… no… zabrać to… (points at the cookies in the picture) [The Interviewer: What do the children want to steal?] Te… Dzieci chcą… (pause) jedzenie. Matka stoi i… (pause) wyciera… (pause) nie kubek, tylko… (a longer pause). [The Interviewer: Co jeszcze chce Pani dodać?] Już wszystko.

The above utterance suggests the participant’s inability to retrieve words such as dzieci [children], ciasteczka [cookies], talerz [a plate]. The patient was observed to compensate for her deficits regarding the retrieval of common nouns using: 1) personal pronouns cf. One… on i ona (points at a boy and a girl in the picture), 2) hyperonyms, i.e. words of a broader meaning compared to others present in a given semantic field cf. chcą… no… zabrać to… (points at the cookies in the picture) [The Interviewer: What do the children want to steal?] Te… Dzieci chcą… (pause) jedzenie, 3) by retrieving a word of a similar meaning, i.e.
a word from the same semantic field, the so-called ‘negated substitute’ cf. *Matka stoi i…* (pause) *wyciera…* (pause) *nie kubek,* tylko… (a longer pause).

**Speech comprehension test**

The analysis of the speech comprehension test results obtained by J. G. confirmed preserved comprehension of individual words (such as *krzesło* [a stool], *L* [the letter L], *koło* [a wheel], *pali* [to smoke], *niebieski* [blue], *siedem* [seven]). Nonetheless, the patient was observed to have difficulties comprehending complex orders, such as *Proszę położyć zegarek po drugiej stronie ołówka i odwrócić kartkę* [Please put the watch on the other side of the pencil and turn the page on the other side], *Proszę klepnąć każde ramię dwu razy dwoma palcami z zamkniętymi oczyma* [Please pat each shoulder twice with two fingers and your eyes closed] and the contents of longer texts (see Table 3). The said difficulties arise primarily from progressive disorders of the participant’s short-term memory and impairment of her other cognitive functions.

**Repetition test**

During the repetition test, the patient manifested no difficulties repeating simple words (such as *brązowy* [brown], *krzesło* [a stool], *hamak* [a hammock], *czerwony* [red], *co* [what], *jot* [the letter], *piętnaście* [fifteen], *1776* [1776], *pokreślić* [to stress], *rzemcho-katolicki* [Roman-Catholic]). However, certain issues were noted regarding the repetition of simple sentences and longer phrases (see Table 3). Difficulties with repeating frequent utterances (such as *Słyszeli jak mówił przez radio wczoraj wieczorem* [They heard him talking on the radio]; *Zatrzymał się przed drzwiami wejściowymi i nacisnąłem dzwonek* [I stopped in front of the front door and rang the doorbell]) and rare utterances (such as *Chiński wachlarz miał niezwykły szmaragd* [A Chinese fan with an extraordinary emerald]; *Zjawa unosila się nad zamglonym wzrosowiskiem* [A phantom levitated over a misty moor]) were not caused by impaired speech kinesthesis (no motor speech disorders were observed in the patient), but resulted from a progressive impairment of cognitive domains, particularly short-term memory.

**Naming test**

The patient was observed to exhibit evident and progressive difficulties with naming (see Table 2). In terms of the actualisation of common names, anomie manifested in the following diagnostic tests: 1) naming pictures, 2) naming based on an orally provided definition. The tasks involved included: 1) forming a definition of a given lexeme, 2) labelling. The patient manifested no significant difficulties, which indicated that the comprehension of individual words and the semantic knowledge of objects was preserved.

The analysis of the study material obtained during testing the ability to name based on pictures and heard definitions allowed the author to identify types of lexical difficulties present in the female participant’s speech and to characterise supplementary strategies applied by the patient in the case of lexical deficits.
In the first study (September 2016), when experiencing temporary difficulties with the retrieval of a given name, the patient most often employed the following compensatory mechanisms: 1) retrieving a temporary supplementary word with a similar meaning or from the same semantic category, e.g. **nie twarz**, **nie noga**, **zaraz**, **kolano** (tłok, a knee); **no nie siedzieć na krześle**, **tylko no... kłaść się**, **na łóżku**... **nie siedzieć**, **tylko... (leżeć, to lie)**; 2) using descriptions with specified characteristics, role, functions of a given item, object, phenomenon or a concept, e.g. **no to jest... taka... ma palce**, **no witamy się**, **trzymamy**... **ręka** (ręka, a hand); **taki... okrągły jak...** **no taki pod ziemią jest**, **kopie się**... **no i jemy... (pause)** **ziemniak** (ziemniak, a potato). In situations where the participants could not retrieve a given target word, i.e. where the search for a given lexeme proved unsuccessful, J. G. applied the following supplementary strategies: 1) semantic paraphasias, e.g. **no to koszula jest** (sweter, a sweater); **stół** (krzesło, a stool); **autobus jedzie** (pociąg, a train); **to... p... pietruszka** (marchewka, a carrot), 2) phonological paraphrasias, e.g. **frezjer** (fryzjer, a hairdresser); **sedzić** (sadzić, to plant); **melerz** (malarz, a painter); **asobowy** (osobowy, a coach), 3) hyperonyms, e.g. **jedzenie** (masło, butter); zwierzę (krowa, a cow) 4) periphrases (circumlocution), e.g. **taki co leczy**, **no bada** (lekarz, a doctor); **no takie koraliki... jak się modlę to trzymam** (różaniec, rosary), 5) retrieving incomplete words (only the initial syllables or the first letters of the target word), e.g. **taki nie**, **kwaśny**, **tylko sło... sło...** (słodki, sweet) 6) omission, i.e. the lack of an answer.

The results of the second test (March 2017) suggest progressive lexical deficits. The number of omissions in the attempts to name common nouns increased significantly. Moreover, numerous cases of pronouns used instead of a given target word were recorded, e.g. **taka... taka... ta** (lodówka, a refrigerator); **no jedzie ten... na tym... no tym** (rower, a bicycle); **to jest... rośnie** (drzewo, a tree). The study participant very often retrieved fragmented words, only the initial syllable or the first letter of a given word, e.g. **no to... g... g... glo...** (głow, a head); **to nazywa się...** **no... na nodze... ko...** (kolano, a knee); **no lubię też... g...** (gotować, to cook) and used phonological paraphasia, e.g. **beran** (baran, a ram); **listonerz** (listonosz, a postman); **statak** (statek, a ship), **cetryna** (cytryna, a lemon), **krewcewa** (krawcowa, a tailor). Compared to the former test, semantic paraphasias, e.g. **ka... kamizelka** (koszula, a shirt); **frezjer** (malarz, a painter); **szewc** (stolarz, a carpenter); **płacić** (sprzedawać, to sell); **jabłoń** (gruszka, a pear tree) and general words (hyperonyms), e.g. **pojazd** (samochód, a car); **do jedzenia** (jabłko, an apple); **kwiat** (tulipan, a tulip) were used significantly more frequently. In turn, J.G. used descriptions, e.g. **to jest... taki do gotowania**, **na zupę**, **to jest... (pause)** **gamek** (gamek, a pot), less frequently.

In a subsequent test (October 2017), the number of omissions increased significantly. The configuration of other supplementary strategies in lexical deficits is similar to the former naming test. The frequently recorded measures involved: 1) pronouns as substitutes of target words, e.g. **to taka... taka...** **na guziki** **ta...** (koszula, a shirt); **to... na tym... na drzewie to jest to... no to to** (jabłko, an apple), and 2) retrieval of incomplete words in the form of an initial syllable or
a letter of a given target word, e.g. k… kre.. kra… (krawcowa, a tailor); no to l… li… (listonosz, a postman); k… to k… (kolano, a knee). The study participant applied descriptions to a lesser degree, e.g. no taki… kwiat taki… kolce ma… (róża, a rose), semantic paraphasias, e.g. no to jest… stół (krzesło, a stool), and phonological paraphasias, e.g. rewer (rower, a bicycle). In this stage of the test, however, noted were numerous instances of J. G. retrieving words different to the target word, i.e. arbitrary words, e.g. buty instead of burak [a beetroot]; jajko instead of jabłko [an apple]; matka instead of małżeństwo [marriage]. The participant informed about her lexical difficulties and abandoned her efforts to seek a given word more often than in the previous tests using messages such as nie wiem [I don’t know], nie przypomnę sobie [I can’t recall], to już nie dla mnie [Not at my age], nie powiem [I won’t tell], nie dam rady [I can’t do this].

**CONCLUSIONS**

Naming disorders are one of the key symptoms of language impairments in logopenic variant primary progressive aphasia (lvPPA). Anomie in lvPPA patients is escalating due to aggravating symptoms of neurodegenerative disease and progressive cognitive function disorders.

The case study presented in this paper confirms that the lvPPA patient manifested growing deficits in her lexical performance and provides some supplementary strategies that were most often used by the female participant when experiencing word-finding difficulties.

Therefore analysis of the collected data allows one to determine a record of compensatory mechanisms applied by the lvPPA patient in regard to lexical deficits covering the following phenomena: 1) retrieval of a temporary supple-
mentary word with a similar meaning or classified in the same semantic category, 2) use of semantic paraphasias, 3) use of phonological paraphasias, 4) use of hyperonyms, 5) use of paraphrasing (circumlocution) focused on the characteristics, role, functions of a given item, object, phenomenon or a concept, 6) retrieval of incomplete words, fragmented words (only the initial syllables or the first letters of a given target word), 7) omission, i.e. lack of any answer, 8) use of numerous pauses, taking some time to think, 9) use of pronouns instead of a target word, 10) retrieval of words other than the one in question, i.e. arbitrary words, 11) direct informing of the experienced lexical difficulties and abandoning her efforts to seek a given target word.

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