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POLISH LANGUAGE OF APHASIA: A SCOPING REVIEW IN THE ERA OF THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH

The International Classification of Function, Health and Disability (ICF) underscores a functional approach to aphasia assessment and therapy. The widespread uptake of the ICF necessitates a reflection whether the existing knowledge base on the Polish language of aphasia will permit speech-language pathologists in Poland to make a strong contribution to this international trend. Using the PRISMA-ScR methodology, a scoping review was conducted to describe and summarise the current state of research on the impact of aphasia on the subsystems of the Polish language and its mental processing. The findings indicate that although empirical studies of the Polish language of aphasia have so far addressed all the language subsystems, the level of scientific evidence in this area is low and the resulting knowledge base is incomplete and fragmented. There are significant research gaps, particularly in regard to pragmatics and discourse in aphasia, which need to be filled, so that the new empirical evidence can be used to develop functionally oriented and consequence-based clinical tools and methods.

Keywords: *Polish language, aphasia, scoping review, International Classification of Functioning*

1. Introduction

Injury to the left hemisphere of the brain usually results in language deficits which affect patients' communication skills and, as a result, their psychological and social well-being. Speech-language pathologists conduct comprehensive assessment of the language deficits in people diagnosed with aphasia in order to confirm or support a medical diagnosis, since the deficits in the functioning of language can be mapped onto the injuries of specific centers and pathways of the central nervous system and types of aphasia (Dronkers and Baldo 2009). On the basis of such assessment of language competences, the speech-language pathologist also develops an intervention plan, aimed at rebuilding the language system of a person diagnosed with aphasia (Hillis 2015; Panasiuk 2015), and an aphasia education plan for his/her communication partners (Simmons--Mackie *et al.* 2010) to facilitate the patient's recommencement of activity and participation in social networks, in line with the recommendations of the International Classification of Functioning, Disability and Health (ICF) (WHO 2001).

The assessment of language competence in aphasia is usually carried out in clinical settings using formal diagnostic tools. Specialised diagnostic batteries allow to assess deficits in language skills, expressive (spontaneous speech, automatic speech, writing, repetition, naming) and receptive (auditory comprehension and reading), and of language subsystems, namely, phonology, morphology, syntax, semantics, pragmatics and discourse (Ivanova and Hallowell 2013). Speech-language pathologists working with English-speaking patients with brain injury are in a privileged situation due to the existence of a range of standardised and normalised aphasia tests, such as the "Boston Diagnostic Aphasia Examination" (BDAE) test (Goodglass, Kaplan and Barresi 2001), the "Boston Naming Test" (Goodglass and Kaplan 2001) or the "Western Aphasia Battery" (Kertesz 1982). Standardisation ensures that the testing process always follows the same procedure, which increases the validity and reliability of the results obtained, and normalisation allows the results to be interpreted in relation to the norm established through research of a representative sample of the population. Speech-language pathologists working with patients who speak languages other than English are in a less comfortable situation. Based on an analysis of publications in the world's twenty largest languages, Ivanova and Hollowell (2013) demonstrate how few standardised and normalised aphasia tests there are in languages other than English, attributing this situation to the still early stages of specialised clinical care for patients with aphasia and aphasia research in the world. Aphasia tests in languages other than English are most often translations of popular English-language batteries, which lack reliability and support in psychometric data (Ivanova and Hollowell 2013). In Poland,

likewise, there is a lack of norm-referenced aphasia tests. Speech therapists use translated and standardised foreign tools – e.g. the "Boston Aphasia Test" or the "Western Aphasia Battery" – or standardised but non-normalised tests developed on Polish soil, such as *Krakowska Neurolingwisytyczna Bateria Diagnostyki Afazji* (Pąchalska, Kaczmarek and Knapik 1995) (Knapczyk 2017). In her review of aphasia assessment tools used in Poland, Knapczyk (2017: 203) concludes that the research of communication disorders in aphasia is "still an open topic" and further progress will be made "as the number of studies devoted to the speech of individuals diagnosed with aphasia increases".

The literature increasingly points to the inherent flaws of the formal assessment batteries used in the diagnosis of aphasia (Mayer and Murray 2003), pointing out that they measure the use of language subsystems in isolation, without taking into account the interaction between them. Formal tests, such as the BDAE, also adopt a purely linguistic definition of aphasia, without due consideration of coexisting non-linguistic disorders (Ivanova and Hallowell 2013). By controlling the testing process, the clinician simultaneously controls the occurrence of any unpredictable disturbances, which means that the cognitive load that occurs while taking a formal aphasia test is most often lower than during spontaneous communication (Bryant, Ferguson and Spencer 2016). Tests designed to functionally assess aphasia, most often based on observation and subjective assessment of patients' language behaviour in activities of daily living, are an attempt to address those problems (Armstrong, Ferguson and Simmons-Mackie 2013). Such tests better assess the patient's ability to engage in various forms of activity and attempts to participate in social networks (WHO 2001). As is the case with formal tests, there is a large number of functional diagnostic instruments in English and significantly fewer in languages other than English. In order to provide a description of patients' deficits in language and higher cognitive activities, Polish aphasia assessment guidelines recommend an informal, "experimental-clinical method" (Panasiuk 2013: 156), involving development of individualised assessment models, taking into account the current state of the patient. Adaptations of foreign functional assessment tests, such as "Communication Ability in Daily Life" (Holland 1977), are also used.

The world literature distinguishes two general approaches to aphasia therapy: impairment-based treatment and functionally oriented treatment (Galletta and Barrett 2014). The latter approach is also known as the consequence-based approach (Martin, Thompson and Worall 2008). Using impairment-based intervention methods, the clinician stimulates individual language subsystems with exercises, such as object naming or rebuilding the structure of sentences. Such therapy draws upon structural, psycholinguistic and cognitive neuropsychological models of language (Simmons-Mackie and Kagan 2007). In functionally oriented therapy, on the other hand, effective communication of patients is always a priority. Individuals are stimulated to use all preserved

language competences, compensatory strategies and alternative communication means in the course of tasks, simulated or real, focused on negotiation of meaning, communicating concepts and reaching consensus. Galletta and Barrett (2014) believe that an optimal aphasia intervention plan should combine impairment-based therapy and functional therapy to address the core domains listed in the ICF (WHO 2001). Recently, an increased interest in conversation therapy, focusing on the ability of individuals with aphasia to participate in conversations and conversational group therapy as well as on training conversational partners, can be observed (Simmons-Mackie, Savage and Worall 2014). The concept of conversational therapy draws on many theoretical and practical sources, such as conversational analysis (CA) and various participation or counselling models (Simmons-Mackie, Savage and Worall 2014).

In response to the direction taken in the ICF (WHO 2001), a strong emphasis on a functional and communicative understanding of language can be observed in speech-language pathology in general and in clinical practice related to aphasia in particular (Simmons-Mackie and Kagan 2007). It is therefore necessary to take stock of the current state of knowledge on the Polish language in aphasia to make sure that there is a solid base in linguistic and psycholinguistic research of aphasia, which will allow speech-language pathology in Poland to make a strong contribution to this global goal.

Currently, many of the instruments used by speech-language pathologists to diagnose aphasia are adaptations of foreign tests, even though comparative studies show that the same types of aphasia can have different presentations depending on the language, and the qualitative and quantitative differences in the processing of different languages in aphasia can be interpreted by applying universal aphasia theories (Bates, Wulfeck and McWhinney 1991). This situation underscores the need to continue basic research into the Polish language system in aphasia. The results of such research will enable the development of diagnostic and therapeutic protocols and materials which are more suited to the needs of Polish-speaking patients, while increasing the contribution of Polish aphasiologists to the world debate on multilingual aphasia or neurolinguistic aphasia theory at the same time.

The purpose of the research presented in this article is to synthesise the existing body of empirical studies on the Polish language of individuals diagnosed with aphasia in order to determine the scope of knowledge on the impact of aphasia on the system of the Polish language and its mental processing, and to identify research gaps. The study was motivated by the following questions:

(1) Which subsystems of the Polish language and specific linguistic structures have been objects of inquiry in research devoted to the speech/language of individuals diagnosed with aphasia?

(2) What research methodologies were used in the reviewed studies?
(3) What theoretical perspectives did the authors adopt?
(4) Which typologies of aphasia were used?

2. Research methodology

The present research used the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) methodology and, more specifically, the PRISMA-ScR (PRISMA Extension for Scoping Reviews) protocol, developed to "map the current state of knowledge in a discipline" (Arksey and O'Malley 2005: 20; Levac, Colquhoun and O'Brian 2010; Tricco *et al.* 2018). The PRISMA-ScR methodology is increasingly used in health sciences to produce syntheses of scientific findings with a view to employing them in the development of clinical guidelines, in line with the premise of evidence-based practice (Dollaghan 2007), or to determine the direction of further research. For example, Iacono, Stagg, Pearce and Chambers (2016) use the PRISMA-ScR methodology to determine the scope of knowledge on the use of e-health by therapists in Australia; Pilnick, Trusson, Beeke, O'Brian, Goldberg and Harwood (2018) – to determine the extent of knowledge about the use of CA in communication fitness training; and Langbecker, Snoswell, Smith, Verboom and Caffery (2020) – to describe what is known about the long-term effects of childhood speech and language disorders.

2.1. Data sources and selection of texts

At the outset of the study, the team determined the data sources and search strategies, and the text inclusion and exclusion criteria. Literature searches involved the use of the EBSCO Discovery Service Multisearch engine, which searches the electronic databases subscribed by the Jagiellonian Library in Kraków. In order not to miss any relevant work, the search strategy, which took place from December 2020 to February 2021, was broad. The search strategy used the term *afazj** to look for information in the abstracts of texts published in Polish, and the phrase *aphasia AND Polish* to identify relevant information in the abstracts of English-language publications. At this stage, the publication language was the only restriction in the search which resulted in 57 records being selected. The next stage in the selection of articles for analysis was the application of the inclusion and exclusion criteria in the screening of full texts. It was determined that the qualified texts would report on 1) empirical studies, which 2) gather new data in the form of words or texts produced by adult individuals diagnosed with aphasia and where 3) analyses focused on the Polish

language subsystem/-s or skill/-s. Any literature syntheses or reviews, conference presentations, articles in popular science magazines were excluded from further analysis. In the end, 11 texts were selected. The search of electronic databases was complemented by a hand search of Polish-language scientific journals used by aphasiologists as their publication venue: *Logopedia Lodziensia*, *Logopedia Silesiana*, *Neurolingwistyka Praktyczna*, *Nowa Logopedia*, *Poradnik Językowy*, *Studia Pragmalingwistyczne*, *Studia Universitatis Paedagogicae Cracoviensis* i *Studia Logopaedica*. At the end of this phase, 7 articles were qualified for the analysis. The authors also decided to include four monographs, presenting well-documented empirical studies of various aspects of the language of aphasia, which were spin-offs in the process of obtaining a doctorate or habilitation (pl. *habilitacja*) degree. Finally, 18 articles and four scientific monographs were qualified to undergo a full analysis (Figure 1).

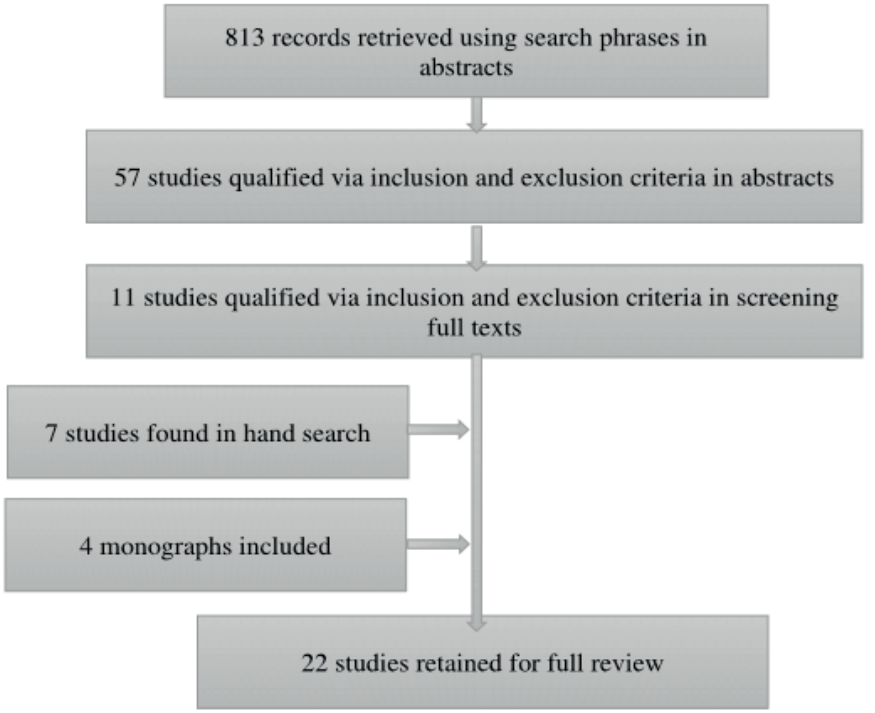

Figure 1. Search process and outcomes.

2.2. Data analysis

The analysis process included reading and extracting information from articles using a data charting sheet containing the following categories: research aims/questions/hypotheses, participants (number, sample), types of aphasia, methods of data collection and analysis, language subsystems, research results, references to aphasia theory, recommendations for further research. The data charting sheet and the definitions of each category were developed jointly by the three authors. At the outset of the analysis, PW-T and RD analysed the same five randomly selected articles and achieved 49% agreement in coding, based on checking the completed sheets at 45 points. To improve the quality of the information extraction process, the authors held a meeting to agree on the understanding of the research questions and the definitions of variables used to extract information. A repeated attempt to code four different articles yielded 81% agreement between the researchers. The small discrepancies at this stage were discussed and resolved before proceeding with the information extraction.

3. Results

3.1. The subsystems of the Polish language

An assumption made at the outset of the present analysis was that a study will be recorded as reporting on research of a subsystem of the Polish language only when that subsystem or its elements are explicitly named in the study's aims or research questions, and data related to that subsystem constitute an important part of the report, indicated by a separate section or subchapter. Our analysis demonstrates that the research reports under review analysed aphasia in relation to the following subsystems of the Polish language: phonology (6/22), morphology (6/22), syntax (9/22), lexis and semantics (10/22), pragmatics (1/22) and discourse (5/22).

Table 1. Studies on the Polish language of aphasia.

Publication	Participants	Methodology	Subsystems of language	Selected findings	Theoretical bases
1. Panasiuk (2019)	70	standard clinical	phonetics, morphology, syntax, lexicon, semantics,discourse	Dichotomy between regulation of linguistics skills by left hemisphere speech centre and outside structures. Process of disintegration and compensation. All language subsystems affected.	Luria's (1967) classification of aphasia.
2. Lipa et al. (2018)	1	case study	syntax	Limited language competence in the two languages in bilinguals with aphasia.	Luria's (1967) classification of aphasia.
3. Daniluk 2017	Information missing	missing	phonetics	The influence of phonetic-phonological disorders on syntax.	Luria's (1967) classification of aphasia.
4. Socha 2017	1	case study	lexicon, semantics, syntax	A new speech-language therapy program.	Boston classification of aphasia (Goodglass et al. 2001).
5. Rutkiewicz-Hanczewska 2016	80 aphasics 60 controls	experiment	lexicon, semantics	Proper names most difficult to retrieve. Pathologies in naming reveal a hierarchical modularity of mental lexicon. Anomia dependent on site and size of lesion.	Boston classification of aphasia (Goodglass et al. 2001). Hypotheses related to anomia, e.g., 'The Token Reference Model' (Semenzy and Zettin 1988) and 'The Interactive Activation and Competition Model' (Burton and Bruce, 1992).
6. Żulewska et al. 2016	71	standard clinical	lexicon, semantics	Functional descriptions are characteristic of amnestic aphasia.	Boston classification of aphasia (Goodglass et al. 2001).
7. Przybysz-Piwko 2015	4	descriptive	morphology	Aphasics do not lose grammatical competence, especially as related to verb inflection.	Luria's (1967) classification of aphasia.
8. Filipczak et al. 2015	1	case study	syntax	Analysis of syntax in written output.	Luria's (1967) classification of aphasia.
9. Panasiuk 2013	200	standard clinical	phonology, syntax, pragmatics, discourse	Disproportion between linguistic and communicative competence. Aphasia impacts code realisation, rather than the language system.	Luria's (1967) classification of aphasia.
10. Stomal-Słowińska et al. 2013	28	experiment	lexicon, semantics	No influence of priming effect on reaction time when aphasics name semantically related words.	Boston classification of aphasia (Goodglass et al. 2001). Priming affects reaction time in naming semantically related words (Ostrin and Tyler, 1993).
11. Siudak 2013	1	case study	lexicon, syntax	Right and left hemisphere activation exercises impact lexical resources and syntactical processing positively.	Boston classification of aphasia (Goodglass et al. 2001).
12. Wójcik 2011	1	case study	phonology, syntax, discourse	Difficulties in realisation of phonological opposition, naming and syntax.	Luria's (1967) classification of aphasia.

Table 1. cont.

13. Panasiuk, 2011	8	descriptive	syntax	No relation between a type of bilingualism and language difficulties.	Luria's (1967) classification of aphasia. Bilingual theories of information storage and retrieval (Kolers 1966, Lambert and Tucker 1972).
14. Jodzio et al. 2008	26	descriptive	lexicon, semantics	High variability in a single modality in global aphasia, e.g., in auditory comprehension.	Boston classification of aphasia (Goodglass et al. 2001). Benson and Geschwind's (1971) model. Global aphasia not a homogeneous aphasia type (Deloche et al. 1981).
15. Panasiuk 2007	70	standard clinical	phonology	Impact of phonological difficulties on reading and writing skills.	Luria's (1967) classification of aphasia. Benson and Geschwind (1971).
16. Jodzio et al. 2006	26	descriptive	lexicon, semantics	Auditory processing affects decoding of meaning.	Boston classification of aphasia (Goodglass et al. 2001)
17. Perlak, Jarema and Corvex (2003)	3 aphasics 17 controls	experiment	morphology	Nouns are processes faster than verbs. The category "singular" in nouns is processed faster than "plural".	Luria's (1967) classification of aphasia. The category of gender as an "intrinsic" property of nouns, encoded in the root or word-formation formants (Ralli 2002).
18. Ulatowska et al. 2001	1	case study	morphology, syntax, discourse	Agrammatisms present in realisations of proverbs.	Luria's (1967) classification of aphasia.
19. Ulatowska et al. 2000	23 aphasics 23 controls	descriptive comparative	lexicon, semantics	Decoding of proverbs requires activation of abstract thinking, rather than concrete thinking.	Luria's (1967) classification of aphasia.
20. Strachalska 1993	20	descriptive	morphology	Language desintegration does not preclude preservation of word formation skills.	Boston classification of aphasia (Goodglass et al. 2001).
21. Grotecki 1987	16	descriptive	morphology	Alternation less difficult for motor aphasia patients than auditory aphasia patients. Alternation errors as compensation strategy.	Boston classification of aphasia (Goodglass et al. 2001).
22. Zarębina 1973	120	descriptive	phonology, lexicon, semantics, discourse	Analysis of aphasic realisations with examples.	Jakobson's (1966) classification of aphasia.

3.1.1. Phonology

The analyses of the subsystem of phonology concern qualitative deformations, consisting in sound substitution (/namʲɔt/ → [namʲat] ‘tent’), and quantitative ones, which are related to a reduction (/t͡ɕastka /→[t͡ɕaska] ‘cakes’) or an expansion (/pɔjazdɨ /→[pɔzjazdɨ] ‘vehicles’) of the phonetic structure of the word (Zarębina 1973; Panasiuk 2019). The most common qualitative changes were the following: phonological paraphasia (/vʲanɛk /→[vʲɛnɛk] ‘wreath’), assimilation (/tablʲit͡sa /→[bablʲit͡sa] ‘whiteboard’) and dissimilation (/tɛlɛfɔn/ →[tɛlafɔn] ‘telephone’) (Zarębina 1973; Panasiuk 2019). The most important quantitative changes reported on were the following: consonant cluster reduction (/mɔmɛnt͡ɕɛ /→[mɔmɛt͡ɕɛ] ‘moment’), elision (/fʲilʲiz̨anka /→[fʲiz̨anka] ‘coffee cup’) and epenthesis (/parasɔl /→[paprasɔl] ‘umbrella’) (Zarębina 1973; Panasiuk 2019). The presence of metatheses was also noted (/ɔkulari /→[ɔkuralɨ] ‘glasses’) as well as more complex deformations involving, for example, a simultaneous occurrence of phonological paraphasia and epenthesis (/salɔn/ →[jɛɛɛlɛɔn] ‘lounge’) (Panasiuk 2019). The total effect of the deformations may impact the search for the relevant auditory-visual pattern (Panasiuk 2019) Phonological difficulties in aphasics may influence the use of inflectional endings and alternation (Grotecki 1978).

3.1.2. Morphology and syntax

The research on the subsystem of Polish morphology concerned mainly the inflection of nouns (Grotecki 1978; Strachalska 1993) and verbs (Ulatowska *et al.* 2001). Grotecki (1978) demonstrated that alternation presents less difficulty to patients with motor aphasia compared to patients with auditory aphasia. Ulatowska (2001) provides evidence that agrammatism can be present in aphasic realisations of proverbs, despite their being regarded as speech automatisms. Panasiuk (2019) discusses agrammatism in aphasia in terms of the grammatical categories of time (*Do tej pory ma* [*miało*] *wyjść sześć tomów encyklopedii, a wyjdzie* [*wyszło*] *tylko cztery.)*, aspect (*Nie lubię szybko wsiąść* [*wsiadać*] *do samochodu.),* voice (*Pierwszą lampę naftową skonstruował* [*była skonstruowana*] *przez Ignacego Łukasiewicza.*), mood (*Ksiądz już pobłogosław* [*pobłogosławił*] *parę i wiernych.),* person (*Ale mam* [*masz*] *minę.),* case (*Lotnik lata samolot* [*samolotem*].), number (*Tu pływa* [*pływają*] *ryby.)* and gender (*biały* [*biała*] *sukienka*), and demonstrates a correlation between the depth of aphasia and the use of grammatical forms.

In their analyses of the subsystem of Polish syntax, researchers note the following disordered patterns: 1) padding (pl. *wypełnienie*) (*O! tutaj, to były rąze. Tak, tak rąze wszystkie.* ‘Yeah! Here, these were roses. Yes, yes roses all’), 2) reduction by using the telegraphic style (*– Jak się pani czuje?* ‘How are you feeling? –- *Bardzo ręka …* [boli] ‘My hand very … [painful]) (Panasiuk 2019;

Ulatowska *et al.* 2001) or 3) syntactic ellipsis (*Ja nie wszystko chcę* [kupić] 'I don't want everything' [to buy]). Another group of patterns described in the research was expansion by applying: 1) repetition (*Tak szczerze mówiąc, ale powiedz szczerze, powiedz mi jedną rzecz ...* 'Yes, to be honest, but tell me honestly, tell me one thing …') (Wójcik 2011, Panasiuk 2013; 2019), 2) automatised sequences (– Kiedy ma pan imieniny? - *Stadeń, luty, marzec, marzrzec, kiwecień, maj, czerwec, moje inne ...* '– When is your name day? – January, February, March, April, May, June, my name …') or modification (*Po* [na] *ulicy stoją auta.* 'There are cars at [on] the street') (Panasiuk 2019).

3.1.3. Lexicon and semantics

Analyses of the lexical subsystem (Ulatowska *et al.*, 2000; Jodzio *et al.* 2008; Rutkiewicz-Hanczewska, 2016) and the semantic subsystem (Panasiuk 2013, 2019, Żulewska, Nowis-Zalewska 2016) were the most common in the reviewed corpus. The research concerned decoding of proverbs (Ulatowska *et al.*, 2000) as well as proper and common names (Rutkiewicz-Hanczewska, 2016). Ulatowska *et al.* (2000) proposes that knowing proverbs requires activation of abstract thinking, rather than literal thinking, and failure in decoding proverbs is influenced by lexical difficulties. Jodzio (2006) demonstrates the impact of auditory processing on differentiation of meaning. Drawing on Kądzielawa's (1985) connectionist theory, he concludes that breaking the nerve fibres connecting essential brain areas causes difficulties in engaging auditory perception in lexical-semantic decoding. Rutkiewicz-Hanczewska's (2016) multi-threaded research of anomia explains, inter alia, the differences existing in the elicitation of proper and common names, the modularity and multimodality of the mental lexicon, and the participation of subcortical structures in the processing of proper names. The researcher concludes that the phenomenon of anomia can be a rich source of knowledge on the organisation of the mental lexicon.

The analysed studies demonstrate a large variation in naming disorders, depending on the location of brain injuries. Patients with motor aphasia more often use semantic neologisms in the nominative function, while patients with sensory aphasia use structural neologisms (Zarębina 1973; Panasiuk 2013, 2019). Naming disorders include: 1) the impossibility of giving a name or 2) replacing the name of an object with its description, the name of a similar object, a similar-sounding word, a repetition of a previously uttered word or a word difficult to classify. Patients with aphasia often use phonetically distorted names, which leads to jargonophasia when occurring with a high intensity (Panasiuk 2019).

3.1.4. Discourse and pragmatics

Aphasia research most often defines discourse as a unit of language larger than a single sentence or as a type of message that is used to fulfill specific goals (e.g. a story, an opinion, or a description of a procedure) (Halliday and Matthieson 2004). Discourse is also subdivided into narrative, procedural, personal, descriptive and explanatory discourse (Dipper and Pritchard 2017). Research on the discourse of the Polish language of aphasia has so far shown that the narrative texts of aphasic individuals are much shorter than those of healthy language users (Ulatowska *et al.*, 2001; Lipa and Wójcik-Topór 2018). Also, disordered use of specific language subsystems, resulting from language disintegration and employment of compensation strategies, results in visible difficulties in the ability to plan utterances and discourse (Zarębina, 1973; Panasiuk 2019). Panasiuk (2013) proposes that in the linguistic behaviour of individuals with aphasia we can distinguish: texts, non-texts (i.e. entirely non-verbal communication), and pathological texts and she discusses those categories. In relation to the language subsystem of pragmatics, Panasiuk (2013) emphasizes its importance in the understanding of texts with a defective structure (e.g. *Mamusia? Leka?* [*Czy mamusia wypiła lekarstwa?*] 'Mum? Medi?' ['Has Mum taken her medications?']).

3.2. Research methods and theoretical bases

The body of studies qualified for the review was dominated by the use of qualitative research methods, including case studies of one or more participants (6/22) (e.g. Ulatowska, Sadowska and Kądzielawa 2001; Wójcik 2011), descriptive studies of language subsystems or skills involving from 4 to 200 participants (e.g. Strachalska 1993; Przybysz-Piwko 2019; Panasiuk 2013) (7/22) or descriptive comparative studies with the participation of healthy language users in the control group (Ulatowska *et al.* 2000). Three articles reported on experimental studies. Perlak, Jarema and Corvex (2003) described an experiment, involving 3 individuals with aphasia and 17 subjects in a control group, in which the gender and person of nouns were the dependent variables which underwent testing. Stomal-Słowińska *et al.* (2013) reported on a study involving 28 individuals divided into 4 groups – 2 groups of patients with brain tumour and 2 groups of patients with lumbar discopathy without aphasia – evaluating and comparing lexical decisions made by participants at the conscious and subconscious level. Finally, Rutkiewicz-Hanczewska (2016) is experimentally investigated activation of the names of common nouns, geographical sites, towns, buildings and monuments in a group of 56 individuals after a stroke in the left hemisphere and 24 individuals after a stroke in the right hemisphere of the brain. In the reviewed studies, data were obtained using

standard aphasia tests (e.g. Ulatowska *et al.* 2000), original tests/tasks designed by the researchers (e.g. Rutkiewicz-Hanczewska 2016), spontaneous speech recordings (e.g. Panasiuk 2013) or writing samples (Filipczak 2015). The data obtained in this way were analysed descriptively in most cases, often using descriptive statistics.

Only several of the analysed research reports grounded their own aims or research questions in the findings of international research on other languages, the theory of aphasia or language processing in aphasia. Jodzio, Biechowska and Leszniewska-Jodzio (2008) confirm the findings of previous studies (Deloche *et al.* 1981), which proved high variability in a single modality in global aphasia, e.g. in auditory comprehension, giving them grounds for questioning of global aphasia as a homogeneous aphasia type. Stomal-Słowińska *et al.* (2013) do not confirm the influence of the priming effect on reaction time when aphasics name semantically related words, thus questioning findings reported earlier, for example by Ostrin and Tyler (1993). The authors also show that participants in their research, unlike in previous studies (e.g. Ostrin and Tyler 1993), needed the least time to recognize the relationship between an image and a nonsense word because they did not need to engage the mind in semantic decoding. Perlak, Jarema and Corvex (2003) gather data confirming an earlier theory, put forward on the basis of the studies of the Greek language in aphasia, that the category of gender is an "intrinsic" property of nouns, encoded in the root or word-formation formants, rather than in inflectional formants (Ralli 2002). Panasiuk (2011), in her study of bilingual aphasia, tests hypotheses about language processing in bilinguals, including the hypothesis that in bilingual aphasiacs there are two separate mental centers for information storage and retrieval (Kolers 1966) and the hypothesis of a common bilingual memory storage (Lambert and Tucker 1972). Rutkiewicz-Hanczewska (2016) reports on a series of experimental studies of anomia, which are well-grounded in international research and the current hypotheses explaining naming deficits in individuals with the diagnosis of aphasia.

3.3. Typologies of aphasia

Two classifications of aphasia have been adopted in the reviewed publications: namely, Luria's (1967) classification of aphasia (12/22), indicating the mechanisms of the observed language deficits, and the Boston classification of aphasia (Goodglass, Kaplan and Barresi 2001) (9/22), which refers to the consequences of damage to the cerebral cortex. Such studies allow us to relate specific aspects of language impairment to the different aphasia types. A few studies also referred to the classification of language deficits proposed by Maruszewski (1966). Zarębina (1973) classified language disorders in aphasia in relation to Jakobson's (1995) theory. Panasiuk (2019) correlates the depth of

language deficits and the frequency of the occurrence of neologisms with different aphasia types, and the realisation of the grammatical category of mood with the depth of aphasia.

4. Discussion and concluding remarks

There are empirical studies devoted to every subsystem of the Polish language in aphasia, but the knowledge base resulting from them seems rather incomplete and fragmented. The semantic-lexical subsystem of language is the best researched. However, it is worth extending the study of this subsystem to low frequency semantic fields in order to enable the development of more sensitive diagnostic tests in the future, allowing for the differentiation of naming deficits in high performing individuals. Also, future studies could focus on anomia treatment, including research problems such as cross-modal generalisation of anomia treatment or comparing the efficacy of different anomia treatments through clinical trials (cf. Kendall *et al.* 2019). The interest in the morphological subsystem is well-pronounced in the literature, although a significant gap can be noticed here as well: the research to date concerns only the grammatical categories of noun and verb. The remaining language subsystems are represented in the research on an equal but lower level. The state of research on the phonological subsystem could be strengthened, for example, by research on the prosody of aphasic utterances (cf. Panasiuk 2019). The research of syntax should include analyses of the full inventory of syntactic structures, including complex sentences and structures differing in mood or voice.

The almost complete lack of research on the pragmatics of the Polish language of aphasia can be explained by the common consensus that aphasia patients maintain their knowledge of universal pragmatics and language-specific pragmatic limitations (Wulfeck *et al.* 1989). However, given that the ultimate goal of aphasia therapy is to improve patients' communicative competence, rather than their linguistic competence, the need to determine the extent to which the outcomes of strictly linguistic therapy are generalized by aphasic individuals to their communication and pragmatic skills is increasing. On the other hand, it is also worth asking to what extent conversational therapy (Simmons-Mackie, Savage and Worall 2014), exploiting the pragmatic layer of language, can result in the reconstruction of the specific subsystems of language. This direction of research is absent in the analysed literature, although it is prominent in the world literature (e.g. Lesser and Algar 1995). It is also unclear how people diagnosed with aphasia use the notional-functional inventory of the Polish language, a consequence of speech act theory, and what is the relationship between the realisations of this inventory and strictly linguistic disorders. The discourse of Polish-speaking people diagnosed with aphasia requires more attention from

researchers, although the recent work by Panasiuk (2013; 2019) must be noted, to reflect the strong interest in the discourse of aphasic individuals in world literature in recent years (Wright 2011). There are important research gaps that require filling. Firstly, the effect of aphasia on all types of discourse requires research. Secondly, universal frameworks and measures of textual cohesion and coherence (e.g. Wright, Capilouto and Koutsoftas 2013) should be validated for Polish and tested. Thirdly, there is a need to investigate further the impact of discourse therapy (Dipper *et al.* 2020). For example, it is worth exploring the strategies used by aphasic and non-aphasic individuals in decoding the different text types. It is also worth investing resources in researching the effectiveness of discourse therapy, the subject of a heated debate in international literature (Dipper *et al.* 2020). The study of the language subsystems of pragmatics and discourse in aphasia is particularly important in the context of the modern, sociocultural and psychosocial understanding of language, cognition and learning (Wittgenstein 1953; Austin 1975; Vygotsky 1978), where social factors are not only the context, but also the driving force behind the process of language construction and reconstruction. Such an understanding of communication competence disorders is proposed by the ICF (WHO 2001), an international conceptual framework for the definition, measurement and policy development in the field of health and disability, also commonly adopted in speech-language pathology (Simmons-Mackie 2007).

Despite the limitations of the present scoping review, resulting from the possibility of some research reports not being included, it seems reasonable to conclude that the level of the scientific evidence (Reilly 2004) thus far gathered on many aspects of the Polish language of aphasia is low, since it mainly results from descriptive single case studies or descriptive studies involving from several to a few dozen participants. The level and overall quality of scientific evidence in the field could be raised by employing research involving more participants, experimental research designs, longitudinal research, as well as more varied research perspectives, including discourse analysis, conversational analysis and ethnography of communication. The formulation of research aims and the interpretation of results of research devoted to the impact of aphasia on Polish must be grounded more firmly in the findings of international research projects, on languages other than Polish, and in the existing psycholinguistic, neurocognitive and linguistic theories (Garraffa and Fyndanis 2020).

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