

|| ● Dementia from an Interdisciplinary Point of View

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Linguistics and Medicine: Linguistic and Interdisciplinary Research Insights and Potential

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In connection with the increase in the number of people affected by Alzheimer's dementia (AD) in many countries and their various languages around the world, intensive research is underway with the aim of early and more accurate diagnosis in order to positively influence or at least slow down the progress of the disease. The linguistic point of view in the study of this field has not yet been researched in Latvian linguistics, although the manifestations of the disease affect all levels of language and are related to different linguistic directions. The aim of this article is to provide an insight into the linguistic characteristics of AD manifestations acquired on the basis of different languages and thus to encourage bringing together fields of linguistics and medicine in Latvian linguistics research. Based on international linguistic experience, the question of the role of language-specific and language situation-based factors and the need for interdisciplinary research based on language oral and written corpus is raised.

Keywords: linguistic manifestations of Alzheimer's dementia, language in Alzheimer's dementia therapy, interdisciplinarity in research on linguistic manifestations of Alzheimer's dementia

Introduction

Language, its research and medicine are closely linked across a wide range of topics. In linguistics, there is a distinction between a diachronic and a synchronous

view. The historical perspective is mainly related to the editions of ancient manuscripts and their linguistic comments. Thus, it is possible to supplement the systematic descriptions of the language aspects of different periods, the text and the history of the language of the field of science. The *Handbuch Sprache in der Medizin* [Handbook of Medical Language] [1], published in German, is one of the sources that allows to judge the diversity of topics in a diachronic view: the historical aspects of the medical language, the development of medical text types, the communication of the doctor and the patient at different stages of history. These topics characterize research that is largely based on modern linguistic knowledge, and their monodisciplinary focus is directed towards the study of language, which has the history of the medical sciences in the background.

A much broader panorama of topics relevant to linguistics and medicine opens in synchronous applied linguistics, which is characterized by an interdisciplinary view of linguistic phenomena. For example, psycholinguistics, neurolinguistics, *patholinguistics* (German *Patholinguistik*) [2] are closely related to the field of medicine, including clinical linguistics (English *Clinical Linguistics*, German *Klinische Linguistik*), in which the attribute “clinical” includes a number of different sub-disciplines of linguistics, such as clinical phonetics, phonology, prosody, morphology, syntax, semantics, pragmatics, discourse, sociolinguistics, as well as a number of other sub-disciplines of linguistics, the focus of which, using linguistic research methods, are medical-related issues. However, other branches of applied linguistics also deal with issues related to medicine. This is the case, for example, with the German Association of Applied Linguistics (German *Gesellschaft für Angewandte Linguistik*), see also in the 16 sections listed on the GAL page [3], there is an explicit reference to cooperation with medicine (and health sciences) in the field of interdisciplinary research is found in the section “Specialised Communication” (*Fachkommunikation*), where important research directions are focused on the language of the specific field (*Fachsprache*), for industry-specific thinking and communication styles (*Fachliche Denk- und Kommunikationsstile*), industry specific cognition and stereotypes (*Fachkognition und-stereotype*), discipline-specific discourse, including between professionals and amateurs (*Fachliche Diskurse/ zwischen Experten und Laien*), as well as plain/easy to use language research. The medical field tied to linguistic research is also emphasized in the Oral Language Section of the German Association of Applied Linguistics (*Gesprächsforschung*), and it is obvious that the list of research directions and thematic cooperation is potentially endless. For example, research also takes place in intercultural communication, which is particularly relevant in the context of migration (German *Migrationslinguistik*, English *Migration Linguistics*), in phonetics and speech science (*Sprechwissenschaft*), morphology, syntax, text linguistics, pragmatics, etc.

The study of a language related to the medical sciences means, first of all, the study of the language of the field itself, starting with the vocabulary. For example, in German, the collection of language for special use covers 170 000 units,

including 80 000 names of various medications, 60 000 disease designations, 20 000 organ function designations, 10 000 body parts, organs and organ parts designations [4]. The onomasiological study of the lexicon, which is dominated by questions of origin and formation of terms (e.g., Latin and Greek terms), includes topics such as eponyms, acronyms and is complemented by didactics of terminology. Dictionaries, textbooks, applications are developed to learn terms (see, e.g., *MEMRiSE*) [5], word lists with references to vocabulary elements and translations (see, e.g., *EHLION*) [6], presentations (see, e.g., Locher) [4]. In Latvian and linguistics, the most attention is drawn to the level of lexis in the applied aspect (see, e.g., Viņķele, 2007; Sviķe et al. 2020, etc.) [7, 8].

Furthermore, a relatively wide field of interaction consists of translation, meaning not only its interlingual perspective, i.e. bilingual and multilingual translations, but also intralingual translation – from the language of the specialists of the field to the language of general use, changing the recipient of the text. This aspect forms an essential background for another research direction – the study of communication between the doctor and the patient. Among the reports included in the aforementioned guide are the questions about communication in medicine, which includes, for example, communication between doctors in professional environment, between doctor and patient, as well as in the media, forums, etc. (see Busch, Spranz-Fogasy 2015) [1].

Considering this broad topicality and its potential both in the research of texts and their constituent units and in the research of discourse, it is necessary to emphasize the very few opportunities used in Latvian linguistics to address these interdisciplinary themes. Terminology and research of easy language are exceptions (see e.g., *Vieglā valoda* – Easy Language) [9, 10]. The website of the Latvian Association of Applied Linguistics amongst the objectives of the organisation indicates – to “promote interdisciplinary research and cooperation”, yet it does not contain information concerning the fields of linguistics and medical cooperation (see LLVA) [11].

This chapter will focus on Alzheimer’s dementia (Lat. *Morbus Alzheimer* – hereinafter referred to as AD) research from a linguistic point of view, since it is this area that touches upon all levels of language and a large number of directions of its research. The media and professional association documents of different countries, as well as the specialist literature of the field contain information on the rise of the curve of dementia and the number of people most directly affected by AD, hence, it is not surprising that intensive research is taking place in many world languages and countries with the aim of enabling a quick and accurate diagnosis, in order to positively influence or at least slow down the course of AD development. The additional aim of this brief literature review, which will be described in greater detail in the final part of the article, is to bring to attention the convergence of the fields of linguistics and medicine in research involving Latvian linguistics.

1. Language and Alzheimer's dementia interactions in the public space

Discussion of medical topics, including dementia, is mainly carried out through the media. AD affects virtually all levels of language – from phonetic/phonological to discourse level. Dementia-related discourse involves different language variants – sociolects, – representing the societal strata. Depending on the language version chosen by the language user and the purpose of the discourse, both industry terms and neutral terms of the commonly used language are employed, as well as euphemisms or pejorative vocabulary.

Here, a brief consideration will be given to the ways how AD and its linguistic overview reach the public, i.e. non-specialist readers/listeners. Here, a distinction must be made between the general public and those directly involved with AD patients, such as family, caregivers and social workers. In the first case, problems with the language use are reported by the media, while in the second instance the sources mainly consist of various publications and materials on the websites of organizations or institutions related to patients and their support.

Information in the media is usually rather laconic and superficial on linguistic issues. The examples include the texts similar to these:

A person's memory deteriorates, especially in short term memory. The patient repeatedly returns to the same topic, although the specific question with the interlocutor has already been discussed several times [...] It is becoming increasingly difficult to recognize the letters in the text, so reading and writing skills are getting worse [...] The vocabulary is becoming increasingly limited – the patient cannot find the right words. [12]

Or:

You forget words and replace them more and more with expressions like 'Well, you get it'. The vocabulary is becoming increasingly scarce and the uttered sentences are becoming increasingly vague. Disturbances in brain function prevent thoughts from being formulated clearly and quickly. [13]

The second strand related to the identification of AD in the wider society is public education with the aim of raising awareness of AD and preventing stigmatization of patients and the related persons. Publications dedicated to this issue are often compiled as linguistic guidance on the topic of dementia. For example, in German they are *Sprachleitfaden "Demenz"* [Conversation Guide on Dementia]. *Wie sprechen wir über Demenz in einer angemessener Weise?* [How do we properly talk about dementia?] is a brochure prepared by Alzheimer's and Dementia Organizations in seven German-speaking countries and regions (DADO) and published in 2020 with recommendations on the words and phrases to use or avoid when talking about dementia, symptoms, people with dementia at different ages, family members

of patients, friends, co-workers and supporters (see *Sprachleitfaden*) [14]. These recommendations target a wide range of people – carers, media representatives, those involved in public discourse, education and politics, as well as any interested member of the public. The recommendations aim to promote quality of life by avoiding linguistic forms of stigmatization and discrimination. A similar brochure is also available in English, such as the *Language Dementia Guidelines* published by Dementia Australia in 2021, which describes the same aspects on an English-language basis (see *Language Dementia Guidelines*) [15].

This kind of brochure is based on linguistic studies of certain thematic orientations, considering the use of language in various sociolects, the semantics and connotations of words and sayings. Thinking about the possibilities in Latvian, this could be a much-needed research task of sociolinguistic orientation in the analysis of meaning, connotations and usage of words.

The information provided by professional organizations is of an in-depth character. For example, on the website of the Alzheimer's Society of the United Kingdom (see Alzheimer's Society), language is characterized as a process that enables a person to understand and communicate his thoughts and ideas using oral and written language, as well as non-verbal means of communication, such as gestures (including sign language). Communication, therefore, takes place by producing and prescribing what is heard, read and communicated in sign language. In this context, the most characteristic features of AD are mentioned, emphasizing that dementia interferes with the natural linguistic process, and it is possible that the patient understands the meaning of the word, but is sometimes unable to remember the correct word. Less frequently used or more recently learned words are usually lost first, but basic words learned at an earlier stage of life remain in memory for much longer. If a person speaks more than one language, he can return to the first language of communication learned in childhood.

The website of Alzheimer's Society [16] indicates characteristic manifestations of AD, including the following compensatory mechanism for word deficit, replacing the “lost words” with related ones, for example, by saying a *book* instead of a *newspaper*, or using generalized word substitutes, for example, not a *chair*, but a *thing that you sit on*. Sometimes a word is not found, and instead AD patients choose other different strategies – use words without meaning, confuse the order of words, fall back on the first language learned in childhood. Deviations are also observed in the course of the conversation, and they begin with problems in the reception of the text. Without understanding what has been said and not being able to maintain sustained attention, it is impossible to form an answer as a string of related words in the continuation of the conversation. The time factor in the reception is also important. Reflecting and deciding on how to respond to what has been said slows down the communication process. In dialogue, one can observe the transition from one topic to another without completing a sentence related to difficulty concentrating (see Alzheimer's Society) [16].

The information provided on the website of the *Deutsche Alzheimer Gesellschaft* (Alzheimer Society Germany – DAG) notes the difficulty of finding words as a linguistic deficit, but also, in the middle stage, the inability to form complete sentences that hinder the ability of AD sufferers to understand [17]. Hence, the restrictions of communication affect communication partners, as well as recipients.

Thus, these linguistic manifestations are described as explicit, prominent in communication, and mainly affect the language of patients who have already experienced AD symptoms. It should be noted that a number of these phenomena are not unfamiliar in the use of the language of cognitively healthy people, for example, the said general noun *thing*, which in German corresponds to *Ding*, *Dingsda* (similar to the English *thing*, *the thingy*) [18, p. 65], as a proforma is distributed in a particularly simplified spoken language. Some of these phenomena, such as unfinished sentences and switching from one topic to another, can often be observed as linguistic expressions in different sociolects. All these signs, characteristic of AD, require in-depth research into each case in order to avoid an overly hasty diagnosis, which may happen, for example, at the domestic level in a non-specialist environment.

2. General linguistic features of Alzheimer's dementia

Dementia is an overarching concept for various forms of its manifestation depending on the affected brain ranges. The appearance of language deficit at the initial stage of various dementia forms is described as different, linking it to dependence on the most severely affected regions of the brain [19,18]. Alzheimer's dementia is the most common form. Typical signs of AD include language and communication disorders, as well as limitations of memory, attention, orientation, logical thinking, judgment, and planned activities [20, p. 155].

The study of the role of language in relation to AD encompasses several directions:

1. Forms of linguistic expression in AD diagnostics and at different stages of AD development.
2. Language or linguistic competence in AD development, e.g., monolingualism, bilingualism.
3. The role of linguistic data in automated analysis.
4. Language in therapy.
5. Language in public education.

The problem of linguistic deficits, which pertains to a certain stage of the disease and the course of the disease, is an essential component of AD research. At the same time, this problem can be perceived as linguistic symptom universality versus language-specific issues. The following section considers select research

issues, focusing on the linguistic symptoms recorded in the literature of this field, and the interdisciplinary nature of the research.

The role of language in AD is metaphorically characterized by Schmöe's comparison of brain cells with *hardware* and language with *software* [21, p. 205]. Language deficits in case of illness develop progressively, this process is characterized as gradual. According to Schecker, until the symptoms become definitive, for example, they match the from the *DSM IV* (American Psychiatric Association (Task Force) 1994 test, this hidden period (German *Vorlaufzeit*) could last as long as 10 to 30 years [22, p. 281]. At the initial stage of AD, the loss of words is usually recorded, – the individuals affected by the disease try to “hide” it by choosing substitution as a technique (e.g., by hypernym). Therefore, the time of onset of symptoms of the disease is not accounted for either by the individuals themselves or by their loved ones [21, p. 207]. It could be assumed that this is complicated by the fact that the use of hypernyms is not alien to the general language of healthy people, especially if, for example, there is a lack of specific knowledge of a term and, accordingly, a lack of the correct word in question.

Schecker draws attention to the reduction of linguistic expressions that appear before the loss of words is recorded [22, p. 283]. Such changes can only be detected in long-term studies and in appropriately sourced corpora (e.g., ILSE, see Weiner et al.) [23]. The language problems of an AD patient begin at the pragmatic level, with linguistic activity gradually becoming insufficient to ensure normally functioning communication [21, p. 208]. Reception and production of texts (oral and written) is a complex performance. The recording of language characteristics in the early AD stage is an important differential diagnostic aspect to distinguish it from depressive pseudodementia, and impaired communication abilities are a timely indication of the possible development of dementia. However, external factors such as the level of education and language skills, including foreign language competencies, should also be taken into account when assessing the linguistic manifestations of AD at an early stage [19, p. 126]. The results of the tests show that, as the disease develops, AD patients become deprived of the ability to understand the context and lose samples of everyday linguistic processes or scripts, text coherence disappears (see, e.g., Schecker) [18, p. 69].

The linguistic characteristics of AD according to the stages of the disease make it possible to highlight the following signs:

At an early stage: limitations of communication, loss of the conversation “thread”, impaired ability to adapt to the conversation partner, blurred speech, word-finding problems, sometimes inaccurate word selection, incomplete sentences, repetitions, phrased formulations, in the case of idiomatic sayings preference is frequently given to direct meaning, sarcastic sayings are often perceived literally, difficulty in understanding compound sentences, simpler syntax, articulation without significant changes.

In the middle stage: coherence deficits, erroneous designations, loss of words (also of commonly used words), confabulation, echolalia, phonemic paraphasia, semantic paraphasia with initially slight deviations from the intended word (German *Zielwort*), repetition, prototype use, difficulty understanding words, limited linguistic understanding, frequent use of passages in sentences and use of verbs denoting speaking or thinking at the beginning of a sentence (German *Satzverschränkung*), loss of auxiliary statements, morphosyntactic errors, impaired reading and writing skills.

At a later stage: mutism, semantic repetitions of empty words and/or sounds, a lot of semantic paraphrases, use of sentence fragments and the use of verbs denoting speech or thinking at the beginning of a sentence, a limited vocabulary, simple phrases, neologisms, poor understanding of language, verbal communication virtually impossible [19, pp. 128; 24, pp. 91, 93].

3. Characteristics of Alzheimer's dementia at different levels of language

Based on a series of studies and emphasizing the gradual development of linguistic deficits, Schmöe [21, pp. 208–215] summarized the characteristic features of AD at various levels of language – pragmatic and communicative, syntactic, lexical, morphological, pronunciation and writing. A brief description of these levels will follow, supplemented by materials from several publications devoted to the topic.

3.1. Signs of communication

Linguistic deficits occur gradually, in proportion to the limitation of other cognitive abilities. For AD patients, language difficulties first occur in communication, when control over the situationally appropriate speech is lost. At an early stage, it has been observed that patients speak pragmatically inadequately [21, pp. 208–209]. Initially, as a result of communicative restrictions, patients avoid conversations, or use vague, meaningless phrases when talking. Patients can often conceal their mental state for years, and they are also indirectly supported by their loved ones, taking over the implementation of communication, most often without realizing it themselves. At the middle stage, communication abilities are already becoming noticeably limited, as patients lose scripts, no longer recognize and interpret implications. The use of general phrases in communication is mentioned as a limiting factor. Referring to the 1989 Blanken study, Schmöe notes that along with weakened receptive performance, the ability to form a coherent dialogue disappears, whereas the ability to form a monologue is still retained [21, p. 212]. Additional difficulties in communication arise when the ability to focus attention

and plan is lost. Deficiencies in oral communication in German have also been detected in the use of connectors, which means restrictions on the formation of cohesive and coherent oral text [25].

Here, the question arises as to the role of education on a case-by-case basis and whether there are differences in relation to a person's education, lifestyle, hobbies and interests in the longer term. The criteria for the interpretation of results are usually age, gender, education, as well as its duration, but the use of language can be heterogeneous, taking into account belonging to certain sociolects and changing throughout the individual's course of life, depending on the dominant communication communities.

3.2. Signs in phonetics/phonology, prosody and morphology

These areas are considered to remain almost untouched at an early stage. Orthographic performance is often not tested at all, because patients refuse to write very early on. Purely linguistic problems can emerge in combination with apraxia and dysarthria. Longer-preserved intonation samples consist of short phrases, for example, expressing surprise [German *ach so?*] "Oh, so?" The patient's speech is fluent for a long time, likewise, the ability to read aloud remains intact for a relatively long time [21, p. 214].

There are publications which confirm that by using audio and automatic speech recognition technology, it is possible to detect AD at an early stage. Studies show that AD patients have a slower speech, and leave longer pauses between words (see e.g., Yang, et al.) [26].

3.3. Vocabulary and semantics

The loss of words is one of the frequently mentioned signs, and it is a much-researched phenomenon in various aspects. From the middle stage of AD, words are no longer understood or are already lost. The longest surviving are the words learned in childhood, such as the German word *Auto* instead of *Fahrzeug* "vehicle" or *Mercedes*, as well as prototypical words, e.g., *Hammer* "hammer" in generic *Werkzeug* "tool" [21, p. 211] or *Veilchen* "violet" instead of *Iris* "iris" or *Lilie* "lily" [22, p. 285]. Strategies used in the circumstances of word loss include semantic paraphasia – the use of a comparable level (hyperonymic, hyponymic) word such as "crane" instead of "excavator". Sometimes the choice of words is based on metonymic attitudes, such as "cup" instead of "excavator", or the choice is made in favour of a paraphrase, for example, "It's there for work". Therapists and patients' relatives sometimes do not know if the patient no longer recognizes the item or is unable to recall the word. Often patients allow the conversation partners to name the relevant subject or phenomenon and thus mask their deficits [21, p. 211]. The question of deliberate or unconscious strategy should be raised here.

Different tests are used to evaluate the lexical level. For example, Schecker has tested verbal abilities (German *verbale Flüssigkeit*) to recall and use lexical units in associative tests in two ways: 1) giving a main concept, for example, “animal”, based on which a person should name the subordinate hyponyms, 2) making names that start with a certain sound, such as s-. As mentioned above, patients compensate for word loss with generalizations [18, p. 66], such as using proformas (such as “thing”), which is a multi-pronged strategy. The difficulty of finding words is checked, for example, by the Boston-Naming-Test and its modifications, which already at the beginning of AD show a correct designation in 61% of cases (ibid.). The question of the loss of the word and/or the semantic concept has been considered. For example, replacing monochrome drawings of different objects with colour drawings or even with descriptive terms improves the results of naming, and this is explained by the greater need to use temporary memory capacity in the first case than when looking at a colour image or realism. This does not exclude the possibility that after a while lexical concept will disappear [18, pp. 70–71].

Schecker (2003, see also 2010) [22, p. 290; 18, p. 71] has included the compensatory action in one of his theses, pointing to a problem in therapy – replacing the lost elements of language, patients in fact themselves contribute to the loss of cognitive abilities, hence, this state can be characterized both from the point of view of AD patient and therapy as a vicious circle (German *Teufelskreis*).

As a linguistic feature, word correction is also to be considered. It is considered that the correction of an incorrectly pronounced word does not take place already in the early AD stage to the extent that it is carried out by healthy persons, since it requires the activation of a large-scale context for this purpose [21, p. 214].

The test of combining a certain meaning of a polysemic word with an image has concluded that recognition of meanings already in the early AD stage shows deficits that can be “concealed” in everyday life [18, p. 69].

3.4. Metaphors, idiomatic sayings, irony

In case of AD, problems arise when it is necessary to interpret metaphorical, idiomatic and ironic words or sayings. With figurative sayings, problems appear quite early. Figurativeness is understood only in the current context or by reconstructing it – this is the ability that disappears in the later stages of the disease. Idiomatic sayings, even if not understood literally, are interpreted in a rather blurred form or incorrectly. Language tests sometimes fail to find out whether the task itself was incomprehensible or whether the task could not be performed due to other reasons. The results of the tests suggest that the interpretation is rather erroneous than literal, and is described as the ability to maintain, at least during the initial and intermediate stages of the disease, a certain ability to use abstraction (generalize) [21, pp. 211–212]. For example, the tests conducted by using idiomatic sayings in which the patient had to choose the correct one from the explanations of meaning

attached to the saying indicated that this choice was incidental (Schecker 2010; see also Schecker 2003) [22, p. 69; 18, pp. 2283–2285].

3.5. Usage and syntax of pronouns

Referring to the Gress-Heister study, Schmöe [21, p. 209] points to deficits in the use of pronouns, such as “he”, “his”, “it” (gender-neutral pronoun), the content of which is not explicit, and AD patients have difficulty maintaining an up-to-date context of their use. In the middle stage of AD, the pronoun usage issues are particularly noticeable, especially for *Sie*, the formal form of “you” in German (this applies not only to the singular use of *Sie* but also to the plural form *Ihr* in the second person, if the conversation are approached with the informal form of “you” in German), this loss of formality creates the impression of lack of social distance and intentional rudeness. The use of nouns remains longer in the cohesion of the text.

The structure of the sentence gradually loses its complexity, which is associated with the loss of memory capacity. Progressively, the ability to form longer complex sentences with subordinate clauses is lost, and the linguistic deficit is caused not by syntactic (i.e. linguistic), but by cognitive limitations. In the middle stage, patients try to avoid longer sentence structures with supporting statements that implement different semantic attitudes [21, p. 210]. For example, AD patients in German also avoid the passive form, subordinate structures, preferring structures without connecting words and replace them in part with a simple enumeration [22, p. 286]. Multilevel subordination and compound subordinated sentences disappear. A repetition of the subject of the sentence is preferred, for example, the construction like “he stands by the window and he smokes” instead of the elliptical construction like “He stands by the window and smokes”. As the disease progresses, single-word sentences and routine phrases remain, for example, “Nothing, it doesn’t matter”. Initially, formal syntax remains, but as content loss intensifies, it also becomes poor [21, p. 210].

So, for example, in Schecker’s 2010 publication [18, p. 65] addressed to (German) language therapists (German *Sprachtherapeuten*), it is noted that the early and middle stages of AD are characterized by the following criteria: difficulty in finding words, impaired language skills, deviation in the use of certain pronouns for the same person that is mentioned multiple times. In addition, patients have difficulties with syntactic complex sentences and verbal polysemy, including metaphoric and figurative language. These deficits have long been considered heterogeneous. It is assumed that this case may be about cognitive slowing and, unlike the initial picture of a set of heterogeneous phenomena, these various phenomena are due to one cause: reduced capacity of temporary memory [18, p. 63]. Schecker [18, p. 68] recommends including not only compound subordinates, but also phased subordinate clauses in the test of syntax ability. In connection with the structure of

sentences in German, constructions characterized by a certain order of words are also studied, for example, the location of the finite verb at the end of the auxiliary sentence, the order of words in sentences with continuous tenses or constructions with modal verbs, as well as with verbs with separable prefixes. The results show that there is no difference in the statistical assessment, whether it is auxiliary sentence, continuous tenses, use of modal verbs with infinitive, so the loss of certain types of structures in a shorter or longer period of time. This suggests that memory capacity should be discussed in these cases, and the frequency of errors is determined by the amount of text or sentence rather than the structure.

In this case, the question of the role of linguistic-specific factors in the research of AD linguistic manifestations could be raised again, since, for example, structures related to word order and certain linguistic-specific elements (e.g., separable prefixes) specific to the German language (German *Klammerkonstruktionen*) are mentioned in German-language publications. The question that arises, for example, in relation to the Latvian language, is about possible syntactic restrictions in the case of AD and their recognition. From a linguistic point of view, one may ask whether oral and written language differences in syntax, the field of education of the patient, as well as reading and information habits in the course of life should also be included as a criterion in the evaluation of results.

3.6. Text creation

There are errors of pronominalization in the text, for example, in the continuation of the text related to the German pronoun *ein/eine* in combination with the adjective and noun *ein junger Mann* “(a) young man’ usually replaces the personal pronoun *er* ‘he’, which can be followed by a nominal group with the pronoun *der Mann* “young man”. Such arrangements are conventional. The results of the tests show that in the case of AD, the pronoun is often preferred, abandoning the expected return to the nominal group with the established article [18, p. 67].

4. Language aspects in Alzheimer’s dementia therapy and research

Accurate diagnosis plays an important role in finding out the further symptomatic development of the disease and planning how to preserve existing resources. This is a prerequisite for treatment that focuses on resources and maintaining the capacity that still exists. Maintaining communication skills on a daily basis, as well as educating the patient’s loved ones, is equally important [20, p. 155]. Abel emphasizes the role of individually selected key everyday language words in speech therapy and other aphasia therapies (post-stroke, primary

progressive aphasia diagnosis), as well as the potential of word activation techniques used in patients with AD symptoms (see Abel 2013) [27, pp. 28,32].

The role of language in communicating with an AD patient is also related to the patient's receptive abilities. When communicating with patients who have restrictions on communication, both the content side, prosody and style are affected – choice of words, formation of sentences and order of words. Following the recommendation of Krupp and Thode [19, p. 127], it is desirable to talk to the patient in order to ensure a successful communicative situation, focusing on the conversation partner and avoiding unimportant statements, use the principle of plain language, forming short, simple sentences, using keywords at the end of the sentence, excluding words that are not in the usual vocabulary of the conversation partner, reducing the speed of speech, talking with emphasized but not artificial sentence intonation, choosing the appropriate volume, avoiding background noises. When reading, attention should be paid to good readability of the text, such as the size of the letters, the space between the lines and the font, as well as good lighting. By flexibly adapting to the capabilities of the patient, doctors, therapists, carers, and relatives are able to support a positive course of communication. According to studies, the resulting deficits are also compensated for by the preservation of written skills, and this can be done, for example, by making to-do lists. According to Krupp and Thode, speech therapy could play an even greater role in symptom treatment [19, p. 128].

The study of the linguistic characteristics of AD is still an important task of applied linguistics in an interdisciplinary perspective. One of the essential prerequisites for research is the creation of a language corpora which, after qualitative analysis of the texts, could be prepared for automatic analysis and which could contribute to the early diagnosis of AD. Currently, active automated research is underway, exploring spontaneous speech (its transcripts) at the lexical, morphological and syntactic levels, including semantic and pragmatic features (for current research and Hungarian language research see Vincze, et al.) [28]. Automated speech analysis expands the potential of previous qualitative methods, in addition, it provides a detailed analysis and assessment of speech abilities, which does not depend on the time resources of medical staff. Therefore, therapy may be offered to patients at a time when the disease may still be affected by slowing down its development (about the ILSE corpus, see Weiner, et al.) [23, 29].

Research points to the correlation of acoustic and linguistic features and the role of their analysis [30, p. 181]. Speech corpora (e.g. with recordings of biographical interviews, with spontaneous speech) and subsequent analysis can help to recognize early signs of AD. The role of prosodic signs is important [31, p. 2]. For example, a Turkish-language analysis of prosody and lexical analysis – an examination of the frequency of words belonging to different word classes and the use of word elements – has been carried out interpreting the results in relation to extrinsic factors such as age, gender, education. The purpose of such an

analysis is to conclude how the linguistic limitations are reflected in the patient's speech prosody and speech transcripts and whether there are markers that can be effectively detected using machine learning methods [31, p. 14].

However, researchers are still pointing to the insufficient amount of speech data in different languages that researchers have at their disposal, such as Agbavor and Liang (2023) [32], who explore the possibilities of artificial intelligence in early diagnosis of Alzheimer's disease by using voice material in analysis and extracting data from image descriptions produced by patients with AD and cognitive-healthy people. Also, in the review of the use of deep learning methods in the determination of AD based on speech data (see Yang et al.) [26] concluded that current dementia-related databases are generally small and mostly monolingual. They lack data from cohort studies, making it difficult to demonstrate the reliability of speech analysis results in individual retesting. To improve further research, there is a need for the development of an effective and accurate computer diagnostic method, which could shorten the time of AD screening [26, p. 13]. It is therefore important to establish research corpora according to certain criteria.

From a linguistic point of view, it is interesting to note the relatively frequent use of pronouns, which probably partially coincides with the use of personal pronouns observed in German [18, p. 65], thus allowing to raise the question of the universal versus the language specific nature of linguistic deficits. The nature of possible universal linguistic deficits is also pointed out by the authors of the study of the Turkish language, emphasizing the potential of multilingual studies [31, p. 31].

One research perspective is the identification of the role of bilingualism. Results of a study published in 2017 (see Perani et al.) [33] shows that bilingualism (in the study – German and Italian in Northern Italy) has a positive effect on the formation of brain reserve, and the symptoms of dementia in AD develop later than in monolingual individuals. When studying changes in the brain in bilingual and monolingual groups of subjects with mild AD, brain scans were performed and a questionnaire on the use of language(s) was completed. Bilingual test subjects had better results in memory and thinking tests. At the same time, bilingual individuals showed increased activation in other parts of the brain, which may indicate the ability of the brain to compensate for the damage caused by the disease. A prerequisite in this case was the regular use of both languages on a daily basis, and the positive results in terms of AD development are based on the observation that brain activity has a compensatory effect.

Conclusions

This brief look at the linguistic features of AD and their research, without claiming to be comprehensive overview of the issue, allows to draw a number of conclusions that could be useful for the development of interdisciplinary research

of the Latvian language within the current research discourse. If the analysis of linguistic formulations with a view to making recommendations for correct use of language is possible as almost purely linguistic research, then the questions related to the role of linguistic factors in the diagnosis of AD, the definition of stages, therapy are possible only by interdisciplinary means, with the cooperation of representatives of linguistics, including computer linguistics, medical and health sciences. The first step in this direction could be the targeted formation of speech and writing corpora according to certain external factors. Firstly, by qualitative analysis of texts (oral and written), it is possible to prepare the basis for a systematic study with corpus linguistic and computer linguistic methods (for comparison, see, e.g., ALMED) [34]. Reliable results could be obtained from cohort studies. The question of the universal and linguistic specific nature of AD symptoms is key in this context. The results of studies based on different languages suggest that both options should be taken into account. In terms of the situation of languages in Latvia, the research potential can also be seen in the study of the role of bilingualism. Linguistic analysis of AD symptoms and interpretation of results in accordance with a detailed structured description of patients' linguistic experience, which would include linguistic competence and life experience – linguistic knowledge and use, belonging to a particular sociolect, field of education, oral and written experience, could be equally important.

To conclude this brief insight into research issues and opportunities, the need for an up-to-date, societal-relevant and science-based long-term research strategy should be highlighted.

REFERENCES

1. Busch A., Spranz-Fogasy Th. (eds.). *Handbuch Sprache in der Medizin*. Berlin, Boston: Walter de Gruyter 2015 (= *Handbücher Sprachwissen*. Bd. 11).
2. Peuser G. *Sprachstörungen: Einführung in die Patholinguistik*. München: Wilhelm Fink 2000.
3. GAL. <https://gal-ev.de/sektionen> (3/29/2023).
4. Locher W. *Medizinische Terminologie*. https://www.egt.med.uni-muenchen.de/studium_lehre/terminologie-fohlen.pdf (3/29/2023).
5. MEMRiSE. <https://app.memrise.com/course/441186/medizinische-terminologie-grundwortschatz> (3/29/2023).
6. EHLION. <https://ehlion.com/magazine/medical-terminology-list> (3/29/2023).
7. Viņķele R. *Medicīnas svešvārdu vārdnīca (15 000)*. Rīga: Avots 2007.
8. Sviķe S., Gorbunovs A., Veckalne A., Šķirmante K., Kaija I. *Medicīnas terminu vārdnīca: mobilās lietotnes izstrādes metodoloģija un izmantotie digitālie resursi*. In: Smiltņiece G., Lauze L. (eds.). *Vārds un tā pētišanas aspekti: rakstu krājums 24 (1/2)*. Liepāja: LiePA 2020: 412–424.
9. Viegļā valoda. <https://www.vieglavaloda.lv/lv> (3/29/2023).

10. Liepa D., Polinska V. (eds.). Viegļā valoda. Rokasgrāmata. Rīga: LU Akadēmiskais apgāds 2022.
11. LLVA. Latvijas Lietišķās valodniecības asociācija. www.llva.lv (4/4/2023).
12. Karičkina E. Alzheimer slimības anatomija – riski, ārstēšanās un samierināšanās. <https://www.santa.lv/raksts/ievasveseliba/alcheimera-slimibas-anatomija-riski-arstesanas-un-samierinasanas-29372/169/part> (4/4/2023).
13. Deviņi simptomi – Deviņi agrīni Alzheimer slimības simptomi. <https://www.mammamunteti.lv/skaistums-un-veseliba/slimibu-apraksti/50410/devini-agrini-alcheimera-slimibas-simptomi> (4/4/2023).
14. Sprachleitfaden „Demenz“. Wie sprechen wir über Demenz in einer angemessener Weise? Deutschsprachige Alzheimer- und Demenz-Organisationen 2020. <https://www.deutsche-alzheimer.de/fileadmin/Alz/pdf/Broschueren/Sprachleitfaden-Demenz-INTERNET.pdf> (3/29/2023).
15. Language Dementia Guidelines. Dementia Australia 2021. <https://www.dementia.org.au/sites/default/files/resources/dementia-language-guidelines.pdf> (3/29/2023).
16. Alzheimer's Society. <https://www.alzheimers.org.uk/about-dementia/symptoms-and-diagnosis/symptoms/dementia-and-language> (3/29/2023).
17. DAG. <https://www.deutsche-alzheimer.de/demenz-wissen> (3/29/2023).
18. Schecker M. Pragmatische Sprachstörungen bei Alzheimer-Demenz/Pragmatic Language Disorders in Alzheimer's Disease. Sprache. Stimme. Gehör. 2010; Jan; 34: 63–72. DOI: 10.1055/s-0030-1254094
19. Krupp S., Thode P. Sprache bei Demenz. Speech in Patients with Dementia. Sprache. Stimme. Gehör. 2016; 40 (3): 126–130. DOI: 10.1055/s-0042-108255
20. Knels Ch. Sprachstörung bei Demenz. Sprache. Stimme. Gehör. 2014; 38 (4): 155. DOI: 10.1055/s-0040-100321
21. Schmöe F. Sprachabbau bei Demenz vom Alzheimerstyp. In: Eins W., Schmöe F. in collaboration with Pretschner S. (eds.). Wie wir sprechen und schreiben. Festschrift für Helmut Glück zum 60. Geburtstag. Wiesbaden: Harrassowitz Verlag 2009: 205–216.
22. Schecker M. Sprache und Demenz. In: Fiehler R., Thimm C. (eds.). Sprache und Kommunikation im Alter. Radolfzell: Verlag für Gesprächsforschung 2003: 278–292.
23. Weiner J., Frankenberg C., Telaar D., Wendelstein B., Schröder J., Schultz T. Towards Automatic Transcription of ILSE – an Interdisciplinary Longitudinal Study of Adult Development and Aging. In: Calzolari N., Choukri Kh., Declerck Th., Goggi S., Grobelnik M., Maegaard B., Mariani J., Mazo H., Moreno A., Odijk J., Piperidis S. (eds.). Proceedings of The Tenth International Conference on Language Resources and Evaluation (LREC'16). Portorož, Slovenia: European Language Resources Association (ELRA). 2016; May 1: 718–725.
24. Knels Ch. Kommunikativ-pragmatische Störungen bei Alzheimer-Demenz/ Communicative-Pragmatic Disorders in Alzheimer's Dementia. Sprache. Stimme. Gehör. 2020; Apr 21; 44 (2): 90–94. DOI: 10.1055/a-1043-7822
25. Wendelstein B. Gesprochene Sprache im Vorfeld der Alzheimer-Demenz: Linguistische Analysen im Verlauf von präklinischen Stadien bis zur leichten Demenz. Heidelberg: Universitätsverlag Winter. 2016.

26. Yang Q., Li X., Ding X., Xu F., Ling Zh. Deep learning-based speech analysis for Alzheimer's disease detection: a literature review. *Alzheimer's Research & Therapy*. 2022; Dec 14; 14 (1): 186. DOI: 10.1186/s13195-022-01131-3
27. Abel S. Störungsspezifische Sprachtherapie für Personen mit Aphasie bei Demenz. Vergleich von drei Studien zur Therapie des Wortabrufs bei Patienten mit gefäßbedingter Aphasie, Primär Preogredienter Aphasie und Alzheimer-Demenz. *Forum Logopädie*. 2013; Sept; 5 (27): 28–33. DOI: 10.2443/skv-s-2013-53020130504
28. Vincze V., Szabó M. K., Hoffmann I., Tóth L., Pákáski M., Kálmán J., Gosztolya G. Linguistic Parameters of Spontaneous Speech for Identifying Mild Cognitive Impairment and Alzheimer Disease. *Computational Linguistics*. 2022; Mar; 48 (1): 43–75. DOI: 10.1162/COLI_a_00428
29. Weiner J., Herff C., Schultz T. Speech-Based Detection of Alzheimer's Disease in Conversational German. *Proc. Interspeech*. 2016; Sept 8–12: 1938–42. DOI: 10.21437/Interspeech.2016-100
30. Gosztolya G., Vincze V., Tóth L., Pákáski M., Kálmán J., Hoffmann I. Identifying Mild Cognitive Impairment and Mild Alzheimer's disease based on spontaneous speech using ASR and linguistic features. *Computer Speech & Language*. 2019; Jan; 53: 181–197. DOI: 10.1016/j.csl.2018.07.007
31. Khodabakhsh A., Yesil F., Guner E., Demiroglu C. Evaluation of linguistic and prosodic features for detection of Alzheimer's disease in Turkish conversational speech. *EURASIP Journal on Audio Speech and Music Processing*. 2015; Mar 25; 2015: 9. DOI: 10.1186/s13636-015-0052-y
32. Agbavor F., Liang H. Artificial Intelligence-Enabled End-To-End Detection and Assessment of Alzheimer's Disease Using Voice. *Brain Sciences*. 2023; 13: 28. DOI: 10.3390/brainsci13010028
33. Perani D., Farsad M., Ballarini T., Lubian F., Malpetti M., Fracchetti A., Magnani G., March A., Abutalebi J. The impact of bilingualism on brain reserve and metabolic connectivity in Alzheimer's dementia. *Proceedings of the National Academy of Sciences of the United States of America*. 2017; Jan 30; 114 (7): 1690–1695. DOI: 10.1073/pnas.1610909114
34. ALMED. https://www.uni-bremen.de/en/csl/projects/current-projects/almed?sword_list%5B0%5D=tisch&cHash=4b062c70c10649debb45c418bc82b3bb (3/29/2023).