

Received: 12.01.2015
Accepted: 28.09.2015

A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

DOI:10.5604/17307503.1184047

THE NEUROLINGUISTICS OF THE US/THEM STRUCTURE IN APHASIA

Maria Paçhalska^{1,2(A,B,D,E,F)}, **Jolanta Góral-Półrola**^{3(A,B,D,E)},
Grażyna Jastrzębowska^{4(A,D,E,F)}, **Anna Rasmus**^{5(A,B,F)},
Bożydar L.J. Kaczmarek^{6(A,E,F)}, **Bruce Duncan**
MacQueen^{7(A,B,D)}, **Agnieszka Małek**^{8(A,D,E)}

¹ Chair of Neuropsychology, Andrzej Frycz Modrzewski University, Krakow, Poland

² Center for Cognition and Communication, New York, NY, USA

³ Old Polish University, Kielce, Poland

⁴ Department of Applied Linguistics, University of Opole, Opole, Poland

⁵ Institute of Psychology, Kazimierz Wielki University, Bydgoszcz, Poland

⁶ University of Economics and Innovation, Lublin, Poland

⁷ Department of Languages, University of Tulsa, Tulsa, OK, USA

⁸ Department of Physical Culture Pedagogy, Gdańsk University of Physical Education and Sport, Gdańsk, Poland

SUMMARY

The aim of the paper was to show the importance of distinction between US and THEM which is disrupted in the patients with aphasia and leads to social isolation. It should be stressed that the distinction between US and THEM is deeply rooted in culture and language. It has great social and psychological significance since foreigners – speaking imperfect language are as a rule excluded from the society. Hence, aphasic persons tend also to be excluded and they become an object of pity. Neurolinguistic aspects of aphasia are also discussed. It is stressed that the structure of person and number constitute essential conditions (along with time) for the proper use of verbs.

After presenting difficulties encountered by classic theories of aphasia a microgenetic theory is described with emphasis put on its possibility to explain aphasic symptoms. It presumes that every speech act re-creates and passes through, in a matter of milliseconds, the entire sequence of processes that has unfolded in the evolution of the species and the growth of the individual, from the primitive medullary reflexes (ME/NOT-ME), to the emotional reactions controlled by the limbic system (ME/YOU) to the cortex.

The paper ends with a presentation of the patient CW who is unable to discriminate from the present or the past. The result of his “mental wandering” in time is that his subjective time cannot be coordinated with objective time, and that is a precondition for coordinating the subjective time of one person with that of another. Such coordination is in turn vital to the formation of a concept of US.

Key words: symptom, short-term memory, imagination, attention, anomia, periphasias

INTRODUCTION

Throughout human history we have sought to understand illness as a means of relieving its symptoms, particularly with respect to devising treatment options in the hope of developing cures (Stefano et al. 2015). The technologies available today for improving symptoms and enhancing the chances of finding rapid cures/treatments now offer opportunities for advancing empirical knowledge, especially into the realm of personalized medicine whereby target therapies will provide for more precise outcomes on an individual basis.

Nonetheless, effective communication concerns must be taken into account since denial of determinations/advanced knowledge based treatments associated with novel technologies may be dependent on issues of access, as well as the availability of financial resources. Thus, it is evident that our understandings of neurolinguistics have brought us both optimism and significant concerns.

Language and affinity

For the ancient Greeks, from at least the 6th century BCE, the human race as a whole was divided into two fundamental groups: Hellenes and barbarians. Both of these terms are of some interest historically. The history of the term “Hellene” (known to Homer in the 8th century BCE only as the name of a relatively unimportant Peloponnesian population, but well established by the 6th century BCE as the name for “Greek”) constitutes a condensed lesson on the history of Greek culture and political thought (Cancik and Schneider 1997, s.v. *Hellenes*). Readers of this volume surely need not be reminded, that in order to *know* who we are, we must be able to *say* who we are.

For our purposes, however, the second term, “barbarian,” is more interesting. Although the derivation of the word *barbaros* is not completely clear, its phonetic structure in the context of the normal phonology of the ancient Greek language is distinctly odd, leading to the speculation (which apparently began in antiquity) that it originated as a kind of onomatopoeia for the speech of foreigners: a barbarian is someone who walks about saying “bar-bar” instead of using intelligible words (Liddell and Scott 1996).¹ All the other (mostly negative) connotations associated with the word “barbarian” are derived from the stereotypes that prevailed among the Greeks pertaining to the peoples who surrounded them, but these are secondary developments. The fundamental denotation of *barbaros* is linguistic: a barbarian is a person who does not speak “our” language, even when that person is a representative of a culture (Persian, Egyptian) that is significantly older and in many ways more developed than the Greek.

The point of this brief historical excursus at the beginning of a text devoted to the neurolinguistic aspects of US/THEM may not be self-evident, but it is not difficult to explain: from the very beginning of European culture, as we see, US/THEM is not so much a product of culture as a determinant of culture, since

¹ Cf. the almost certain derivation of the Polish word for “German”, Niemiec, from niemy ‘mute, non-speaking.’

it is embedded deep in the basic structures of language, and language is a determinant, more than a product, of culture. Can the case be made, then, that US/THEM is also an aspect of language in its neuropsychological and neurolinguistic (and not merely cultural) dimensions?

As anthropologist Desmond Morris points out (1969), one of the major functions of language from the perspective of cultural anthropology is to unite-and-divide. That this is here expressed as one function may seem paradoxical at first, but of course it is not: a group cannot be formed in any other way than to bring together (unite) a certain number of people and then divide them from all others. The possession of language *qua* language is among the most commonly mentioned features separating the human being from other animals, while the possession of a common language is often a much more effective criterion for establishing a sense of nationhood than other characteristic features that could be used for that purpose (ethnicity or “race”, religion, culture, geography, shared historical experience, etc.). Conversely: the recent history of many countries suffices to justify the conclusion that a language barrier is a disintegrating factor within a given country or nation, which is only with the greatest difficulty kept under control.

The concept of “language barrier” introduced here is most commonly used in the ordinary situation, in which people from one country do not know the language spoken by the inhabitants of another country, or when persons living in the same country do not speak the same language. In recent times, however, we have become aware of the existence of language barriers even within a given language community, when the members of a particular group within that community use various lexical, phonological, and even – though perhaps more rarely – syntactical structures that may not be familiar to other speakers of the same language. This leads on one level to the situation so aptly described by Sir Winston Churchill’s famous oft-quoted jest: “The British and the Americans are two peoples separated by a common language”; on the other, to intergenerational conflicts, the creation of various kinds of professional jargon, and so forth.

For example: When an English sentence begins with the words, “This patient presents with...” a great deal of information about the speaker is immediately made available: the use of *patient* in a noun rather than adjective position suggests a medical context, while the peculiar intransitive use of the normally transitive verb “presents” complemented by a “with” PP removes any lingering doubt that the speaker is a medical professional, since such a construction would not appear well-formed outside of the medical environment. There is a great deal more information to be derived from this sentence fragment, of course, particularly as pertains to genre and context, but for the present purposes the most important aspect of the example given here is that its lexical and semantic features serve to place the speaker within a fairly well-defined social group – or, to be somewhat more cautious and more precise, that the speaker is making a patent attempt to place him/herself within that group, implicitly including or excluding his/her listeners, depending on who they are (Duszak 1998).

This process of inclusion (US) and exclusion (THEM) is not a simple one. Each individual stands at the center of a series of more or less concentric circles defining different groups that in varying contexts make up US and THEM. The following table is an attempt to schematize this system, at the risk of a certain simplification:

| US | THEM |
|--|---|
| family and close friends (whether or not the latter belong to this innermost circle depends on the individual and the culture) | strangers (in the sense of the word usually used in conversation with children, as those with whom it is best not to speak) |
| residential community (where the structure and dimensions are dependent on the place where the person lives) | outsiders (people who live "somewhere else") |
| vocational community (using "vocational" in the broadest sense, as pertaining to a particular social role or niche to which a person subjectively and/or objectively belongs) | "laymen" (with great variation in particular terminology; within a given vocational community there is almost always a rather specific term for THEM) |
| primary political affiliation (depending on the cultural and historical context, there can be more or fewer layers of political affiliation, but in most cases one such layer is primary for a given person, esp. psychologically) | foreigners |

Of course as one proceeds from the innermost to the outermost circles the role of language changes, generally from language 'parole' to language 'langue.' Children recognize strangers not only by sight, but also by voice and manner of speaking (especially suprasegmental aspects of speech: rhythm, pitch, intonation). Outsiders may belong to the same language community as ourselves, but their choice of words and/or their "accents" place them within a different regional, vocational, or generational group, a metalinguistic judgment which is typically made by both parties in the conversation after only a few words have been exchanged.

The skills required to place oneself in a particular language community, and in one or more smaller groups within that community, are like all language skills acquired in the course of normal development, beginning in early childhood and continuing (or not) throughout life. An adult who is functioning normally within a given language community (is fully one of US) possesses certain reserves of information stored in long-term memory that are available for immediate activation at virtually any moment, though at a given point in time only a minute fraction of these resources are actually in use. When a person does not possess those reserves (lexical, syntactical, phonological), or when they are not *immediately* available, that person's speech becomes either unintelligible or sufficiently different as to mark him or her as "not one of US." Thus within the actual or virtual confines of a given language community (US in the present sense of the term) there are essentially three groups of people who, for lack of command of the rudiments of the language, constitute THEM:

1. those who do not know OUR language, because they know a different language, i.e. foreigners;
2. those who have never learned any language, i.e. children or adults with various kinds of developmental disorders;
3. those who once possessed a command of the language, but have lost it, i.e. persons who have forgotten the language due to disuse, or persons who have lost their language capabilities due to some kind of catastrophe, physical or emotional.

The causes and consequences of belonging to THEM, and not to US, are different for each of these groups. Of course, a foreigner is only a foreigner outside of his own language community; when we are in their territory, we become THEM and they are US. The foreigner who lives with US and wants to become one of US will necessarily have to learn OUR language in order to assimilate, and in many cases the difficulties involved in fully mastering the lexicon, morphology, syntax, phonology and pragmatics of the new language cause a persistent “foreign accent,” clearly signaling that this person does not fully belong to US, or at least, once belonged to THEM.

The group consisting of small children and the developmentally disabled differ from foreigners in that they have never clearly belonged to some other community. Infants are simply accepted as belonging to US even without holding the prerequisite command of language, because it is assumed that they will learn to speak and thus enter into personhood, or rather, “US-hood”. The developmentally disabled, on the other hand, present a different problem, but the number of cases involved here (assuming that this is global alalia) is extremely small, though this is not the only reason that such persons are typically marginalized.

Those readers familiar with the theory and practice of neurolinguistics (Whitaker 1998, Goodglass 1998, Luria 1970) will of course realize that the bulk of the present chapter will be devoted to the third group mentioned above, and in particular to persons with aphasia, the acquired inability to express oneself verbally due to brain damage (Pąchalska 1999).

A review of the scientific literature on aphasia will reveal many different definitions of this disorder, which only to a distinctly limited extent can be reconciled with each other (Pąchalska 1999, Goodglass 1993). Fortunately, the salient feature of aphasia that is most important for the present purposes happens to be one that occurs in virtually every definition of aphasia: namely, that aphasia is an *acquired* disorder. In other words, persons afflicted with aphasia once possessed a normal command of the language appropriate to their respective level of education, social class, profession, and so forth, but as a result of physical damage to the brain (due to a stroke, an accident, the progress of a degenerative disease, and so forth) they have lost that command and are unable to function normally within the language community to which they previously belonged.

The language barrier created in this way is thus rather different from the kinds of language barriers familiar enough to most readers in both theory and practice,

as described somewhat earlier, because rather than existing from the outset, as in the case of foreigners and children, it appears unexpectedly, *in medias res*, as it were. Depending on the nature and extent of the damage to the brain, the person affected may be to a greater or lesser extent aware of having been excluded from the language community, but from the outside perspective the change in status is both immediate and evident. The concentric circles described earlier drop away, in varying order and to varying extent depending on the situation, though for most patients the most immediate exclusion is from the pre-morbid profession and from various kinds of social groups. Unfortunately, exclusion even from the family circle is not an isolated phenomenon.

At the same time, the aphasic person enters into another language-defined group: namely, “aphasia patients.” Prior distinctions of race, age, social status, education and so forth are wiped out and replaced by a distinction between those who can still speak normally and those who cannot. This constitutes in fact one of the basic rationales for group therapy in aphasia (Pąchalska 1999, 1986; 2007; Lindsay et al. 2000), that the patient finds psychological support among other patients, not merely or even primarily because they “understand,” but rather because the language disturbance is here an inclusion criterion, where in all other groups (including very often the immediate family) it is an exclusion criterion.

The foregoing implies that the breakdown of the US/THEM structure in aphasia should be viewed both subjectively (i.e. from the point of view of the patient looking out at the world) and objectively (i.e. from the point of view of the outside world looking at the patient), since the process of exclusion and inclusion is taking place simultaneously from both directions (Sarno 1988, Holland 1977, Pąchalska 1999): that is, the environment is making implicit or explicit decisions as to the exclusion of the aphasic patient from various groups to which s/he previously belonged, while the patient (apart from perceiving or failing to perceive what the environment is doing) loses interest in some groups and acquires interest in belonging to others.

Some version of what has here been described as the “objective exclusion process” occurs in the aftermath of any major illness or injury². The very use of the word “patient” assigns the person thus designated to a particular group, in which all other social and biological distinctions are erased in favor of one inclusion criterion: the existence of a pathological condition. Aphasia, however, has a particular devastating social impact, because it strikes directly at speech and language, which are crucial elements in a person’s identity. Those who work closely with aphasia patients and their families are accustomed to hearing remarks by visiting friends and family members along the lines of “That’s just not the same person I knew before,” or “I feel like I’m dealing with a total stranger who just happens to look like my Dad.” These remarks are as revealing as they are common. For all the emphasis in recent years on the importance of non-verbal communication, it remains an inescapable fact that our most essential knowl-

² For that matter, even minor illnesses lead to a certain kind of isolation, but that topic would be digressive here

edge of the persons around us is based on what they say. When verbal contact is lost or rendered very difficult, other kinds of contact over the long run do not fill the gap.

The change in attitude towards a person with aphasia is also made evident in the suprasegmental aspects of the speech directed to the aphasic patient from the environment. In conversing with an aphasic it is of course necessary to speak somewhat more slowly, more clearly, and more simply than usual. What often results, however, is that most visitors talk to the patient as though to a small child, or to the stereotypical 99-year-old hard-of-hearing old maid aunt. In many cases this is observed by the patient and becomes the source of enormous humiliation and frustration. In this context, however, it is important to note the almost automatic and instinctive posture adopted by the environment: that we are no longer dealing with an adult, but with a child or a person in advanced old age. This is simply exclusion: the patient no longer belongs to US, and the tone of voice we use (regardless of the context) sends that message very clearly and very compellingly.

At this point, however, some important distinctions must be made. The clinical picture of aphasia is far from uniform. The enormous number of variables that inform the premorbid idiolect of the patient naturally effect the results of a pathology, measured as an undesirable change from the pre-existing norm. Moreover, the effects of brain damage on the language apparatus as a whole are selective, depending on size and location. For all the debates and controversies surrounding the issue of localization, it remains an inescapable fact that various components of language processing can be and typically are selectively disturbed by particular lesions (see below). The goal of “mapping” the brain to identify exactly which functions are performed in exactly which area has so far eluded us, and may never in fact be achieved, given the growing suspicion that it is an ill-formed goal (Pąchalska, Kaczmarek & Kropotov 2014). Nevertheless, the selectiveness of aphasia-related speech and language dysfunctions is an obvious fact, and its importance for the present discussion is considerable.

For the last two decades or so what is generally referred to as the “Boston school” of aphasia research (Goodglass 1993, Pąchalska 1999) has proposed a very general symptomatological division of aphasia into two types:

- “non-fluent” aphasia, in which the patient’s verbal output is sparse, produced with difficulty, frequently telegraphic, deprived of most functor words, and characterized by pathologies of naming (anomia, periphasias);
- “fluent” aphasia, in which the patient speaks freely, retaining at least in large part the rhythm and melody of normal conversation, but the text is almost impossible to understand semantically: bizarre word substitutions, phonemic paraphasias, neologistic jargon, sometimes simply babble vaguely resembling the prelinguistic output of small children.

Beyond the division of aphasias into fluent and non-fluent, the scope and nature of classification becomes difficult, obscure, and controversial, but fortunately this is not a something of vital importance for the present discussion. What mat-

ters here is that in non-fluent and fluent aphasia the constellation of lost and preserved speech and language capacities is sufficiently divergent that the impact of aphasia on the US/THEM structure differs fundamentally. This results from the complex interaction between cognition, language, and emotion. Simply stated:

- The patient with non-fluent aphasia is typically fully aware of his or her aphasia. S/he most often has a fairly clear notion of what s/he would like to say, but for various reasons is unable to produce a clear and understandable utterance that successively realizes the underlying notion. The result is considerable frustration, very often leading to depression, anxiety, outbursts of aggression and auto-aggression, and withdrawal from transactions that the patient is sure cannot possibly be completed successfully. This patient is thus often ashamed of his/her speech and may not use even those limited speech and language capacities which remain intact for fear of ridicule. It is very common for such patients to refuse to receive visitors from work or social groups, or even family.
- The fluent aphasic, by contrast, typically has only a limited awareness of the existence of a speech problem. S/he may at times react with frustration to the apparent dullness or perverseness of the interlocutor who cannot understand, or pretends not to understand, what for the speaker is a perfectly sensible utterance. Though there are certainly exceptions to the rule, this patient is typically cheerful, even unnaturally so, and unlike the non-fluent aphasic does not avoid speaking or shy away from old friends.

It is obvious that the environment will react differently to each of these patients. Both fluent and non-fluent aphasia are frequently mistaken for dementia, but the fluent aphasic, due to the characteristic nonsensical utterances and sometimes unnatural cheerfulness, is especially likely to be received as being "mentally ill." The non-fluent aphasic very often deliberately withdraws from social contacts of any kind and refuses to admit even well-meaning visitors, many times falling ultimately into deep depression. Conversely, the gregariousness of the fluent aphasic continually promulgates the fact that this person is no longer capable of normal social interaction. The result, then, is much the same. The patient becomes the object of pity or even revulsion, former acquaintances avoid now painful and sometimes embarrassing contacts, and even the family tends to regard the aphasia patient more as a problem and a burden than as a member of the family. Ultimately the patient no longer belongs to US on any level, and the world is divided into ME and THEM.

What we have been describing to this point consists primarily in the psychosocial consequences secondary to aphasia. As mentioned previously, similar phenomena may be observed in patients with other catastrophic illnesses (neoplastic diseases, paraplegia, cardiac insufficiency, etc.), though in each case the specifics of the symptomatology create different circumstances and thus somewhat different outcomes. It remains to be considered here, however, whether the destruction of the various layers of the US/THEM relationship caused by aphasia

may in some dimensions and to some extent constitute a direct, i.e. primary result of brain damage, rather than exclusively a secondary, psychosocial reaction to the symptomatology of aphasia. Perhaps there are particular cognitive and emotional deficits which result from the dysfunction or destruction of brain tissue, and which cause particular pathologies of perception and behavior that in turn produce the negative reactions seen in both their patients and their psycho-social environment.

It may be best to begin, then, by a closer look at the cognitive dimension. The ability to recognize particular individuals as belonging or not belonging to one's immediate family is a function of the limbic system, and to a certain extent of yet deeper and phylogenetically older layers of the central nervous system, such as the brain stem and the cerebellum. Even lower order animals with much more primitive nervous systems than ours are capable of recognizing individuals as "friend or foe," where "friend" generally means "belonging to the same species," while a "foe" is any animal who belongs to a different species. The instinctive responses mediated by this layer of the central nervous system can be reduced to attraction/repulsion, i.e. movement towards or away from the friend or foe respectively. Conversely, patients with very deep lesions affecting subcortical structures or brainstem sometimes lose not only the ability to recognize faces, but even to recognize the fact that what they are seeing at this moment is actually a face.

The identification of persons as being "familiar"—US or "strange"—THEM (both words deserves a moment's reflection on their etymology) belongs to the basic functions of the primary associative core, located primarily in the posterior lobes of the cerebral cortex and closely associated with memory. One of the first conscious judgements we make when we encounter someone is the decision as to whether or not this is someone we know (have seen before). The inability to recognize faces (aprosopognosia) is commonly encountered in patients with posterior lesions, especially to the right hemisphere. As is generally known, dogs make this decision on the basis of scent, rather than vision, but the analogy is still present: the dog classifies a scent as "previously encountered" or "not previously encountered," and then, depending on the associations residing in the memory, further classifies individuals into "friends" or "enemies," reacting appropriately. This process (in dogs and humans alike) takes a moment longer than the instinctive, virtually medullary or cerebellar reaction described earlier, which is essentially a reflex.

The classification of persons as belonging or not belonging to the same political group as ourselves ("Hellenes" and "barbarians") is a higher order cognitive skill required a healthy and well-developed cortex, since this is to a large extent a conscious judgement made on the basis of learned criteria. The tendency of patients with aphasia to withdraw from contacts and more or less deliberately narrow the circles of their social contacts and acquaintances was explained above in psycho-social terms, but we may now be prepared to consider the possibility of an organic component here, too. The antisocial behavior often noted in patients with lesions in the prefrontal region (Damasio 1994) may in fact represent

to some extent the inability of the individual to identify him- or herself as belonging to a given social unit, and thus bound by its rules.

It may seem at this point that we have wandered rather far from the subject of language, in the direction of behavioral neuropsychology (or “neurobehavioral psychology”). Since, however, language use from the point of view of neuropsychology is a certain kind of behavior, and not so easily separated from the whole of human behavior, the digression is not nearly so extreme as it may have appeared. If, as we have suggested, the US/THEM structure is “built in” to our brains, and if the structure of language is a reflection in some sense of the structure of our brains, then two conclusions follow: first, that the US/THEM structure must be “built in” to language as well, and secondly, that brain damage may indeed be a direct cause of the collapse of the US/THEM structure on the linguistic, cognitive, behavioral, and social planes.

THE NEUROLINGUISTICS OF THE US/THEM STRUCTURE

The US/THEM structure is only one part of the entire system used by language to establish the relationships among persons. The traditional grammar of Indo-European (and many other) languages provides six possibilities resulting from the existence of three persons and two numbers. It may be worth noting that this is not necessarily the inherent structure of reality itself, as witness the fact that other languages provide more or fewer possibilities in this respect. In the proto-Indo-European language there clearly existed at least a third number, the dual, traces of which can be seen in ancient Greek, Latin, and other IE languages. In Chinese grammar, on the other hand, the notion of person as an aspect of morphology or flexion essentially does not exist. Of particular interest in the present context is the existence in some Amerindian languages (e.g. Cherokee) of two morphologically distinct forms of the first person singular: one that expresses “I and you”, excluding the third person, and other that expresses “I and they,” excluding the second person.

Be that as it may, however, we may assume for the sake of argument here the structure of three persons and two numbers as something other than an arbitrary rule that serves to assign meaning to a conventional symbol; rather, this structure emerges from the inherent structure of reality as we experience it. This is not, however, so much a static, objective structure existing in the world “out there” as it is a dynamic and subjective process, shaped ontogenetically in an evolutionary process which, like most developmental processes taking place in the growth of an individual, constitutes at once a replica in miniature of phylogenesis. It is also necessarily connected in a particular way to the ontogenesis and phylogenesis of the central nervous system, since the successive steps in that process require ever more sophisticated neural structures, which are supplied as the mature brain emerges (ontogenetically and phylogenetically) in a general outward movement from mid-brain to cortex.

Phases in the ontogenesis of person and number

The work of the structuralists (Piaget 1930, and others, with the significant influence of Freud and the psychoanalysts) has revealed certain stages in the dynamics of ontogenesis, which with certain modifications (and simplifications) can be applied to the topic at hand. From our perspective, which is neuropsychological and neurolinguistic, we may distinguish four distinct stages in the development of language:

- **primordial chaos.** Here everything is at once objective and subjective, and nothing is centered as “I” or “you”. The child is an extension of his/her mother and vice versa. At this stage there is no speech as such, simply reflex noises, especially crying, which function in a very simple stimulus-response loop not far from reflex.
- **egocentrism.** The world is divided into “I” and “not-I,” interior and exterior, subjective and objective. Things and people have names (i.e. a given phenomenon is regularly, permanently associated with a particular string of sounds). The child begins to learn pragmatics: different kinds of verbalization (crying and laughing) produce different effects in the environment. The cortex is not yet fully formed and the neural networks characteristic of the adult brain are as yet inchoate; for all practical purposes there is no hemispheric lateralization.
- **communication:** “I” and “you” enter into a relationship that now begins to be defined linguistically. The first verbs to be uttered and understood are imperatives (2nd person), and their first use represents for the family the real advent of speech. The child says “cookie”, not so much to name the cookie, as to ask for one. Speech is still a synchronic process of immediate stimulus-response, but the roles of sender and receiver in the act of communication have begun to be differentiated. At this stage, however, whatever is not first-person-singular is second-person-singular. The cortex is now fully formed and neural networks representing the effects of constant learning are sprouting exuberantly, but there is little specialization, as indicated by the fact that a focal lesion occurring at this stage of development produces generalized effects rather than specific symptoms explicable in terms of function.
- **objective thinking.** With the emergence of the third person it becomes possible to think and talk about phenomena in various temporal and spatial relationships, include persons and things that are not physically present at the moment of speaking. The world begins to be sorted into three persons, singular and plural, and their mutual relations established. This is a precondition for adult speech, while speech in which the morphological and or lexical elements of person and number are missing or mishandled is considered characteristic of very small children, extremely stupid people, and foreigners: i.e. the speech of THEM, and not US. Not only is there a slowing of the process of neural network sprouting, there is in fact a considerable amount of necrosis: apparently the maturing brain begins to discard non-essential connections and pathways.

It emerges rather clearly from the foregoing that the structure of person and number is not an accident of “proper” grammar, a “regulative rule” in J. D. Searle’s terminology (1998, 1983), but rather a precondition for fully formed speech, a “constitutive rule.” This structure is expressed linguistically in most languages through morphological and/or lexical signs that constitute essential conditions (along with time) for the proper use of verbs, which in turn is a necessary precondition for the construction of sentences. Thus it is a matter of both deep and surface structure (to use Chomsky’s older, 1965 terminology). Insofar as “deep structure” is in fact “brain structure,” then, we have gone full circle and returned to the original thesis. It remains to be seen, then, how the structure that develops in the way briefly described here can be damaged or destroyed by a lesion.

For all the great variety of theories regarding the fundamental pathomechanism of aphasia, there are in fact only two general theories (Goodglass 1993, Brown 1988):

- If a speech act is effected in a series of steps, during which information conceived in the mind is conveyed to and from specific centers in the brain and successively processed until it emerges through the operation of the speech organs, then the model proposed by Wernicke and Lichtheim (Wernicke 1874, Lichtheim 1884) is essentially correct, subject to occasional revisions and modifications: a lesion destroys or damages a particular center, which is thus rendered incapable of performing its particular task, as suggested by the Father of Aphasiology, Paul Broca (1863), or it cuts a connection between centers, so that the necessary information does not travel to its next destination, thus interrupting the process (Goodglass 1993). It is difficult to deny the logic of this interpretation, which effectively explains a great deal of what is observed in clinical practice (Damasio 1995). There are several weaknesses, however, perhaps chief among which for our purposes here is that it can satisfactorily explain the failure of the speech act, but not its distortion.
- If, on the other hand, a completed speech act is the product of a process that entails the entire brain working as a whole, as suggested by Hughlings Jackson (Taylor 1958) in a theory that is periodically revived in various forms (Head 1926, Goldstein 1948, Dressler 1995), then a lesion depending on its severity reduces the overall effectiveness of that process and the end product is thus distorted. This approach explains many of the clinical features of aphasia that the anatomical locationist approach cannot explain, but the problem of the location effect then remains unexplained. Though much has been made (probably rightly) of the notable exceptions to strict locationist theory, the fact remains that lesions in particular places tend to produce particular symptoms with a regularity that is to say the least far beyond random (Goodglass 1993, Damasio 1995).

This is not the time or place to attempt to unravel all these difficulties, which have exercised aphasiologists for many decades and will certainly continue to do so. Of particular interest for our purposes, however, is the attempt to apply microgenetic theory to aphasiology (Brown 1988), in that it may provide a way to meet the arguments advanced by both proponents and opponents of locationist theory.

In accordance with microgenetic theory (Brown 1988), every realized speech act re-creates and passes through, in a matter of milliseconds, the entire sequence of processes that has unfolded in the evolution of the species and the growth of the individual, from the primitive medullary reflexes (ME/NOT-ME), to the emotional reactions controlled by the limbic system (ME/YOU), through the white matter to the cortex, where the concept of number is added to the fully developed system of grammatical persons. Thus a statement expressed in the first person plural (US) or third person plural (THEM), regardless of its emotional or cognitive content or value, is the culmination of a cerebral process (lasting milliseconds) defining similarities and differences in order to clearly identify who is US and who is THEM (ME, YOU, HIM, HER, IT). Since this is in a rather strict and literal sense of the term an *evolutionary* process, the earlier, more primitive stages are not superseded or replaced by the later stages of development, but rather remain in place and fulfill their original function.

Since this process is coincident with a general movement from lower to higher and inner to outer layers of the brain and central nervous system, which is to say, from older (phylogenetically and ontogenetically) to younger (likewise), it is at one and the same time a functional and anatomical explanation of the formation of a speech act. The final product of the completed speech act represents the visible apex of an evolutionary tree that lies almost entirely under the surface and invisible. What a lesion does, as Brown explains it, is to block or divert some portion of this process, so that an earlier stage, rather than being subsumed and concealed in the final product, emerges unexpectedly to the surface in an anomalous speech act that no longer embodies what we expect to hear from an adult native speaker of the language. Rather than interpret this anomaly as a mistake, however, we should view it as *a well-formed speech act prematurely brought to the surface*.

This theory explains an interesting phenomenon observed clinically for many years and noted by Alexander Luria, among others. The speech of an aphasic often resembles in certain respects the speech of small children, differing primarily in the degree of self-criticism exhibited by the speaker, who in many cases (especially in non-fluent aphasia) retains the ability to recognize his or her own speech acts as being anomalous (Blumert 1998). The same applies to the environment: that which is easily tolerated and even indulged in children is very difficult to accept coming from the mouth of an adult; for the members of the immediate family, it is often painful or embarrassing, or both, and the tendency to keep the aphasic family member out of public sight to avoid humiliation is

among the factors leading to a degree of social isolation so extreme it is sometimes referred to as “social death” (Sarno 1991).

The neuropsychology of mental representations

It becomes increasingly clear that the problem here under discussion is at once a linguistic and cognitive problem. The nature of the relationship between language and cognition is, of course, an ancient one, with a truly intimidating literature. For the present purposes, however, we can safely concentrate on one particular dimension of this enormously complex problem: the relationship between mental representations (in this case, the representation of belonging/not belonging to a group) and the linguistic capacity to transmit and receive information regarding that representation.

A representation is formed in the brain on the basis of the assimilation and comparison of information supplied on-line from three sources:

- **perception:** the process by which information is received and processed inside the brain on the basis of sensory stimuli supplied by the receptor organs through the peripheral nervous system. It is important to recall here that this information consists not only in information from the “outside” provided by the five senses, but also in somesthetic and kinesthetic information originating from within the body. This information arriving continuously at various receptor points in the brain is sorted and integrated into a relatively coherent representation that constitutes our sense of the present, of the here-and-now.
- **memory:** the process by which the representations of here-and-now – which by the very nature of the situation are continually replaced and refreshed – are sorted and stored in the brain, available for recall at some later date. Access to this information on demand is hindered by two major problems: first, memory traces, i.e. representations stored in the memory, are subject to decay over time, especially when inactive; secondly, access is dependent on the nature of the address denoting where the information is stored. Something has to “re-mind” us in order for us to “re-member,” and it is best when the system of addressing information is consistent and conscious. Language is one of the most powerful tools for labeling and storing information in the memory, though obviously not the only one.
- **imagination:** the ability to produce a mental representation not derived directly from either perception or memory, but rather as a secondary product. In other words, on the basis of what we have already seen (heard, felt, smelled, tasted) we can *imagine* how something looks (sounds, feels, smells, tastes) even when in fact this “something” has never been the object of a mental representation produced by perception. This cognitive function is frequently overlooked and little studied (Brown 1988), but it is vital to ordinary mental functioning in daily life. More to the point, it is vital to *linguistic* functioning, since *every speech act that is not echolalic is dependent upon a projection into the future of an as-yet-unrealized intention, and thus is a function of imagination.*

It follows from the foregoing that every mental representation has both a synchronic and diachronic dimension, mediated (as we have suggested in previous publications) in general by the right and left hemispheres of the brain respectively (Pachalska et al. 2000). The synchronic dimension consists in collecting, sorting, arranging, and synthesizing information arriving at various centers in the brain at a given moment from both the interior and exterior environment. The diachronic dimension results from the flow of time, which subjectively means that the mental representations experienced as here-and-now continually decay and are replaced by new ones in a succession not unlike the frames in a videotape (Damasio 1994).

As Brown points out (1988), a representation takes shape in the mind as the result of a microgenetic process of “unfolding.” Our perception of a given object begins on a primitive cellular layer and develops in successive stages as it travels through the nervous system from peripheral to central, reproducing in a matter of milliseconds the whole history of the evolution of life from single-cell organisms to the human being, and at the same time the growth of the human individual from a single cell to a thinking adult person. Language, then, consists in a process of realizing (in a literal sense of the word) representations, the “visible” surface of a process that takes place within the brain. Thus it serves both as a means of expressing mental representations and as an end product of a mental process that emerges from representations.

This applies in a particular way to the US/THEM structure, understood from this perspective as both means and expression of a process of inclusion and exclusion, where both the subject and the object of representation (through perception, memory, and imagination) are human beings. In this regard, the category US may prove to be particularly difficult, since it is a set consisting of mixed elements from the primitive mid-brain categories ME/NOT-ME (that is, the category US consists of ME plus *selected* elements from the set NOT-ME). When as a result of a lesion the representation US/THEM cannot unfold normally in the brain, what comes to the surface is the product of ME/NOT-ME thinking.

A BRIEF CASE STUDY

In order to give some concrete dimensions to this increasingly abstract discussion, it may be useful to consider briefly the history of a particular patient, whose difficulties in finding his place in the world after brain damage aptly illustrate the observations made here.

The patient, CW, is a right-handed male, age 45, married with three children. In 1998 he suffered major bilateral brain injuries in an automobile accident, after which he was in a coma for nearly two months. He is a physician (a gynecologist), very active professionally prior to the accident and well regarded by both his patients and his colleagues. His wife is also a physician (in family practice), as are his two brothers (a nationally prominent orthopedic surgeon and a dental surgeon).

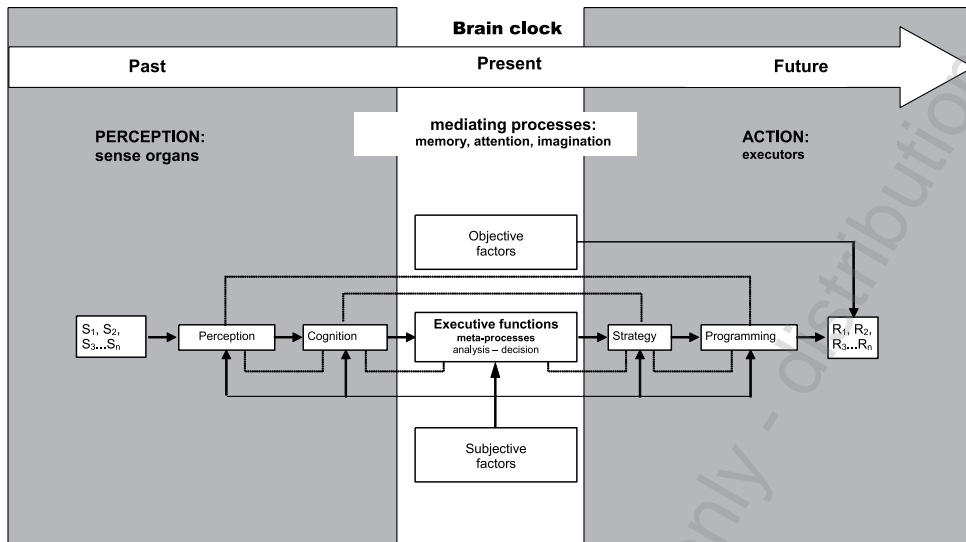
As of this writing CW has learned to walk and speak, though significant problems remain in both areas, and is slowly but steadily recovering his ability to function in normal daily life. The greatest challenges he now faces – apart from the continuing tasks of learning to walk without external support and to speak fully-developed sentences in a steady rhythm, where he is making considerable progress – can be reduced to two:

1. an inability to perform complex tasks involving a series of steps that must be executed in a particular sequence within a given time frame without immediate supervision (known as “executive function disturbances,” cf. Pačalska 2007). Order to take two coins from a drawer in his bedside table, go to the newsstand and buy a newspaper, and then return with the newspaper to the therapy room, CW will either refuse to cooperate, fall into a panic, or go to his room and dither about among his belongings for 30 minutes before returning to the therapy room empty-handed.
2. a tendency to confabulate (fill in memory gaps from the imagination, without being aware of the process) and to lose orientation in time. Asked to give his age, he will answer anywhere from 18 to 42 years; sometimes he remembers that he is a physician, but at other times he speaks of himself as a secondary school student or a medical student in the present tense; he occasionally speaks of his wife of 16 years as his fiancée and either forgets that he has children, or underestimates their ages by 5 years; and so forth.

The combined result of both of these problems in daily life is that CW is unable to function normally, either in his family or in any larger group. He also takes no interest in other patients and exchanges only minimal conversation with them, often ignoring their greetings or attempts to initiate conversation. What is particularly interesting in the present context is that he occasionally demonstrates an inability in conversation to modulate between the second and third persons: that is, in speaking to therapist A he will speak *to* A in the second person singular, but *about* A in the third person singular, reacting with surprise when it is pointed out to him that the person A *about* whom he is speaking is the same person A *to* whom he is speaking.

Without going further into the neuropsychological details of this interesting case, we may summarize by saying that CW’s mental representations suffer consistently from a certain kind of fragmentation, consisting in the inability to maintain a consistent frame of reference: temporal, spatial, psycho-social, etc. This is perhaps best explained by focusing on the issue of executive function disorders, which in a particular way lie at the heart of the entire problem.

Executive functions involve making the transition from planning (that is, having in the imagination a representation of the goal and the steps needed to realize it) to action (which requires sending the requisite signals in the requisite order to the requisite nerves and muscles to set the body into motion). This process can be diagrammed as follows:



The upper layer of the model is time, which can be understood objectively, as the object of interest of physicists and clock-makers, or subjectively, as the principle regulating how we experience the course of life. Objective (external) time is essential linear and dynamic, which means that what we call the “present” is a dimensionless and constantly moving border between past and future. In the regime of subjective time, however, only the present has real dimensions, while the past and the future are relative concepts. The clocks embedded in the two hemispheres of the brain, as mentioned earlier, mediate between past, present, and future through the operation of three short-term cognitive functions:

- short-term memory (retrospective), which when normally functioning allows us to remember the beginning of the sentence we are uttering at least until we finish it;
- imagination (prospective), which enables us to conceive the end of the sentence at the moment we begin to utter it;
- attention, which defines the temporo-spatial dimensions of the time window here referred to as the “present” in the subjective sense.

These are the processes located in the center of the second layer of the model, mediating between past, present, and future, and thus between perception and action.

As described earlier, perception is the process of gathering internal and external information from various sources; cognition, then, may be understood as the process of converting this variegated information into representations. Since this is a process with a diachronic temporal dimension, perception as such is always involved with the past, with the state of things as they were a millisecond ago, whereas action constitutes a projection into the future of the state of things

as we wish them to become, so that the future will be something different from the past.

The third layer of the model is an elaboration of the familiar S-R (stimulus-response) behavioral cycle, somewhat expanded and modified. To put it simply: on the basis of various stimuli ($S_1, S_2, S_3, S_4\dots$) mental representations are created; on the basis of these representations, plans are created; on the basis of these plans, in turn, action is initiated ($R_1, R_2, R_3, R_4\dots$). All this depends, however, on the crucial moment at the very center of the model, the climax of the perception-action cycle and the transition from thought to behavior (Fuster 2000).

The course of this process is of course influenced by many factors, both objective (external, acting upon the subject beyond his/her control) and subjective (internal, generated by the subject). Among the latter emotions and motivation are of particular importance, providing the “motor” that keeps the entire system moving. It is no accident that the word “emotion” comes from the Latin *e+motio*, that is, motion to the outside.

Every decision to react or not react (including especially for our purposes to speak or remain silent) constitutes essentially an action plan, based on our imagination of the situation to be changed by our future, intended action. This is generally speaking a conscious process, though it may become automated to a greater or lesser extent. Nevertheless, it seldom happens that a conscious effort of the mind is needed to perform the hand motions involved in writing. Rather, the executive center gives the command “Write!”, and the motor process obediently runs its course, while the conscious brain is occupied with formulating the text to be written. At another, deeper layer, of course, the same relationship occurs between conscious choices (belief fixation, for example, cf. Fodor 1983) and automatic processes.

All this is possible, of course, because execution programs (which are “fast” and mandatory, cf. Jackendoff 2000) have long since been learned, reside in the memory, and are available at a moment’s notice when needed. They must be brought into play, however, by conscious decision (which is “slow” and discretionary), and their functioning is conditioned by the operation of both the synchronic and diachronic brain clocks.

Thus the symptoms exhibited by CW can be understood as the effect of the malfunctioning of these clocks, caused by organic damage to the brain. This patient cannot maintain the requisite relations between subjective and objective time (frequently experiencing the past as the present, etc.), or between diachronic and synchronic functions (which is the root cause of his “jerky” gait and equally “jerky” speech). There is no “fixed center in a moving world” in his consciousness. He cannot execute a plan, because its execution lies at a point in the future, which he is unable to discriminate from the present or the past. His therapy, then, consists in reestablishing the sequences of things and the relations of persons and things in the environment (Pachalska et al. 2000a). It remains to be seen whether or not this will prove to be possible.

For the present purposes, of course, it is vital to understand how the picture here described affects CW's perception of US and THEM. The result of his "mental wandering" in time is that his subjective time cannot be coordinated with objective time, and that, as should be obvious, is a precondition for coordinating the subjective time of one person with that of another. Such coordination is in turn vital to the formation of any useful concept of US. WE travel through time together, or rather, so long as we occupy the same subjective present, we are US. Our patient is nearly incapable of doing this, and like most seriously ill patients behaves most of the time in a way that is at best egocentric, at worst selfish and manipulatory. Not surprisingly, his marriage is in jeopardy and his relations with his aging parents are strained.

At the same time, he is virtually incapable of formulating and executing action plans, which also means *a fortiori* that he cannot take part in the creation and execution of common plans. Needless to say, this is yet another vital aspect of functioning within a meaningful first-person-plural framework. We are US exactly at that moment when we act in concert towards some common aim, which of course (as other authors in the present volume will surely describe) becomes clearer and more compelling when it is directed at THEM, at NOT-US. When a brain-damaged aphasic patient, such as CW, proves incapable of making a meaningful contribution to either the formulation or execution of common plans, he becomes within the group only a dead weight, which can be removed from US not only without detriment to the group, but indeed to its benefit, insofar as we define US precisely on the basis of shared plans.

That is, of course, not the only way to define US, but it is a common way, and the result, once again, is the effective exclusion of aphasic and other brain-damaged patients from various kinds of groups to which they may have formerly belonged. For the patient, US/THEM is replaced by ME/THEM, and the road from here to isolation, profound depression, and the loss of the quality of life (Carozza & Shafi 2013; Tomaszewski et al. 2013) and will to live is short and – unfortunately – well-traveled.

Therefore, it is necessary to conduct studies in order to recognize the actual and expressed needs of the disabled person (Kołtątaj et al. 2015), and even more so, that there is often a discrepancy of opinions in this respect between the physician in charge of treatment and the patient with aphasia.

CONCLUSION

The foregoing is not, and does not aspire to be, an exhaustive treatment of the subject of aphasia and its social consequences. It is offered here on the basis not only of considerable reading and research, but also, and perhaps particularly, of long hours, days, week, years in clinical practice, dealing with patients who have lost or nearly lost all sense US and THEM. Mediating between clinical realities and linguistic reflection has always been, after all, the *raison d'être* of neu-

rolinguistics. It may be well to remember, in conclusion, how great a responsibility we assume when we begin to reflect on the nature and functioning of language.

REFERENCES

- Blumert L (1998) Recovery from language disorders: Interactions between brain and rehabilitation. [In:] Stemmer B, Whitaker HA (edd.) *Handbook of neurolinguistics*. London: Academic Press, 547-557
- Broca PP (1863) Localisation des fonctions cérébrales. Siègne du langage articulé. *Bulletin de la Société d' Anthropologie*, 4, 200-203
- Brown JW (1988) *The life of the mind: Selected papers*. Hillsdale, NJ: Lawrence Erlbaum
- Cancik H, Schneider H, edd. (1997) *Der neue Pauly: Enzyklopädie der Antike*. Stuttgart and Weimar: J. B. Metzler.
- Carozza L., Shafi N. (2013) Quality of life in aphasia community group members: a social model of clinical treatment. *Acta Neuropsychologica* 11(1):1-8.
- Chomsky N (1965) *Aspects of the theory of syntax*. Cambridge, MA: MIT Press
- Damasio A (1994) *Descartes' error: Emotion, reason and the human brain*. New York: Avon Books
- Damasio H (1995) Neuroanatomical correlates of the aphasias. [In:] Taylor Sarno MT, ed., *Acquired aphasia*, 2nd ed. San Diego: Academic Press, 45-71
- Dressler W (1995) Wealth and poverty of functional analyses, with special reference to functional deficiencies. [In:] Millar S, Mey J, edd. *Form and function in language*. Odense: Odense University Press , 11-39
- Duzsak A (1998) *Tekst, dyskurs i komunikacja międzyludzka*. Warszawa: PWN
- Fodor J (1983) *The modularity of mind*. Cambridge, MA: MIT Press
- Fuster JM (2000) Prefrontal neurons in networks of executive memory. *Brain Research Bulletin*, 52, 331-336
- Goldstein K (1948) *Language and language disturbances*. New York: Grune and Stratton
- Goodglass H (1993) *Understanding aphasia*. San Diego: Academic Press
- Goodglass H (1998) Advances in neurolinguistic research. [In:] Stemmer B, Whitaker HA (edd.) *Handbook of neurolinguistics*. London: Academic Press, 13-24
- Head H (1926) *Aphasia and kindred disorders of speech*. 2 vols. Cambridge: Cambridge University Press
- Holland A (1977) Some practical considerations in aphasia rehabilitation. [In:] Sullivan M, Kommers MS, edd. *Rationale for adult aphasia therapy*. Lincoln, NB: University of Nebraska Press
- Jackendoff R (2000) Fodorian modularity and representational modularity. [In:] Grodzinsky Y, Shapiro L, Swinney D, edd. *Language and the Brain*. Foundations of Neuropsychology Series. London: Academic Press
- Kołątaj B, Gorczyca R, Kołątaj W, Jędrych M, Sobieszcańska A, Sobieszcański J, Karwat ID. Meeting needs for rehabilitation equipment and home adjustments among the disabled in their life environment. *Ann Agric Environ Med*. 2015; 22(3): 504–512.
- Lichtheim O (1884) On aphasia. *Brain*, 7, 443-484
- Liddell HG, Scott R (1996). *Greek-English Lexicon*. 1st ed. 1843; 9th ed. revised by HS Jones and R McKenzie. Oxford: Clarendon Press
- Lindsay J, Penman T, Pound C (2000) Partnerships in practice. [In:] *Proceedings of the 9th International Aphasia Rehabilitation Conference: Abstracts*. Rotterdam: Rotterdam Aphasia Foundation, 21
- Luria AR (1976) *Basic problems in neurolinguistics*. The Hague: Mouton
- Morris D (1969) *The human zoo*. London: Capes
- Pachalska M, MacQueen BD, Knapik K (2000) Disintegration of higher level language functions in post-stroke patients with anterior and posterior right hemisphere lesions. [In:] *Proceedings of the 9th International Aphasia Rehabilitation Conference: Abstracts*. Rotterdam: Rotterdam Aphasia Foundation, 27-28

- Pąchalska M (1986) *Kompleksowy Model Rehabilitacji Chorych z Ogniskowym Uszkodzeniem Ośrodkowego Układu Nerwowego i Afazją Całkowitą*. Scientific Monograph No. 28. Cracow: AWF, 1986
- Pąchalska M (1999) *Afazjologia*. Krakow and Warsaw: PWN Publishers [in Polish with English summary]
- Pąchalska M. (2007) *Neuropsychologia kliniczna: urazy mózgu* [Clinical neuropsychology: brain injury]. Warsaw: PWN Publishers [in Polish with English summary]
- Pąchalska M., Kaczmarek B.L.J., Kropotov J.D. (2014) *Neuropsychologia kliniczna: od teorii do praktyki*. Warsaw: PWN Publishers
- Piaget J (1930) *The child's conception of physical causality*. New York: Harcourt Brace
- Sarno MT (1988) The case of Mr. M: The selection and treatment of aphasia patients. [In:] *Case studies in ethics and rehabilitation medicine*. New York: Briarcliff
- Sarno MT (1991) Recovery and rehabilitation in aphasia. [In:] Sarno MT, ed. *Acquired aphasia*. 2nd ed. San Diego: Academic Press, 521-582
- Searle JR (1998) *Mind, language and society: Philosophy in the real world*. London: Orion
- Searle JR (1983) *Intentionality: An essay in the philosophy of mind*. Cambridge: Cambridge University Press
- Stefano G.B., Kream R.M. (2015) Personalized- and One- Medicine: Bioinformatics Foundation in Health and its Economic Feasibility. *Med Sci Monit*, 2015; 21: 201-204
- Taylor J, ed. (1958) *Selected writings of John Hughlings Jackson*. London: Staples Press
- Tomaszewski W., Mańko G., Ziółkowski A., Pąchalska M. (2013). An evaluation of health-related quality of life of patients aroused from prolonged coma when treated by physiotherapists with or without training in the 'Academy of Life' programme. *Annals of Agricultural and Environmental Medicine*, 20(2): 319–323.
- Wernicke C (1874) *Der aphasische Symptomenkomplex*. Breslau: Cohn & Wiegert
- Whitaker HA (1998) Neurolinguistics from the Middle Ages to the Pre-Modern Era: Historical vignettes. [In:] Stemmer B, Whitaker HA (edd.) *Handbook of neurolinguistics*. London: Academic Press, 27-54

Address for correspondence:

Maria Pąchalska
Chair of Neuropsychology,
Andrzej Frycz Modrzewski Kraków University
Herlinga-Grudzińskiego 1
30-705 Krakow, Poland