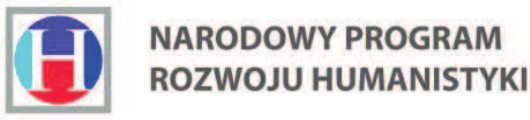
Studia Semiotyczne — English Supplement

Volume XXVII

Warsaw • 2015 (2010)

Praca naukowa finansowana w ramach programu Ministra Nauki i Szkolnictwa Wyższego pod nazwą "Narodowy Program Rozwoju Humanistyki" w latach 2012-2015 (nr projektu 32H 11 002180).

This publication is funded by the Ministry of Science and Higher Education of the Republic of Poland as part of the National Programme for the Development of the Humanities (project no. 32H 11 002180).



ISSN:

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ON THE UNDERSTANDING OF NON-LITERAL EXPRESSIONS

Originally published as "O rozumieniu wypowiedzi niedosłownych," Studia Semiotyczne 27 (2010), 27–35. Translated by Rafał Jantarski.

"There is nothing wrong and nothing illogical in granting meaning to anything that people say with a feeling of understanding and which other people receive with a similar feeling"

Leszek Kołakowski 1982: 164

I

The following remarks should be treated as a discussion of a semiotic claim posed in the quotation above. Kołakowski opted for this rather radical perspective to challenge semiotic views prevailing in the analytical philosophy of that day. No wonder that his intellectual opponents felt obliged to take a stand. I once tended to side with his opponents, which is one of the reasons why I would like to take the emerging opportunity and revisit Kołakowski's argument. I won't be discussing the meaning of expressions in general, my purpose here is rather to, as the title suggests, bring into focus the meaning of non-literal expressions, particularly where they are supplied with inverted commas to imply their non-literal, metaphorical character. I chose to pursue this particular topic because there is little agreement as to what they actually mean.

I've written on the meaning of metaphorical expressions on many occasions, most extensively in my 1969 paper *O metaforze w filozofii* (Przełęcki 2002: 181-189). Elsewhere, in a 1998 paper entitled *Czy istnieją niewyrażalne treści poznawcze?* (Przełęcki 2002: 42-50), I was advancing an idea essentially conflicting with the semiotic claim proposed by Kołakowski. While trying

to establish the meaning of "X believes that p" I came to the conclusion that it can only make sense if p could be literally expressed in the language of X. I further claimed that our feeling of understanding of such non-literal expression is but an illusion if we have no means to express it in a literal way. This expression, I argued, could be meaningful to us only in a degree to which it can be expressed in discursive language, that is, a language that satisfies the condition of literalness, among others.

In contemporary discussions revolving around this problem, a clear and firm stand on the issue is taken by Adam Nowaczyk in his paper *O roli cudzysłowu w filozofii* ([On Inverted Commas in Philosophy] Nowaczyk 2001: 73-79). His argument centers on expressions used by philosophers in inverted commas to suggest their non-literal, metaphorical interpretation. If she stops short from discursive paraphrase of what was said, the philosopher "abdicates responsibility for her own words," argues Nowak. A responsible philosopher always offers a paraphrase that is "free from understatements and eligible for literal interpretation."

How do things stand, then? Is the feeling of understanding enough to grasp the meaning of a non-literal expression, or do we also need to have its literal paraphrase ready at hand? And what exactly would be the difference between the SENSE OF UNDERSTANDING and UNDERSTANDING proper? Before we can set about answering these questions, it appears that we first need to draw a distinction between the feeling of understanding and understanding proper. We must also bear in mind that there are various types of non-literal expressions along with various contexts in which they can be found. Since in the present circumstances I have no THEORY to fall back on, all I can do is offer here some loose and partial remarks.

First, it must be said that the SENSE OF UNDERSTANDING can be described as at least two mental states. I have a feeling of understanding of any given expression w if:

1. I vaguely believe that I understand w;

2. I understand w in a certain way.

While (1) is a conviction that I understand w, (2) is a certain way of understanding
w.[1] A closer look at those notions would obviously prompt questions about the

[1]In his study titled *O rozumieniu* [On Understanding], Jacek Jadacki (1989) notes that each of those mental states can be either actual or dispositional. He also takes a critical look at the idea of treating the "feeling of understanding" as a subjective condition of "understanding."

actual meaning of VAGUE BELIEF in (1) or UNDERSTANDING appearing in (2). VAGUE BELIEF generally underlines uncertainty, something opposed to firm belief. It would be more difficult to say what "feeling" actually means in (2), and what "feeling of understanding" contributes to "understanding" in general, and if so, what would be the difference between the two. Thus, the primary purpose of these considerations will be to compare those two notions.

For non-literal, or metaphorical expressions, this comparison seems to be particularly important. Put simply, I'm inclined to say that understanding of the metaphorical expression w and the feeling of understanding of such an expression can be both construed as types of understanding, conceived in the broadest way possible. Understanding follows on from understanding of a literal paraphrase of w, while the feeling of understanding follows on from the unmediated understanding of w, without literal paraphrase standing in between. It's key to construe the feeling of understanding of w as understanding in general. Those who have the feeling of understanding of w actually understand it in a certain way, even if it cannot be expressed through a literal paraphrase. One must already have some sort of understanding of a metaphorical expression before one comes up with its literal paraphrase, this is because one first needs to know what this literal paraphrase actually means. Precisely this preliminary, unmediated, or intuitive kind of understanding would in my opinion qualify as "feeling of understanding."

Since understanding of metaphorical expressions is what we are trying to get hold of here, let's briefly describe what metaphorical expressions are about (in doing so, I will largely reiterate conclusions of my paper titled *O metaforze w filozofii* [On Metaphor in Philosophy]; Przełęcki 1969). If saying that S is M qualifies in a language as a deviation foreign to the competent user of language (it being, for example, patently false), then at least one of the terms used in the expression, let it be M, is used in a metaphorical way. Generally speaking, Mused metaphorically means here that one used a term more general than M, one broader in scope but holding less clear content, which, if applied to S, would not cause the sentence to be a deviation (especially one considered to be patently false). So, using "S is M" metaphorically, all we say about S is that it possesses only some of the qualities attributable to M. What would such qualities be? First and foremost, the qualities that are part of M's meaning, that is, the qualities through which one would define M. However, while using M metaphorically to describe S, it's often the case that we attribute to S some qualities which, instead of being part of M's meaning, are rather related to M in a logical or

factual manner, those qualities being, for example, attributable to typical designates of M or its proverbial qualities. When Mickiewicz chooses to describe the steppe as an "ocean," what he does is to emphasise such oceanic qualities as "infinitude, desolateness, wave like motions of the surface, etc." When Pascal calls man a "reed," what he means is that human beings are fragile organisms.

It's important to stress that literal meanings of particular constituents of the expression are simply not enough to understand metaphorical meaning of the whole. Being able to speak the language is simply not enough to properly grasp the metaphorical meaning of an expression. First, one must be familiar with the context in which the expression features. Then, we usually need to be aware of the extra-linguistic circumstances of the spoken word. This immediate environment aside, however, our interpretation is also clearly influenced by something we could call one's cultural literacy, that is, whether one is aware of the references made and possesses the ability to interpret them accordingly. The better one navigates in this terrain, the smoother the interpretive process.

These considerations shed some light on what is usually thought to be the crucial difference between understanding of a metaphorical expression and merely having the feeling of its understanding: the former is perceived as intersubjective, while the other as subjective. In order to understand a metaphorical expression, that is, its literal paraphrase, it's enough to speak the language in which this paraphrase is articulated. Any competent speaker of this language is capable of this, not least the addressor and the addressee of the expression. In this sense, understanding is intersubjective. In opposition to this, in the case of ametaphorical expression, feeling of understanding requires something more than the mere command of language because it transcends the language in a sense that it gives metaphorical expression a new meaning that previously wasn't there. Which is why, as said earlier, linguistic context, particular circumstances, as well as interpretive skills as a part of cultural competences of the addressee all play their part in the interpretive process. Those elements are subjective and may differ in various human beings, not least in the addressor and the addressee who, in consequence, may have different feelings of understanding of one and the same expression. Those two mental states are virtually incomparable until each of them is expressed literally through a paraphrase. But then, if we were to follow our definitions, the feeling of understanding turns here into understanding proper.

Apart from its intersubjectivity, understanding has another advantage

that the feeling of understanding has not. It's brought up by Nowaczyk who argues that "in literal interpretation, we are relying on conventional syntactic and semantic connections already working in language; they determine truth-relationships between sentences, or, put another way, their logical relations" (Nowaczyk 2001: 7). Those relations remain elusive for those who, failing to articulate metaphorical expression's literal interpretation, have only its feeling of understanding.

This clear advantage begs the question whether, and if yes, why, the state where one has merely the feeling of understanding would be acceptable or tolerable. The usual answer to this question points to troubles encountered while trying to come up with the literal paraphrase, as well as the incurable inadequacy it eventually offers. Worn-out metaphors aside, which aren't really metaphors anymore, it's almost impossible to grasp the literal meaning of a metaphor, even if contexts, circumstances, and competences are all accounted for in the interpretive process. When I say something about S using M in a metaphorical way, it's practically never entirely clear which qualities of M are attributed to S. If I want to stand by metaphorical meaning of the predicate, I cannot unambiguously settle for a single literal paraphrase. At best, if at all, its meaning can be shown by selecting a class of such paraphrases, where each would be treated as acceptable interpretation of the original expression. Furthermore, such a class would never be unambiguously determined in advance: there are some paraphrases of a metaphorical text where it would be difficult to judge which ones are considered to be legitimate. This leads us to the conclusion that meaning of a typical metaphorical expression can never be unambiguous. And this is also where it doesn't compare with literal expressions.

This is not to say that such a vague expression possesses no cognitive value, by which I mean its truth-value. There've been various attempts to attribute truth or falsity to metaphorical expressions by interpreting the musing of a particular class of literal expressions. One of those proposals (corresponding with the so called supertruth theory) treats metaphorical expressions as true when all of its interpretations are true, and as false when all of its imaginable interpretations are false; otherwise, the expression is treated as having no truth-value at all. Some propose to treat metaphorical expression as true when the alternative of all of their imaginable interpretations is true, or to put it another way, only when its weakest interpretation is true. If it happens to be something else, it's false. It seems that on their own both of those proposals stand to reason and can work if provided with an appropriate theoretical context.

Our discussion so far has been built on the assumption that there are two kinds of broadly conceived understanding of metaphorical expressions: understanding of their literal paraphrase and unmediated feeling of understanding found in its non-literal and metaphorical form. Without unmediated feeling of understanding to rely on, we would be at a loss coming up with its literal paraphrase as we must know in advance what it is that we want to express literally. If it was any different we would have no reference point to measure its adequacy. This can be best observed when one is trying to come up with an adequate paraphrase: one is usually struggling to find the phrase that would ideally pin down this unmediated metaphorical meaning of the expression one is seeking to paraphrase. This approach goes against the standpoint presented at the beginning of this paper, according to which metaphorical expressions can only be understood through their literal paraphrases. One must resort to it, however, if one wants to compare what two different users of language, the addressor and the addressee, for example, make of one and the same metaphorical expression. But with feeling of understanding, the most we can do is guess while considering external and internal circumstances in which the addressor and the addressee happened to use the expression.

In light of those remarks, the claim made by Kołakowski quoted at the beginning of this paper allows for interpretations that one would find difficult to disagree with. If it's indeed so that the feeling of understanding of an expression is to be considered as a kind of its understanding, such expressions must necessarily be meaningful because one cannot understand something which has no meaning at all. But before we can attribute this or other meaning to the expression, a meaning which would be therefore by necessity determinate, the feeling of understanding possessed by the addresser must correspond with that of the addressee, it must be, to quote Kołakowski, "similar." But this, as we could see with the metaphorical expression, is difficult to establish, only literal paraphrase can provide us with the certainty we need.

II

These general remarks on the understanding of non-literal expressions call for various clarifications, I will try to include some of them in my further discussion. While speaking about non-literal expressions I essentially narrowed down my inquiry to metaphorical expressions because in my view it's the most important kind of non-literal expressions. When we supply expressions with Inverted comas to suggest their non-literal meaning, we

usually treat them as metaphors. Some note, however, that such expressions may also hold other figures of speech like metonymy or synecdoche. It appears, however, that we may treat them as kinds of metaphorical expressions. What's more, they easily lend themselves to interpretation as they are usually highly conventional and thus quite simple and trivial. The same goes for symbol and allegory sometimes used in philosophical texts.

That said, one other figure of speech, the simile, deserves a closer look as it's used to express various statements, also in philosophical discourses. Instead of metaphorical expression discussed here so far, S is M, one often uses a simile S is like M (or, S is as if it were M). The meaning of such simile is regarded as identical with that of metaphorical expression. It asserts a certain likeness between S and M, where S can be attributed particular qualities of M (in S is as if it were M only a limited number of qualities of M can be attributed to S since the very wording of such simile precludes that S is M). Similarly to a metaphorical expression, a simile is essentially ambiguous: it's difficult to tell which qualities of M in particular can be attributed to S. But the source of ambiguity is here different. In S is M it's the metaphorical meaning of M which is the source of ambiguity. But in the case of S is like M, the expression is considered to be literal: M is used here in its ordinary meaning. It's rather the elliptical nature of this expression and the understatement which follows that are responsible for its ambiguity. By saying S is like M, we are not specifying in what ways and to what degree S is similar to M. Interpretation should clear up things a bit here, it generally should be similar to interpretation of metaphorical expressions, particularly in regard to its broadly conceived linguistic and circumstantial contexts. Despite sourcing material from those various contexts, however, there will always be some degree of ambiguity left, as it would in the case of metaphorical expressions.

Apart from metaphors and similes, one other figure of speech often perceived as a vehicle for philosophical thought is analogy, found particularly in religious metaphysics. In my view, however, an analogy in this regard is not that different from a simile, rather some kind of it. There are, admittedly, some highly particular theories of analogy, but I think they have little to contribute to our present discussion.[2]

[2]Such a theory was proposed by Jan Maria Bocheński who treats analogy between various empirical relations (pertaining to human beings) and the corresponding metaphysical relations (pertaining to a deity) as an isomorphism of those relations. In my study *Poza granicami nauki* [Beyond Borders of Science] (Przełęcki 1996), I attempted to demonstrate that this interpretation fails to deliver on its promises.

Considering semantic imperfections of non-literal expressions which I am signalling here, that is, their subjectivity and ambiguity, begs the question whether, and if so, when, such an expression can be used in a legitimate way. In what kinds of philosophical texts would they be welcomed? I have already formulated an answer to this question, in which I differentiated between scientific philosophy and the so-called literary philosophy, or broadly conceived existential philosophy, arguing that in the latter non-literal language is perfectly acceptable. The difference between these two is that scientific philosophy deals with purely descriptive claims, whereas existential philosophy prefers value judgments of an emotive and prescriptive nature. Scientific philosophy is expected to come up with "theories" of the reality, while existential philosophy is meant to provide "visions" of the world and human life, shot through with an evaluative approach. To convey those visions, the philosopher speaks through mental states where cognition, emotion and volition all merge, striving to evoke states which are subjective, subtle and deep, something which cannot be achieved through literal terms. This is the reason why the philosopher sometimes resorts to far-flung metaphors and similes. Wielding her literary prowess, the author can enliven metaphorical expressions and evoke in the reader an acute feeling of understanding of what is actually said. Pascal or Nietzsche do just that. Besides, metaphorical expressions often serve as shorthand or summary of paragraphs where thought is discussed at length and in a more straightforward way.

Non-literal expressions behave differently in what I have called here, perhaps with a bit of a stretch, "scientific" philosophy. This philosophical discipline includes in my view primarily ontological conceptions such as various philosophical theories of being. If they are really supposed to be genuine "theories," they should be formulated with as much literal language as is only possible. As we remember, this is also the suggestion put forward by Nowaczyk, who calls for the philosopher to clarify with a literal paraphrase any expression used in inverted commas. He goes on to point out that, for example, this requirement is not met by Thomism, whereas Heidegger openly disagrees with this approach and uses as key concepts of his ontology such phrases as "the being of beings" or "being-towards-death," which by their very design are meant to be ambiguous.

Here we can see, however, one difference between those two Heideggerian concepts. For someone who accepts conditions for understanding postulated by Nowaczyk, "the being of beings" would indeed be unacceptable. But "being-towards-death" seems different. The phrase "man is a being-towards-death" is essentially a rather spectacular aphorism summing up reflections

on human condition, which only when considered as a whole lend to the phrase a graspable sense (Heidegger 1996, part II, chap. I, § 51). Put in that way, however, rather than part of ontology, the phrase belongs to philosophical anthropology (or, to borrow from Heidegger himself, "hermeneutic of Being"). What is important here is that on this interpretation, it ceases to be purely descriptive and becomes valuative instead, postulating an ideal of "authentic" man while condemning his "fall into inauthenticity." It's therefore not an element of philosophical "theory," but rather functions as a part of philosophical "vision" of human condition. It's also worth noting, that some ontological philosophical claims articulated in non-literal language have similarly "wholesale" nature. Their interpretation must take into consideration its whole context which often happens to be quite broad. Taking these claims and interpreting them out of those contexts may be rather unsatisfactory.[3]

What would be, then, the main conclusion to draw from our considerations? First and foremost, it seems that non-literal expressions such as metaphors do possess certain meaning, regardless of our inability to come up with their literal paraphrase. They have meaning by virtue of our feeling of understanding of those expressions. We need to possess it before we can set about articulating its literal paraphrase. If we succeed, we not only possess the feeling of understanding but also what we have called understanding proper. It differs from the feeling of understanding in that it's intersubjective, among other things, which gives it a methodological advantage over the, merely subjective, feeling of understanding. This advantage in itself is a good reason for providing, where possible, literal paraphrases of metaphorical expressions. However, we face particular difficulties in making good on this requirement when we encounter claims advanced by existential philosophy, which through their "valuative" visions seek to penetrate hidden dimensions of human condition. I believe that the relevance of such a philosophy for our lives is a redeeming feature which absolves it from its methodological deficiencies.

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[3]It appears, therefore, that some objections raised against Carnap's famous critique of Heidegger are legitimate.

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Jerzy Pelc
A SENSE OF NON-UNDERSTANDING

Originally published as "Poczucie nierozumienia," Studia Semiotyczne 27 (2010), 37–43. Translated by Małgorzata Szubartowska.

> That you did not understand a very simple claim
> Against you I hold, so your obtuseness you should blame.
> But when you once grasp an incomprehensible thing,
> Then it seems you got worse, so give your doctor a ring.
>
> Tadeusz Kotarbiński, *Wesołe smutki*

In fact, I could content myself with using as my motto this "rhyme," as its author would like to call it. Although it is not my cup of tea in terms of literary value, it nevertheless conveys adequately what I think. As to the rest, which is merely my supplementary comment, it is not going to be a dissertation or a research-based study, but rather a sort of an essay — occasionally humorous, somewhat exaggerated and provocative, yet undoubtedly concerning a serious matter.

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I consider myself a teacher. I believe that a successful teacher must be comprehensible. It is a necessary condition, even if — obviously — it is not enough. But it certainly is a crucial condition. It is only when the students actually understand their teacher, instead of merely having a sense that they understand him, that they are able to learn or unlearn something from him. They are given an opportunity. The sense of understanding alone does not offer that, unless it goes together with actual understanding.

It is different with philosophers. In order to achieve fame and become popular among the masses, a philosopher had better be incomprehensible

and locate the "poetics" of his narration somewhere between a scientific lecture, a literary piece and journalism. This would allow his supporters and admirers, especially those who are not philosophers themselves, to strike a chord with an exceptional, profound and apparently very bright idea, which is at the same time put across in an appealing manner, so that it evokes aesthetic experience. And once they are under the illusion that they have fully grasped the idea, they are rewarded with a sense of intellectual power and satisfaction derived from communing with a wisdom available only to the chosen few.

Whereas a politician, in order to gain supporters and political power, should avoid making clear and unequivocal statements. Let him be understood differently – differently by different people. Then, everyone will feel that they understand him as a person who thinks this or that; this is something that people who experience such a sense of understanding tend to do. Even if these understandings differ, no matter how contradictory they are, people who have this sense of comprehension will be united by the illusion of shared beliefs and consequently, by the willingness to support the politician.

I once tried to draw a line between philosophical essays and studying or teaching philosophy academically (Pelc, 1999). To a certain, yet rather small, extent my work falls into the latter category. I prefer the prudence and restraint Władysław Tatarkiewicz expressed in his reservation: "if I am entitled to consider myself a philosopher." I go even further and do not claim this right at all. I am merely trying to teach some bits of philosophy. As a teacher — just like when I am advising that we recognize John's belief that a sentence p is true does not equal that sentence p is true — I am advising that we distinguish between a sense of understanding a statement and its actual, adequate understanding; even if this does not mean a full understanding, then at least in some respect. Making this distinction turns out particularly difficult and fallible when it concerns our own thoughts and statements. Unfortunately, it happens so often that we feel we understand them and we confuse this sense of understanding that we take for granted with genuine understanding.

Obviously, 'the sense of understanding' is a vague and imprecise expression, the same as 'the sense of non-undrestanding'. However, we know from experience that the road between the two, between the sense of understanding and actual understanding, is often long and bumpy. Following this road is a toilsome process of reaching a more accurate and fuller understanding, which requires time and, sometimes considerable, effort. Even then, it usually proves impossible to arrive at a complete understanding. Yet,

gradually, despite alternating between failed attempts and partial successes, we occasionally manage to get closer to understanding, although it makes it harder if we take the sense of understanding for understanding itself. It happens to people who are prone to experience the sense of understanding. Precisely that: prone, inclined. Just like there are people who are prone to colds and others who are prone to go into ecstasies, there are sometimes people who are prone to a spontaneous sense of understanding. I believe that this inclination is typical of people with a specific mental attitude, especially the emotional one. This inclination makes them more likable: we like people who are trusty, even credulous. But there are probably not many of those among the students of analytic philosophy.

How to distinguish the sense of understanding from actual understanding? Let us begin with understanding something or someone, which, in my opinion, stems from understanding respective propositions, either true or false, that do not necessarily take a linguistic form. What do I do to show that I understand something? One method would be to give specific examples. What do I do to check if a student understands a given sentence? I ask him to give examples. ”Do you understand what it means that someone is ‘spolegliwy’ [eng. *reliable*, but commonly used in the sense of *acquiescent*]? Give me some examples of such people, behaviors or attitudes.” If, as it often happens, he gives examples of agreeable, submissive people who do not put anyone to inconvenience, because they predict everybody’s wishes and comply with them, then I know that he understands it wrong. But if he mentions those who will not fail despite major obstacles, who keep their commitments, whom you can ”rely on as on Zawisza” (I do not mean here Artur Zawisza, the deputy from Lublin, but Zawisza the Black of Garbów, who stands as a symbol of knightly virtues), then I know that this person understands what the word means. When my students give me their essays for evaluation, my comment ”Example!” appears in the margin of almost every page. What could serve as an example is a drawing, a verbal image like a metaphor, a diagram or a table. Someone who wants to explain what they mean by saying ”an off-brown fabric” brings in a wool sample, the sample being an example. In a different case they can resort to a comparison: Volkswagen, a car manufacturer, made cars in the color called ”fireman red” in order to avoid a possible claim from the customer, who, upon hearing ”red,” could expect, say, ”weinrot,” which is the color of red wine. Another method of proving that one understands a statement is to translate it into other ethnic languages, as well as to provide either a few versions of the expression’s translation into a foreign ethnic language

or a number of different paraphrases, that is, translations within the same ethnic language in which the statement was originally expressed. A special case of such a paraphrase is a translation of a metaphorical expression into an expression in which some of the metaphors are replaced — if possible — by non-metaphorical expressions. I have already discussed this subject (Pelc 2000), while challenging the opinion that some metaphorical expressions are fundamentally untranslatable into metaphor-free expressions. Finally, what can also serve as evidence of understanding a particular declarative sentence, is looking for a logical consequence and drawing a few or even a dozen statements that follow logically from this sentence.

And what is someone supposed to do who wants to let others know that they have a sense of understanding of something or someone — merely the sense of understanding without actual understanding? There is left nothing but to avow his state of mind, his psyche being directly accessible only to him through introspection. The best he could do to support his confession, as well as to prove his sincerity and truthfulness, is to look his interlocutor in the eye and assure him by saying something like: "I understand, I swear." But when he applies the aforementioned means — giving examples, translating, enumerating possible logical consequences — in the attempt to objectify his sense of understanding and to make it available to others, this counts as evidence of actual understanding and not of a mere sense of understanding. A sense of understanding is something much more intimate, private, hermetic, exclusive and... unverifiable than, say, the feeling of unspecified fear, since anxious states manifest themselves as e.g. sleep disorders, lack of appetite, insomnia, dry mucous membranes, accelerated heart rate, rapid pulse and breathing, thus enabling extraspection and partial, intersubjective verification, while the sense of understanding can be detected by neither pressure gauge nor encephalogram, nor phonendoscope.

I suggest we distinguish this kind of sense of understanding from the sense of understanding that we experience after we have actually succeeded in understanding something. I could provide evidence to prove my understanding by resorting to numerous, aforementioned means. I could also receive such evidence in the feedback from other people. In a conversation, it could take the form of a statement like: "you understood me perfectly, this is exactly what I meant," or of nonverbal behavior or actions of the interlocutor — generally, evidence derived from the situational context. The second type of the sense of understanding will be called here "a *post factum* sense of understanding." This state of mind is a natural consequence of a certain objective occurrence and it results from my awareness of this event.

I am entitled to experience this *post factum* sense of understanding, just as a first prize winner or someone who was appointed to an important post has every right to experience the sense of success. Perhaps, the *post factum* sense of understanding consists in the fact, at least among others, that even though I am not thinking at the moment about what I have understood, even though I am not setting off the process of arriving at this understanding, I can still be certain that if I did, I would immediately regain the current understanding, which I once acquired. That is why the *post factum* sense of understanding could pass as potential understanding. And what I have in mind is not the *post factum* sense of understanding, but that first one, the spontaneous sense of understanding, which is not based on an actual understanding and which precedes all attempts to understand something.

It has occurred to me that the sense of understanding is like the gift of seeing at a long distance ascribed to a certain tzaddik from Odessa. This is something that Max Black, who himself came from Odessa, told me about. Two Jews are talking with awe and worship about a local miracle-working tzaddik. One of them — the enthusiast — says: "Can you imagine? He can see everything from thousands of versts away. He can see what is happening in Petersburg: he sees a Jewess carrying a baby in her arms, he can see a Jew wearing his fur cap today.... He can see everything, even the smallest things." The second one — the skeptic – responds: "But how come? Is he never wrong?" The first one answers: "Oh, no... he is wrong. But the very fact that he can see that far, isn't that a miracle?!"

The sense of understanding of something or someone is a subjective state *par excellence*. It seems similar in some respect to a religious feeling, that is, to faith. Faith is a feeling or mental disposition, which by the believers is considered a gift or God's grace. Although the sense of understanding regarding whatever I hear, read, say, write or do is accessible to both believers and non-believers, it does require some faith as well, just of a different kind: it requires believing in yourself, in your own mental power or your intuition, instead of believing in someone else or in something "out there." Therefore, the sense of understanding is not experienced by everyone in the same measure, which probably depends more on one's confidence and the strength of one's conviction about their shrewdness and their interpretative potential, rather than on one's special skills, intelligence or knowledge. Knowledge determines not so much the sense of understanding, as whether we succeed in the process of arriving at understanding: the more you know, the easier and more you understand, but also the sooner you realize that you do not and maybe will never understand. Meanwhile, the other way round, the

sense that you understand something creates the sense that you know it, which is often illusory and which leads to the conviction that you are entitled to make authoritative judgments or force bans. It so often happens that people who have a sense of understanding of something e.g. how nuclear power plants work, even though it is not accompanied by actual knowledge of the subject, fiercely oppose building such plants; and people who have a sense of understanding what GM food is, but merely the feeling without actual understanding, fight against allowing its consumption. The sense of understanding something is a fertile ground, on which grows the often unfounded sense of knowing something that makes you feel certain about your decisions, often on very important matters, and in consequence makes you act hastily. Therefore, a sense of understanding without actual understanding is deceptive, as it encourages irrational attitudes, behaviors and actions.

On the other hand, the effortlessness of arriving at the sense of understanding is subjectively perceived as something positive and it is considered nice to have a sense of understanding of another person — even when it does not go beyond the sense of understanding by accompanying actual understanding, in other words, even when it is basically unfounded. In this case of understanding another person, the sense of understanding often accompanies infatuation, not so much love as falling in love, especially in its first stage of uncritical acceptance, full of feelings such as passion or ecstasy.

For the purpose of these considerations, I suggest we call those who easily arrive at the sense of understanding of something or someone "understandingable" people, while those who are resistant to this experience – "not-understandingable" people.

What makes a person inclined towards an "understandingable" attitude, is his urge to empathize with others, to develop spiritual bonds with them, to sympathize with some of their desires and to be tolerant of others. An "understandingable" person leads a life that many conformists would desire; it goes on in a blissful atmosphere, as if taken from the ending scene of *Revenge* by Fredro: "Peace and concord! / Troubles at an end — / Now, may the Lord His hand to us extend!" (Fredro 1993: 109) We all know that a communion of hearts and minds is an invigorating experience. It also wins you friendship among your fellow men and it is certainly nice to be liked. An "understandingable" person gains more and more satisfaction as their sense of understanding of other people grows and as this unifying feeling encompasses more numerous and more varied attitudes and views. At that point, all these different stands seem similar and that, which differed from them, however radically, goes out of sight. The world around becomes

a harmonious and friendly, unified whole. And whenever the sense of understanding concerns something to which an "understandingable" person originally strongly objected, they are rewarded with the awareness of their admirable tolerance.

Despite numerous benefits connected with adhering to the "Sense-of-understanding Party," despite mental and social advantages of the life lead by an "understandingable" person, the more mature and more critical approach of a "not-understandingableable" person is recommended, especially to analytic philosophers, as it is more productive from a methodological point of view. It is a "not-understandingableable" person's principle to ask the question: "what does it mean?" and look for differences hidden under the surface made of similarities, rather than ignoring differences in order to succeed in finding similarities. I encourage you to cherish the sense of not-understanding. However, loyalty to those who will actually follow that suggestion, forces me to warn them that the life of a "not-understandingable" person is far less pleasant than the comfortable life of an "understandingable" one, because all the features which characterize the latter — criticism, hesitation in accepting and approving the opinions that he comes across, a habit of getting to the bottom of things — make people anxious and they start to treat such a person with reserve: "he is difficult and hard to please, we'd better watch out and put on hold any signs of friendliness or support."

Although a "not-understandingable" person treats all analyzed concepts and theorems with a dose of conscious distrust, he allows for, as an exception, a sense of understanding of the considered problems, a sense of understanding of a particular kind. That sense of understanding is all about readiness to interpret those problems, while approaching them. This attitude requires a "not-understandingable" person to refrain from rejecting *a limine* a hypothesis that he has to do with something uninterpretable. Such a person is inclined to acknowledge from the start that this something could become the subject of the process of arriving at an understanding. Therefore, he assumes that the statement he heard or read makes sense, which means it is interpretable. However, this hypothesis needs to be verified. So he starts with assuming an opposite hypothesis, so that in the following steps he can refute it. You could say that in the first phase a "not-understandinable" person makes a certain concession to an "understandingable" attitude and begins by taking this position. Sometimes the concession is limited to a minimum, which could be illustrated by the following example. Half a century ago jewelry stores in the People's Republic of Poland used to import gold-plated cufflinks from China. There is a golden ornament against the black enamel.

Once, when professor Janusz Chmielewski, a sinologist, saw the cufflinks, he asked me if I knew what was written on them. At that moment the ornament turned into a Chinese sentence. I no longer remember what it means, but I know that it is a meaningful whole. I adopted the attitude of a reader towards it: I see it as a text, rather than as an ornament which does not signify anything, even though in this case I am unable to undertake any further action that would result from this embryonic sense of understanding. It seems to me that experiencing this initial sense of understanding is a prerequisite for further interpretation, that is, of arriving at a more and more complete understanding of the signs, which consists in ripping off the veils covering the meaning one after another. Raising the first veil is something to which both an "understandingable" person and his skeptical opponent would agree. This unanimity is encouraged by the "let's take the preliminary interpretation principle at face value." It is the interpretation suggested by an "understandingable" person, which is related to Grice's conversational maxims in the sense that it too has at its source a willingness to understand, but without giving up the requirements set out by a "not-understandingable" person.

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Magdalena Zawisławska

METAPHOR IN SCIENTIFIC LANGUAGE BASED ON THE EXAMPLE OF NATURAL SCIENCE

Originally published as "Metafora w języku naukowym – na przykładzie nauk przyrodniczych," Studia Semiotyczne 27 (2010), 45–55. Translated by Wioletta Karkucińska.

The proposition that metaphor exists in scientific language, especially in the language of natural science, can initially raise many objections. Perhaps it would be less surprising in the search for metaphors in humanities. It is universally acknowledged that natural science presents the objective, "true" picture of the surrounding reality, quite contrary to the naïve folkloric view of the world. As a result, it would seem that metaphor has no place in it. Arutiunova wrote: "it is no coincidence that scientists **avoid the use of metaphor in their publications** *(bold emphasis in all quotes mine – M.Z.)* — they think metaphor constitutes no argument, furthermore: 'committing a metaphor' is comparative to committing a crime. (Arutiunova 1981: 140-141). Perelman also notes that "the scientific writing style rarely reverts to the use of metaphors" (Perelman 1971: 250). However, the analysis of texts from the domain of natural science — both popular-science and strictly scientific publications presents an entirely different situation — not only is metaphor used in these texts with reasonable frequency, but it also plays a significant role. Fojt claims that "the process of metaphorisation plays a significant role in the formation of terms, and as a result, it influences the expression of scientific theories" (Fojt 1998: 107). Similar claims have been made by Draft (Mac Cormac 2002: 353), Harré (Paton 2002: 270), Paton (Paton 2002, 270). Even Perelman, who does not consider metaphor to be a typical component of scientific language admits: "[. . .] when a scientist is faced with a new domain of research, he often allows himself to be guided by analogies. These analogies play a heuristic role – they act as creative tools which provide

the scientist with hypotheses which give direction to further analyses. Their most important feature is potency – they ought to open new perspectives for the research; however, in the end they should be eliminated, because the acquired results must be expressed in technical language, whose terms are derived from theories connected to the given domain." (Perelman 1971: 250).

The present article shall discuss the function of metaphor in the language of natural science and enumerate methodological problems connected with describing metaphors in scientific texts.

1. THE FUNCTION OF METAPHOR

According to Paton, metaphors can have the following functions in science:

– *catechretic — they can supply new terms to the theoretical vocabulary;*

– *ontological — they are involved in the formulation of hypothetical entities;*

– *didactic — they facilitate dialogue between a teacher and a student* (Paton 2002: 271).

Boyd, however, claims there are two types of metaphors in scientific language: *theory-constructive metaphors and pedagogical/exegetical metaphors.* According to Boyd, theory-constrictive metaphors are the most original metaphors in the language of science, because they help to shape a specific manner of conceptualization of the new objects or phenomena. Boyd claims that these types of metaphors cannot be paraphrased, because they represent the only way of speaking about the given object or phenomenon and thus fill a certain cognitive void — not only at the level of language, but also with reference to terminology.

Pedagogical/exegetical metaphors are used to explain the properties of the given phenomenon. They are neither original, nor argumentative — they are strictly descriptive and as such, can be paraphrased (Boyd 1993).

Knudsen observes that within the classification proposed by Boyd it is rather difficult to differentiate between the metaphor which constructs the theory and the pedagogical metaphor because both types of discourse (strictly scientific and that of popular science) use virtually the same types of metaphor and as a result, the boundaries between the two types become rather vague. Boyd points out that these two types of discourse only differ in the frequency of metaphors and the manner of their presentation. As a result, the metaphor may be **closed**, that is, one stops being aware of its metaphorical character and it becomes a stabilized concept; one might even say — a component of the system. An **open** metaphor is presented

as a foreign component of the discourse (for instance through the use of quotation marks) which is ambiguous and therefore needs to be supplied with an explanation. Knudsen emphasizes that frequently, a closed metaphor used in popular discourse transforms again into an open metaphor (Knudsen 2003: 1254).

1.1. CATECHRESIS

The most obvious and probably the least controversial function of metaphorization is its use in the naming of new objects and phenomena in scientific language. The majority of scientific terms are catechreses, which fill the voids in the lexical system, for instance: brainstem, cerebral cortex, thorns, end-brush, red giant, white dwarf, Baby Universes, DNA chain, trash DNA, progeny DNA, egoistic DNA, etc. It is typical for catechresis to lose their metaphorical character at a certain point and become simply a component of the lexical system.

T. Dobrzyńska emphasizes the difference between catechereses and proper metaphors. She claims that catecheresis does not possess this "semantic tension, which is characteristic for metaphors; it does not require a simultaneous actualization of the code meaning different from the one used at the moment: (Dobrzyńska 1994: 63-64). Her opinion is shared by Arutinowa, who uses the term *nominative metaphor* instead of *catecheresis.* According to her definition, nominative metaphor is based on the similarity of objects either within the category of function or some external, obvious characteristic, hence, it works in a demonstrative manner — it does not appeal to intuition, but to the sense of sight. [. . .] After fulfilling its nominative function, the metaphor disappears" (Arutiunova 1981: 138-139.) Meanwhile, according to Arutiunova, the proper, predicative metaphor is "a certain form of contingency, used not in order to search for a name, but to find a picture, a manner of individualizing or assessing an object or for making out the facets of its sense. (Arutiunova 1981: 139-140).

However, one ought to emphasize here that catechereses in the language of natural science differ amongst each other to a significant degree. For instance, in the Polish language, the term denoting the cortex — *"kora [mózgowa]"* is based on the visual comparison between the source domain (*"kora [drzewa]*" — treebark) and the target domain (the corrugated tissue of the brain). One might say that in the Polish language, this catechresis is based on a simple comparison — the brain's tissue (Polish: "kora") is corrugated in a manner similar to treebark (also "kora" in Polish).

However, catechresis can activate much more complicated connotations, for instance the term *black hole* as the description of a super-massive astronomic object. This term was not coined based on a simple comparison — there is no category within which a supermassive astronomic object is similar to a black hole, since it is a hypothetical entity, whose existence has been debated by physicists since the 18th century. So far, no one knows what such an object looks like and if it actually exists. The term *black hole* was proposed in the 1960s by John Wheeler. The earlier name — *frozen star* — was rejected. One might say that the creation of the term *black hole* was based not only on the act of transferring the meaning and filling a gap in vocabulary — it also became an image and a way of assessing the given object – which makes this catechresis more similar to a proper metaphor. The fact that this term is connected to a very distinct process of assessment and evocative imagery is confirmed by its "second life" in other domains of science or in other types of discourse, for instance:

– Polish society identifies itself and becomes involved on both private and national levels. There is a gap between the two — how should it be eliminated?

– There are two approaches to the goal of filling this gap, which sociologists have called **"a black hole."**[1]

Despite its many achievements, NASA is a wasteful and messy bottomless pit, which does not generate any profits and in a manner similar to a black hole, sucks in billion after billion of tax payer's money ("Czas" no 40 (959) 4^{th} October 2008).

1.2. METAPHOR AS A PEDAGOGICAL TOOL

Another role played by metaphor in language is its pedagogical function. Metaphor is frequently used in texts designed for non-professionals in order to explain very complex ideas in a fairly non-complicated manner. A good example here would be the following text describing the analysis of the human genome – the Human Genome Project:

The analysis of the largest human chromosome has been completed. It also constitutes the **publication of the last chapter in the Human Book of Life** – claim the scientists writing for *Nature* magazine.

The Human Genome Project (HGP) was created sixteen years ago. Americans decided that by 2005 they would have ***read*** *the entirety of the human genetic material. This decision gathered such enormous feedback from*

[1] http://www.euroregiony.pl/html/253.html

all over the world and so many countries joined the project that the first sketch of the ***transcript*** *of human DNA was created as early as 2000. Ever since that time scientists have been trying to further specify the acquired data and fill in all the gaps that have been created during the rapid transcription of the* ***letters.*** *[DNA] consists of millions of letters ordered into pairs on a double srand called the helix . [. . .] The human* ***"transcript of life"*** *uses four types of letters, specifically those marked as A, T, C and G. [. . .] While analyzing chromosome 1, scientists also discovered that the* ***"genetic recipe for a human being"*** *starts with the* ***letter C.*** *[. . .]What else is known about chromosome 1? It is more than six times longer that the smaller human chromosomes — 21 and 22 — and carries as much as 8 percent of our genome. If the* ***transcript*** *it contains were ever* ***printed,*** *then it would take up more than 60 thousand* ***pages*** *[. . .]*(M. Kossobudzka, *Największy ludzki chromosom rozszyfrowany,* "GW", 19.05.2006).

Metaphors fulfilling pedagogical functions are figurative — they are based on a comparison or an analogy. In the discussed type of metaphor, the sender reveals the source domain (which is LANGUAGE in the quoted text), which becomes a source of the lexis transferred to the target domain (DNA). The sender assumes that the recipient is familiar with the source domain. As a result, the sender introduces a string of analogies between the source and target domains (for instance between the language and the deoxyribonucleic acid) and enumerates all the instances in which these two domains are alike.

LANGUAGE	DNA
letter →	*nucleotide*
word →	*codone*
sentence →	*gene*
chapter →	*chromosome*

1.3 THE MODELING FUNCTION OF METAPHOR

The modeling function is undoubtedly the most important feature of metaphor in scientific language. Fojt described it the following way: "I shall argue that metaphorisation processes play a **constituitive** role in concept formation by virtue of which they influence articulation of scientific theories. [. . .] Once a given metaphor is established in some discipline it specifies a framework for research. It provides inferentially useful patterns for further theory articulation. It also sets forth a range of plausible explanations for theoretical problems — some solutions are acceptable under a given

understanding while others have to be discarded. Hence — mataphors can be said to guide reasoning by predetermining scientific research. (Fojt 1998: 108).

Metaphor with a modeling function does not consist in the transferring of single lexemes from the source domain nor in an impromptu formation of a name for a new object or phenomenon, which shall gradually become a term (as is the case with catechresis). This metaphor consists in transferring the entire conceptual structure from the source domain into the target domain together with the appropriate terminology. In certain aspects, the maker of a model shapes the target domain as a mirror image of the source domain, hence he refers to it with the words that are primarily used to refer to the source domain. This might be connected to a real similarity between the domains, however, the said similarity might be only postulated by the sender — this way, he creates a hypothetical model of the given object or phenomenon (such an action was referred to by Paton as an ontological metaphor). Good examples to present here might be the metaphor of BRAIN AS COMPUTER borrowed from the domain of neurology and psychology or the metaphor of ORGANISM AS AN ENTERPRISE borrowed from the domain of biology; see:

BRAIN AS A COMPUTER

[. . .] the basic ***operational unit*** *of the mind and the brain is the* ***module — the cognitive processor which computes****, in strictly specified parts of the cortex, equally* ***strictly specified types of information. The modules, which work automatically*** *and independently from one another are informationally impenetrable, i.e. they use sources of information exclusive only to them. The results of their* ***operations*** *are transferred to the so-called* ***central processor****, which encompasses more complex cognitive functions (for instance: processes involved in decision-making) and cannot be pinpointed in the brain* (Jodzio 2003: 38).

ORGANISM AS AN ENTERPRISE

The theory of a disposable body states that it is the task of the mortal body to enable the dissemination of the immortal reproductive cells. It ponders the manner in which an organism should ***distribute its resources*** *— primarily energy — in order to both ensure its own survival as a unit and* ***produce progeny*** *which shall enable the survival of its genes after its death. In principle, an overly large investment in the maintenance of somatic cells is*

unprofitable because it depletes the resources which might be used for reproduction. *In short, immortality leads to lower fertility because the organism's* ***resources*** *are* ***used*** *for the maintenance of somatic cells. Aging is the* ***price*** *the organism pays for* ***investing*** *in reproduction* (Strosznajder, Mossakowski 2001: 12).

What conditions should be met in order to conclude that a metaphor fulfills the modeling function? It seems that the vocabulary of the source domain has to be transferred to the target domain in a consistent manner and should encompass entire fragments of the text or even the whole text, i.e. it should not be limited to one utterance. In principle, the name of the source domain should not appear in the text. However, the name of the source domain is present in the texts which dispute the given model (for instance the claim that the brain is NOT a computer), demonstrating a lack of similarity between these two domains; see:

[. . .] the latest discoveries seem to indicate that biological networks function via continuous dynamic changes of states [. . .] and not as a result of simple algebraic calculations. ***The term "processing of information" can only be a metaphor used to describe the process of auto-modification, and not the calculation of a result in a "biological computer"*** (Górska et al. 2005: 71).

A metaphor with a modeling function is reversible, i.e. the source domain can become a target domain in a different domain of science, for instance ORGANISM AS A SOCIETY, SOCIETY IS AN ORGANISM in sociology. It does not seem that the target domain was more abstract than the source domain — the target domain in scientific language is simply an object for analysis. For instance: the human body is no more abstract than a machine or a computer, which does not change the fact that biology describes it using the abovementioned metaphors. On the other hand, computer sciences describe a computer as similar to a human being.

The metaphor with a modeling function can later become a basis for the entire sequence of co-related metaphors with pedagogical function, which are used to explain the properties of a new phenomenon to the recipient; see:

Our mind is a product of a network of neurons, ***which depend upon them to a greater degree than the operational system Windows depends on a processor, memory and other components of the computer.*** *[. . .] However, we still do not know how this biological network which constitutes the brain actually* ***processes information****. The mind may be a kind of* ***supercomputer*** *but it does not function in a similar*

manner. One of the reasons for this is the complexity of inter-neural communication: the signals are ***coded*** *in two forms: electrical and chemical. It cannot even be clearly determined, which parts of the brain would constitute* ***software*** *or* ***hardware*** (Aneta Brzezicka, Marcin Rotkiewicz, *Śmierć duszy,* "Polityka", issue 50 (2482) from 11^{th} December 2004, special edition Niezbędnik Inteligenta, p. 29).

2. METHODOLOGICAL PROBLEMS IN DESCRIBING METAPHOR WITHIN SCIENTIFIC LANGUAGE

The majority of publications on metaphors use literary texts for analysis because it is universally believed that the metaphor is a phenomenon typical for the poetic style of writing. This point of view was questioned by Lakoff and Johnsons in the book *Metaphors we live by*, in which they demonstrated that metaphors occur frequently and that it constitutes an operation on the terminological level (consisting in perceiving one cognitive domain through another, for instance LOVE IS DEATH, which is later displayed at the level of the language) (Lakoff, Johnson 2003). However, regardless of the change on the manner of describing metaphor in cognitive linguistics, it still lacks a precise definition and differentiation from other similar expressions (for instance metonymy, analogy, comparison). Bogusławski observes: "as we know, the term 'metaphor' is used in a variety of ways; it can encompass either a wider or narrower circle of facts. In the wider interpretation, the term metaphor can even refer to an explicit comparison. In any case, every situation in which an expression is used in a different manner than the one accepted as fundamental, according to a certain principle within a given class and when the given instance of usage and the class can be said to posess a 'common feature', justifies the use of the term 'metaphor'. As a result, the label 'metaphor' can refer to many different things, including certain terminological uses (for instance "a mechanical horse"), hyperboles, litotes, circumlocution and a multitude of others." (Bogusławski 1971: 113).

When analyzing scientific texts, it is quite important to differentiate between metaphors and analogies. This task is difficult because in many publications the definitions of metaphors and analogies overlap; see: "[...] analogy occurs only when one can establish a certain similarity of relations and not only a similarity between objects. When one claims that A is B (this man is a fox) – then we are not dealing with an analogy but a metaphor, which is a condensed analogy and which shall be discussed later. A typical pattern of an analogy shall consist in the claim that **A is related to B the same way C is related to D.** A and B as well as C and D can be

quite different — in fact, their heterogeneity is necessary if the analogy is to be something more than a simple proportion. [...] **a metaphor occurs (in accordance with the analogy: A is related to B the same way C is related to D) when in order to indicate A one shall describe the relation of C to B or if one observes that A is a type of C"** (Perelman 1971: 248-250).

It is also difficult to differentiate between a metaphor and a comparison. Based on the existing definitions, it would seem that the two phenomena are very close; see: "With greater or lesser confidence, a metaphor of this type *(predicative metaphor — M.Z.)* **can also be inferred from a comparison** based on the parallel relation between various phenomena: *a storm (wind) sounds similar to the howl of an animal* → the *storm (wind) howls like an animal* → the *storm (wind) howls.* The process of similarization in this type of metaphor is based on a fully described feature." (Arutiunova 1981: 142 -143).

The definitions of all the figures mentioned above, that is, a metaphor, analogy and comparison, emphasize the similarity between two objects or phenomena, which in the traditional terminology referring to metaphors would be called a topic and a carrier. As an example, one might consider the following quote from Jakobson: "The development of discourse [...] can progress along two semantic lines: one topic is connected to the other either via **similarity** or by adjacent placement. **The metaphorical way** seems to be the most appropriate term in the first case, whereas the most fitting term in the second case is **the metonimic way**; the reason for this belief is that the most condensed form of these connections is either a metaphor or a metonymy" (Jakobson 1989: 169).

The similarity between the topic and the carrier was also emphasized by T. Dobrzyńska. She claims that in order for the receiver to understand the metaphorical utterance and to preserve the utterance's coherence, the following conditions ought to be fulfilled: the receiver has to: "1) identify the subject of the utterance — 'topic' – 'main topic' of the metaphor (X); 2) recall the opinion on the topic Y-a — 'carrier', 'auxillary topic' of the metaphor; 3) choose certain features of Y-a, which in the given situation can be ascribed to X, then transfer them to X. (These of course will not include all possible features of Y-a, because Y is not identical to X, **they are merely similar in a certain aspect**" (Dobrzyńska 1994: 16).

The issue of similarity as an important part of the definitions of metaphor was discussed by Ritchie in his 2006 publication *Context and Connection in Metaphor*, in which he analyzes several examples of metaphors. I shall

discuss only one of them: *encyclopaedia is a jungle.* According to a dictionary definition a *jungle* is "a humid tropical forest with a great variety of trees, a multi-layered system of forest-stand, a multitude of lianas and epiphytes and an underdeveloped layer of shrub and undergrowth." an *encyclopaedia* is "a publication encompassing a set of information from all the branches of knowledge or from one domain, arranged as entries in an alphabetical or subject order." The discussed metaphor seems to be simple and understandable. However, one ought to note that the literal meaning of the lexemes *jungle* and *encyclopaedia* do not have any semantic elements which might be considered similar. Ritchie observes that this metaphor was created as a result of an initial metaphorisation of the two domains. "*Jungle* must first be understood in a metaphorical way — generally as a thick accumulation of something, not just as an accumulation of plants. That is not all — one also has to create a conceptualization of information and knowledge as a material object which can be thick and tangled.

Thus, the metaphor '*encyclopaedia is a jungle'* does not contain a direct transfer of carrier features to the topic. The carrier features must first be metaphorized and the abstract topic must also be conceptualized in a proper way so that the metaphor can exist at all. This issue is more complicated in scientific language, which often describes very abstract beings or phenomena.

Max Black, who analyzed metaphor in scientific language also criticizes the comparison theory of metaphor, see: "the main drawback of the comparison theory is its haziness which borders on verbosity. [...] A metaphorical utterance is not a surrogate of a formal comparison or any other literal utterance because it possesses its own value and potential. We often say 'X is M' by evoking certain relationships between M and L (or rather with an infinite sequence L_1, L_2, L_3...) when it would be difficult to construct a metaphor by finding literal similarities between M and L. In such cases, it would be more reasonable to say that a metaphor **creates similarities instead of defining those that already exist**" (Black, 1971: 227).

3.CONCLUSION

The analysis of texts from the domain of natural science indicates that the metaphor constitutes one of their most significant components and one of the fundamental tools for communicating new information and explaining phenomena. Further research on this issue ought to include a more formalized classification of the functions of metaphor in scientific texts, because the divisions suggested by Paton and Boyd are nor fully separate and the types of metaphor they proposed overlap. It shall also be necessary to reformulate

the issue of similarity between carrier and topic in the existing definitions of metaphor, because otherwise the majority of phenomena described in the analyzed texts (except for very conventional expressions such as *cerebellum*) will not qualify to be called metaphors.

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Adam Pawłowski

QUANTITY STRUCTURE OF LEXICAL FIELDS AND THE HUMAN COGNITIVE PROCESSES[1]

Originally published as "Struktura ilościowa pól leksykalnych a procesy poznawcze człowieka," Studia Semiotyczne 27 (2010), 71–80. Translated by Agnieszka Ostaszewska.

INTRODUCTION

The notion of optimum coding is traditionally associated in linguistics with a binary record of the phonetic level units and/or other equivalent symbols, e.g. letters (Jassem 1974: 239-297; Herdan 1966: 259-303; Hammerl, Sambor 1990: 418-420). Its purpose is to demonstrate that variable frequencies of occurrence of the examined symbols may reduce the length of the coded message, i.e. indirectly reduce the time of its processing (understanding, reproduction and/or sending). A similar technique may, however, also be applied to the subsystems of the language. In particular, with the use of this method, one may code lexical fields, treated here as subsets of the lexical subsystem.

Comparing, on the basis of corpus and dictionary data, lexical fields in various languages, one is able to note that the frequencies of lexemes in each field are uneven and distributed in a decreasing order in a quite characteristic and predictable way (a non-monotonic decreasing curve of the shape resembling a negative-exponent power function, Fig. 1). This phenomenon is present in various languages, probably in the case of all lexical fields, but also on various levels of generality, since it pertains to the quantity structure of the entire vocabulary, and not only the subsets thereof. On the surface, the explanation seems simple: namely, it is possible

[1]The analyses presented in this paper are an elaboration of the empirical analyses contained in Pawłowski 2007.

to refer to the categories of COGNITIVE REALISM and assume that the diversification of the frequencies of lexemes reflects the quantity structure of actual designations of the respective notions. This would mean for example that lexemes *black, white, red* etc. have the highest frequencies, since they indicate the colours which are most often found in the environment of a human being (an analogous reasoning may be carried out with reference to lexical fields representing other fields of reality). However, this explanation is insufficient. Although there is a certain relation between the human environment and the quantity properties of vocabulary, explanation of uneven distributions of frequencies in the lexical fields requires a reference to the basic epistemological categories (constructionism, cognitive realism, apriorism, and aposteriorism), as well as to the knowledge of neuro-linguistic processes taking place during the recollection, reproduction and transmitting of linguistic information by a human being.[2]

THE CONCEPT OF A LEXICAL FIELD

The term lexical (word) field[3] has entered the linguistic conceptual apparatus thanks to the works of J. Trier, W. Porzig, L. Weisgerber, E. Coseriu and other, mainly German, scholars, active in the first half of the 20^{th} century (Trier 1973a, 1973b; Weisgerber 1950; Porzig 1957; Coseriu 1975). In Polish scientific literature this view was popularised i.a. by Walery Pisarek (1967), Danuta Buttler (1967) and Ryszard Tokarski (1984, 2006). It is worth adding that the difference between the scopes of the sometimes interchangeably used names of *the lexical field* and *the semantic field* is relatively small: the notion of the lexical field is defined in the semasiological perspective, which is characterised by the primary nature of the network of names (signs) with respect to the network of notions and the set of designations; the notion of the semantic field is, on the other hand, defined in the onomasiological perspective, where the supreme role is played by the relations between the designations and not their names (signs).

A lexical field may be defined as a set of lexemes having common semantic properties. An example may be the lexical fields of the names of colours, animals, plants, vehicles, etc. The most distinct elements of this

[2]Literature devoted to the examination of linguistic data coding processes in the psychological perspective is quite extensive. One of the latest works on the subject is Michael Fortescue's *A Neural Network Model of Lexical Organisation* (Fortescue 2009; cf. also Johnson 1978).

[3]The term *word field* is a loan translation of the German name *Wortfeld* and shall be treated as a synonym of the name *lexical field*.

set may be recognized on the basis of the fact that they are combined by a relation of hyponymy with the same hypernym. Less distinct elements, i.e. such elements whose appurtenance to a given lexical field is disputable, may be recognized on the basis of the fact that they are in a relation of broadly understood meronymy with respect to the basic lexemes, and do not have to demonstrate the same morphosyntactic properties (for example the lexemes: *to paint, light* and *shadow* in relation to the "core" of the lexical field of names of colours).

An issue more important from the definition of the lexical field itself however, is the idea to treat vocabulary as a large system, composed of smaller, coherent subsystems, and not as an amorphous set of independent, isolated units. This idea is, of course, present to a varying degree, in the assumptions of many theories of linguistics and other disciplines related to linguistics. And thus, close to the notion of the lexical field are the notion of Ch. Fillmore's SEMANTIC FRAME (Fillmore, Atkins 1992), psycholinguistic notion of BEHAVIOURAL SCRIPT, the notion of ONTOLOGY in language engineering and AI research, the notion of SYNSET in Wordnet research (cf. Miller 1998, Piasecki et. al 2009) and the notion of SEMANTIC NEST in lexicology and psycholinguistics (Sambor 1997; Sambor, Hammerl 1991; Łobacz, Mikołajczak-Matyja 2002). In this paper it has been assumed that not only the vocabulary, but also THE REPRESENTATION OF KNOWLEDGE IN THE HUMAN MIND IS OF SYSTEMIC CHARACTER, AND ONE OF THE METHODS THAT MAKES IT POSSIBLE TO DISCOVER HUMAN COGNITIVE SCHEMATA IS TO EXAMINE THEIR EXTERNAL MANIFESTATIONS, FOR EXAMPLE THE LEXICAL FIELDS. Such research may in consequence facilitate the choice between two competitive epistemological approaches, which one may consider to be cognitive realism and constructivism.

LEXICAL FIELDS STRUCTURE MODELLING METHODS

From a mathematical point of view, distribution of the frequencies of lexemes may be described by many methods. One of the methods which is often applied is function estimation, constituting assumingly a theoretic model of the described phenomenon. This type of modelling was propagated by the German school of quantitative studies (cf. Altmann 2000; Köhler et al. 2005). Function models of this kind have many advantages, they show the co-dependency between the variables, as well as provide for a prediction of the properties of texts of a given kind. Their disadvantage are their small explanatory power, and therefore lack the possibility to explain the essence

of the phenomenon, its sources and consequences. Approaching this issue in a minimalist way, it is of course possible to assume that the reason for the variability in the value of function *f(x)* modelling the studied phenomenon, are the changes of the value of parameter x, it is also possible to show the dynamics of these changes. A model treated in this way is not an explanation, however, but only a mathematical, formalized mapping of a certain fragment of physical or abstract reality.

In order to avoid limitations, this paper employs an approach, whose objective and main idea is to search for the causes of the phenomenon, and not only the mapping of its internal dynamics. It has been assumed that a subset of the lexicon, constituting a lexical field, may be represented in the memory of a person as a binary sequence, and therefore, its model should also be based on a two-value scale. This approach is consistent with the current knowledge of neurological processes, since zero and one in the mathematic model correspond to the states of activity and non-activity of a neuron. The neuron activation process, taking place at the synapse, consists of adjusting the amount of the neurotransmitter, i.e. of the substance separating the ending of the axon of the neuron delivering information from the receiving neuron, which makes it possible to transmit an electrical impulse between the neurons. It may be added that in the artificial neural network theories, the neuron activation process is modelled by the so-called binary-type threshold function (Tadeusiewicz 2000: 4-17; Rutkowska et al. 1999: 18-21).

Two methods have been applied in order to code binary sequences corresponding to single lexemes:

– simple coding, based on the principle that binary sequences corresponding to particular lexemes are of the same length;

– optimal coding, based on the principle that the length of the binary sequence depends on the frequency of a lexeme's occurrence, whereby frequent lexemes are coded with the use of shorter sequences and non-frequent lexemes are coded with the use of longer sequences (the so-called Huffman coding).[4]

Having performed the coding, we have compared the average lengths of the binary sequences, corresponding to the lexemes belonging to the lexical field of colours, obtained by both methods. The obtained results

[4]Optimal coding technique, used most often by data compression, is based on a quite simple algorithm, which has been described in the literature from the field of linguistics, study of information and computer science (Meyer-Eppler 1959; Hammerl, Sambor 1990: 415-423), as well as on various all-accessible WebPages (examples of such descriptions may be found at: `http://en.wikipedia.org/wiki/Huffman_coding`, `http://www.compressconsult.com/huffman`, `http://www.quant-dec.com/Articles/steganography/huffman.ht`).

have been subjected to analysis and interpretation and an account taken of evolutionary aspects of the increase in the efficiency of human brain cognitive processes in the course of phylogenesis. By formulating conclusions, it has been assumed without proof that processes and systems of communication in the world of living organisms are governed by two basic principles. The first is the principle of the least effort. It stipulates that each organism strives at minimising the amount of energy invested in the process of generating, understanding, remembering and sending information. According to the second principle, the communication systems are relatively autonomic and are subject to self-regulatory processes. One of the consequences of the operation of these principles is the common phenomenon of the abbreviation of forms of high frequencies, modelled i.e. by Zipf's law.

RESEARCH RESULTS

In the first part of this research a histogram was prepared of the average frequencies of basic colour names in ten Indo-European languages, based on a representative five-million sample (in each language there were on average 500 000 test words).[5] The absolute values were changed into a percentage share of particular colour names in the entire lexical field and presented in decreasing order (Fig. 1). The obtained result has a distribution typical for most lexical fields, which may be observed in the vocabulary structure of a single text of relevant length,[6] a collection of texts, as well as the entire vocabulary of a given language. This distribution has not been subject to modelling, however, one may suspect that a non-monotonically decreasing function (e.g. a power function or an exponential function) would yield good results in this case. The data was then coded using Huffman's method.

[5]A detailed description of the corpus of the texts is contained in the works Pawłowski 2003 and 2007.

[6]Balance, whereby increase of the length of the sample does not materially affect the value of the measured parameters, is considered to be the most reliable criterion specifying the text volume in quantitative language study.

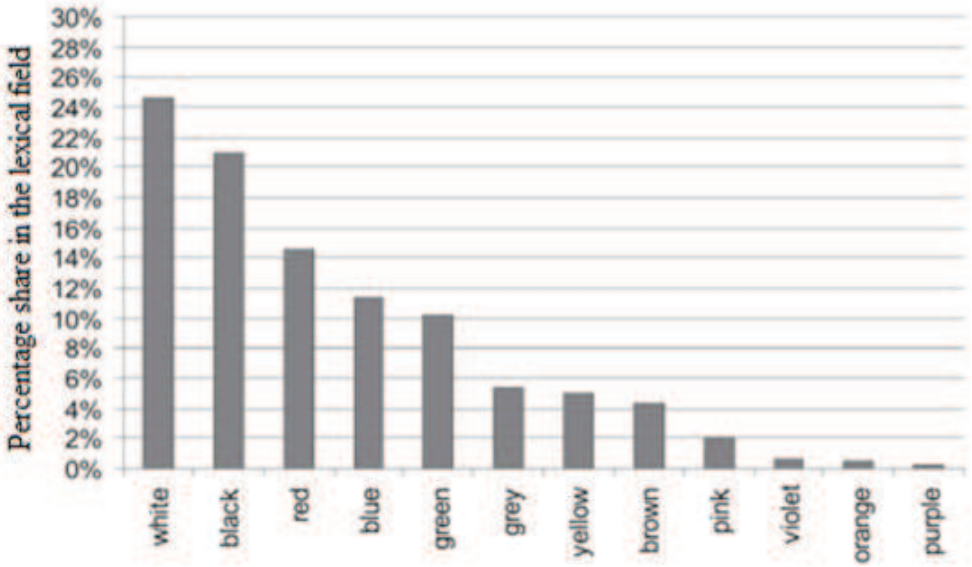

Fig. 1. Share of average colour names frequencies in the lexical field on the basis of a multi-lingual corpus of texts (cf. Pawłowski 2003 and 2007).

In accordance with the expectations, the average length of the sequences of bytes coded with the optimal method proved to be smaller than the average length of the sequences obtained

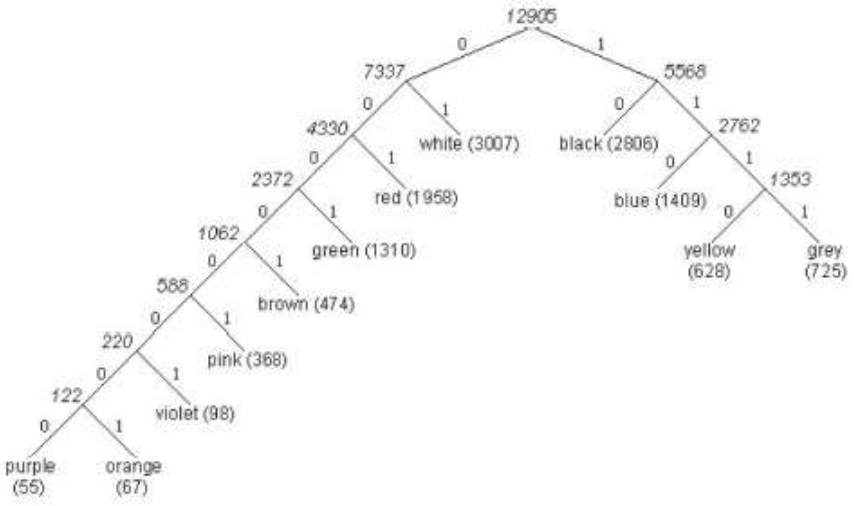

Fig. 2. Huffman codes values ascribed to the elements of the lexical field of colours

C	F	p	p.c.	H.c.	L
white	3007	0.233	1111	10	2
black	2806	0.217	1110	01	2
red	1958	0.152	1101	100	3
blue	1409	0.109	1100	011	3
green	1310	0.102	1011	1000	4
grey	725	0.056	1010	1111	4
yellow	628	0.049	1001	0111	4
brown	474	0.037	1000	10000	5
pink	368	0.029	0111	100000	6
violet	98	0.008	0110	1000000	7
orange	67	0.005	0101	10000000	8
purple	55	0.004	0100	00000000	8

Tab. 1. Binary coding of the elements of the lexical field of colours

Designations:
C name of the colour
F frequency of the use of terms corresponding to C in the corpus
p empirical probability of C appearing in the corpus
p.c. proportional coding (sequences of even length)
H.c. optimal coding (sequences of varying length)
L length of optimally coded sequence

in the course of even coding. The length of the sequence by even coding for the lexical field of the colours was permanent and was equal to 4 bytes of information, whereas by optimum coding it dropped to 2.97 bytes (Tab. 1, Fig. 1). This means that the increase in the effectiveness of processing the information coded by Huffman's method was equal to about 25%, since this is the value by which the average length of a "binary word" was reduced, and therefore by which the average time of decoding, recording or sending it was reduced. The notion of information is wide, of course (in the general sense it means every stimulus increasing the organism's knowledge of its environment). In this context, however, information should be associated with processing (coding, decoding or sending) of a stimulus corresponding to one notion or lexeme.

CONCLUSIONS

The cause-and-effect reasoning, whose objective is to explain the common phenomenon of uneven distributions of frequencies of lexical units in

communication systems, is based, as already mentioned above, on the principle of the least effort. In connection with the self-regulatory mechanism, these are the principle results in establishment of a state of balance between two conflicting forces, which are, on one hand the human communication efficiency and orientation in the environment, and on the other — limited capabilities of the human brain to register and process information. The maximisation of the first parameter, i.e. the best possible orientation of a human being in the environment, would require processing, in real time, of a practically unlimited number of various stimuli, constantly received by the preceptors. However, such a task exceeds the capabilities of the human brain. This is why probably in the course of the phylogenetic adaptation processes there have developed internal cognitive mechanisms, which in a way pump the stream of stimuli into ready, simplified schemata (the model of such schema has been presented in Fig. 1 and 2). The HYPOTHESIS OF COMPROMISE between the tendency to maximise the quantity of analysed information and the limited capabilities of the human brain to process information, which has been presented and initially verified herein, is a very good starting point, leading to formulation of generalisations.

The first conclusion that comes to mind after analysis of the data is the assumption that human cognitive processes are of MODERATELY APRIORICAL character. This means that the representation of knowledge contained in the human brain is determined not by external stimuli but by the structure of the memory itself. It forces data categorisation based on uneven distributions, composed of ca. seven or eight units of decreasing frequencies and of a large number of low frequencies ("the curve's tail"). It may be said that people perceive reality in this manner and nothing else, since the brain would not stand the intensity of the cognitive process, in which every element of the world would be categorized in accordance with its physical properties, and the units belonging to lexical fields would have similar values in the discourses. Distinguishing for example n perceptively separate colours (n may vary from several hundred to several thousand, depending on individual features), a human being reduces this number in his representation of knowledge to several dominant terms, described as basic colour terms (Kay, Maffi 1999; Pawłowski 2006). Although loss of information takes place, it is compensated by the greater speed of processing smaller numbers of categories, which finally increases the human being's orientation in his environment. This phenomenon is of course multiplied by reference to all linguistically categorised elements of experience.

This conclusion does not mean, however, that the verbalised represen-

tation of knowledge is entirely separate from experience. Perception, and therefore indirectly the human being's environment, is decisive for which categories are to be put in particular places of the schema analogous to the one presented in Fig. 1. For example, the primal experience of light, darkness, blood and fire results in the fact that colours corresponding to these prototypical phenomena or designations are present, in all languages which were linguistically examined, at the first three places in the schema. Also of importance here are the physiological properties of the human eye, which provide for easier recognition of certain colours. However, the mere scheme of decreasing frequencies of subsequent lexemes, resulting in a subjective conviction of the language users of varying "importance" or "prototypicality" of particular colours, is only a result of the limitations imposed by the human brain. Since an analogous reasoning is possible to be carried out with respect to lexemes constituting other lexical fields, the conclusions presented here should be considered relevant for the entirety of the human cognitive processes.

In order to find additional confirmation of this conclusion, one might design an experiment consisting therein that a group of people is located in an isolated, yet observable, environment (a kind of "scientific Big Brother"), containing even distribution of perception stimuli of a certain type. It needs to be expected that as a result of self-regulation and optimisation of the cognitive process, the linguistic representation of this balanced group of stimuli, corresponding to a certain lexical field, will not be even, but will adjust to the schema built in the human psyche, presented in Fig. 1. The relation of this structure with such constructs as Universal Grammar or *Lingua Mentalis* remains an open question, however (the conducted research allows only to state with high probability that such relation does exist).

The second conclusion is of self-referential character, and its consequences may prove auto-destructive. Since the representation of knowledge in the human brain has such a large autonomy in relation to the sensually perceived reality, then also perhaps the entire human knowledge, to which the cognitive activities of the human mind lead, should be recognized as a construct only loosely connected to the reality (self-reference means here recognition of this paper as being an element of the scientific discourse). Such a conclusion would be consistent with the standpoint of radical constructivism, which stipulates that "[...] human beings, due to the construction of their nervous system, do not have cognitive access to reality. The human nervous system is autopoietic and self-referential, semantically and operationally closed. All we can do is construct reality" (Graszewicz, Lewiński 2007: 206). The conducted

research does not, however, justify drawing such extreme conclusions. It has only been demonstrated that "access to reality" is strongly distorted by human adaptation mechanisms, optimising the cognitive process by the creation of a linguistic representation of the world relatively autonomous with respect to experience. It has not been demonstrated, however, that this limitation pertains also to purely intellectual operations, whose purpose is to rationally process the perception stimuli with the use of mathematical models and to carry out cause-and-effect reasoning.

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Joanna Jurewicz

ON GENERAL AN ABSTRACT TERMS IN ARCHAIC THOUGHT – ON THE BASIS OF THE RIGVEDIC TERM *ÁṀHAS*

Originally published as "Powstanie pojęć ogólnych i abstrakcyjnych w myśleniu archaicznym – na przykładzie rygwedyjskiego pojęcia *áṁhas*," Studia Semiotyczne 27 (2010), 81–92. Translated by Magdalena Tomaszewska.

'The actual fragments of the Presocratic thinkers are preserved as quotations in subsequent ancient authors, from Plato in the fourth century B.C. to Simplicius in the sixth century A.D"- reads the introductory note to *The Presocratic philosophers* (Kirk, Raven, Schofield 1999: 21). Researchers of the oldest thought of Hindu philosophy are thus in a much better situation. The thought is present in a huge corpus of works collectively referred to as the Veda, and has survived into modern times. The oldest text of Vedic literature, the *Rigveda*, composed by an Indo-European people the Aryans, is dated to circa the eighth century B.C. and comprises 1028 hymns. Other texts, which include the remaining three Vedas, the Brahmanas, the Aranyakas, the Upanishads, are spacious compositions, both in verse and prose, and all of them attest the Old Hindu love of wisdom. They serve as a foundation for classical Hindu philosophy which originated in the first half of the first millenium B.C. All thinkers engaged in this philosophy credited the Veda and declared that their conceptions were only a commentary to its oldest heritage even if their conceptions were in fact distant from the Veda. This heritage is important not only because it outlines many subsequent mataphysical, epistemic or axiological theories, and some of their notions. Its importance lies also in the fact that it attests the earliest rational efforts of human thought to describe the world in general and abstract terms, and even if such descriptions have been changing over time, they have made classical

investigations possible. It is my conviction that examining the oldest Hindu philosophizing is beyond the scope of interest of Indology: it can be regarded as an attempt to reconstruct the beginnings of general and abstract thinking and the source of this ability in humans. This article deals with the Sanskrit term *áṁhas*. In dictionaries its meaning is generally captured by 'anxiety, trouble'.[1] It was commonly employed in the oldest Hindu texts, then it was disappearing (Gonda 1957, Renou 1939). Analyses of its use in the Rigveda facilitate the observation that the meaning mentioned by lexicographers is only one of the meanings and by no means the most important one. As it will be shown, *áṁhas* is a general and abstract term, and the Rigvedic material suffices to trace the development of the semantic field of the term. My analysis is based on the assumptions of cognitive linguistics according to which our conceptual system is motivated by experience, both physical and cultural. The meaning of a word is a coherent and organized way of thinking about the referent and is ultimately constructed in context both co-text (directly linguistic context) and situational context.[2] Cognitive linguistics assumes that human beings understand abstract terms in the categories of the terms familiar to their everyday experience.[3] Terms whose categories capture other terms are called source domains, while the captured terms are target domains. The more difficult it is to represent the source domain of a term, the more abstract the term is. In this paper I would like to show how this abstraction can be reached by thought, thus departing from the experience motivating it. The pursuit of generality will play a crucial role here as it allows us to capture common features of different experiences in one term. Cognitive linguists debate about issues of polysemy, monosemy and homonymy (Allwood 2003, Janssen 2003), search for the criteria for polysemic expressions (Evans, Tyler 2001, Evans 2004), and consider relationships between polysemy and generality (e.g. Geeraerts 1993, Tuggy 1993, Zlatev 2003). Since this paper is mostly concerned with the issue of the beginning of philosophical thought understood as the ability to abstract and generalize, it will discuss the generality and abstraction of the term *áṁhas* and the polysemy of its linguistic expression. It is worth mentioning that an analysis of the term's meaning was conducted a half-century ago by Gonda (1957), who provided rich comparative material. He noted the general character of the term and its foundation in experience. This

[1] Mayrhoffer 1956. This is also the first meaning in Grassmann 1873, followed by 'Enge' (narrowness) and 'Kluft' (cleft).

[2] Tokarski 1990, Langacker 2003.

[3] Lakoff, Johnson 1980, Radden, Dirven 2006.

paper focuses on reconstructing the experience relevant from the point of view of the semantics of the term *áṁhas* and - as has already been signalled - the ways leading to abstraction and generality. As it will be shown, the term *áṁhas* does not have an equivalent in English, thus it will remain in its original form.

I

The *Rigveda* is full of verses in which the poets plead the gods to protect them against *áṁhas*, without reference to particular situations.[4] In such contexts it seems difficult to establish the meaning of *áṁhas* unambiguously. However, the verses in which *áṁhas* is accompanied by other phenomena regarded as undesirable are of help. The poets make a plea for difficulties (*duritá*) and discomfort (*árāti*)[5] as well as physical diseases: illnesses (*ámīva*)[6] and suffering (*tápas*)[7] to be lessened together with *áṁhas*. When *áṁhas* disappears, also fear disappears.[8] Pleas for relieving *áṁhas* co-occur with pleas for wealth.[9] Ocassionally, it may seem that the presence of *áṁhas* brings death as its lack brings life.[10] Also, it is likely that the word *áṁhas* refers to mental state as it can be driven away by thought, and its defeat overcomes insanity (*prádṛpti*) and thoughtlessness (*ámati*).[11] The above contexts imply that *áṁhas* is a rather general and abstract term. It refers to an undesirable state accompanying difficulties, illnesses, suffering, poverty, evoking fear and bringing the threat of death, states both physical and mental.

II

The word *áṁhas* belongs to a group of nouns and adjectives referring to 'narrowness, tightness', 'narrow, tight' (*aṁhatí, áṁhu, áṁhurá, áṁhūrṇá*)[12] and this sense is present in its semantic field. The Rigvedic poets were aware of this and employed the verb *uruṷsya-*, originating from the adjective *urú-*

[4]RV 1.18.5, 1.136.5, 5.31.13, 5.51.13, 6.16.30 = 7.15.15, 6.16.31, 6.67.8, 7.15.3, 7.71.5, 7.104.23 = 10.53.5, 8.18.6, 8.19.6, 8.31.2, 9.56.4, 10.36.2, 10.132.7 (quoted after Lubotsky 1997).

[5]Both words are ambiguous: *duritá*, (literally: 'that what is difficult to go through'), means 'difficulties, misery, poverty, harm', *árāti* - 'discomfort, misery, disease, distress'. *duritá*: RV 2.23.5, 10.39.11, 10.126.1, 7.82.7. *árāti*: RV 2.23.5.

[6]RV 2.33.2, 8.18.10.

[7]RV 7.82.7.

[8]RV 10.39.11.

[9]RV 4.2.9, 4.20.9.

[10]RV 3.59.2, 4.12.6=10.126.8, 6.48.8 (quoted after Lubotsky 1997).

[11]RV 4.11.6, 5.45.11, 6.3.2.

[12]Gonda 1957, Mayrhoffer 1956. Those words are etymologically related to Polish "wąski" 'narrow'.

'extensive', literally meaning 'to broaden, give space:[13]

> He gives space [so that we could escape] from áṁhas, protects from poverty, even from closure (*áṁhóh*) opens the space, wonderful![14] (2.26.4.cd)

Such descriptions create oposition between that what is tight, narrow and limited, and what is extensive and spacious. I am convinced that it is exactly this notion of physical tightness that is the foundation of conceptualization of the presented above state of discomfort, both bodily and cognitive, and the state of a death threat. The metaphoric thinking reconstructed in such a way represents the general and abstract state (target domain) in more concrete categories of physical tightness, which is a notion refering to everyday experience shared by all human beings (source domain). Thus, the word *áṁhas* has the target and the source domains of the metaphor in its semantic field.

III

It is worth noting that the notion of tightness is general and abstract. It is a result of searching for the common features of various experiences. It is possible to reconstruct the notion on the basis of some verses of *Rigveda*. They describe the Rigvedic man without the possibility to move. Now, I shall analize the verses that recall such experiences in the context of the pleas for removing *áṁhas*.

IIIa

The first experience bearing a threat of physical closure was the journey in which the way was either lost or seemed too difficult. The term for the wrong way, *durgá*, is evoked in the verse below, in which the poet asks the gods for rescuing from anhas:

> Let the merciful Vasus rescue us from *áṁhas* like a chariot from the difficult way![15] (1.106.1)

[13]Gonda 1969, p. 107-108. The word is translated as "to free" and "to rescue": Mayrhoffer 1956 - "befreit, erlöst, rettet/ frees, delivers, rescues".

[14]Cf. RV 1.58.9, 1.91.15, 4.55.5, 7.1.15. Scholars point to the fact that the idea of a tight place referring to anhas is present in 6.11.6, where a plea for jumping over it is made, as if it were something closed; Grassman 1873 suggests translating the word *vṛjána* as "gorge, cleft"; Yelizarenkowa 1995: "okrużenije", Renou 1964: "encerclement (de l'ennemi)", supplemented by a commentary that what he understands by it is "emprisonnement", Geldner 1951 opts for ring ("Gürtel") explaining in a commentary that he understands it as "Umschlingung". In this context, the word aṁhú is even more frequent: RV 1.63.7, 1.107.1, 5.65.4, 8.67.7.

[15]RV 1.42.1, 7.60.6. Cf. RV 1.180.5 together with Gonda's (1957, p. 39).

Although the way may be lost in every journey through the unknown, the verses of *Rigveda* echo a memorized experience of crossing the mountains on the way to the Indian subcontinent.[16] In the verse quoted below, *ámhas* is modified by the adjective "massive" (*vīḍú*), which frequently refers to a mountain-obstacle in *Rigveda*:

> Push away, destroy the massive *ámhas*, kill the powerfully rising demon![17] (4.3.14cd)

The experience of becoming lost in the narrow mountain valleys is also present in the verse below; instead of *ámhas* the poet used its cognate *aṁhūranā*:

> O gods, we came to this tight field, the land, though spacious, has become too small! O Brhaspati, o Indra, reveal the right path to the singer who is searching for cows and has met such [difficulties]! (6.47.20)

"Tight field" evokes the image of sparse narrow strips of soil, characteristic of a high mountain landscape, avaiable for cultivation and grazing. The description of a narrowing land may refer to an entrance of a narrow mountain gorge or cleft, in which the exit is hidden.[18]

Contrary, the verse below illustrates finding the way which leads to an open space and enables movement. The state of closure is rendered by means of *ámhú*, which is a cognate of *ámhas*:

Mitra conquers the passage even from tightness (*ámhóh*)! to a spacious place. (5.65.4ab)

The above examples clearly echo the experience of inability to move freely, caused either by the difficulty of the route or its lack altogether. The experience of journey through the mountain paths and gorges unknown to the Aryans is easily observable in most of the descriptions. Thus, they can be regarded as motivating a general idea of physical closure in the term *ámhas*.[19]

[16] On the journey of the Aryans see: Kieniewicz 1980, Yelizarenkova 1989, Mallory 1989, p. 223 and ff.

[17] RV 1.6.5, 1.71.2, 1.127.3, 3.31.5, 8.45.41, 8.88.3, 10.45.6, 10.89.6.

[18] *agavyūtí kṣétra* literally means 'non-grazing land', as the gvedic notion of grazing land carries the notion of space.

[19] Gonda 1957, p. 35 discusses the verse in relation to the Aryan expansion, without reference to mountains.

IIIb

The second experience limiting the unconstrained movement was war. It is necessary to highlight that the verses describing war and containg the word *ámhas*, do not mention the inability to move. However, some Rigvedic descriptions present embattled warriors, surrounded by enemies, in a cleft stick.

It is especially worth noting the descriptions of a dramatic envelopment of the Aryan troops under king Sudas by attacking enemies, the envelopment in which the king got off lightly.[20] These descriptions lack the word *ámhas*, but they are constructed in such a way as to represent the impression of a claustrophobic and life-threatening state. Also, the enemies are presented as those who prevent the Aryans from passing and make it impossible for them to move.[21] Thus, it seems reasonable that the poets describing the fight against enemies and evoking the notion of *ámhas* wanted to highlight the impression of closure caused by the presence of hostile forces. In the verse below, their enemies' hatred, which should be defeated, is mentioned together with *ámhas*:

> Set off to happiness, to the good place of heavenly warriors, let's overcome hatred, anhasy and [that what] is difficult to go through! (6. 2.11)[22]

The verse below brings to mind a specific place, that is the drainage basin of the Indus River, here called the confluence of seven rivers (Yelizarenkova 1995), where the Aryans faced a double threat they were attacked by their enemies and a bear. The following passage allows us to hypothesise that the use of the word *ámhas* is motivated by the impression of an inablity to escape:

> [You,] who has rescued from the bear, from anhasy, from the enemy in [the confluence of] seven rivers, [You who] bent the Dasa's weapon down, o greatly valiant! (8.24.27)

Thus, the envelopment by hostile forces can be regarded as yet another experience that motivates understanding, the state of discomfort in terms of physical closure.

[20] On the so-called battle of ten kings see: Kieniewicz 1980, p. 37.

[21] On the so-called battle of ten kings see: Kieniewicz 1980, p. 37.

[22] On repelling anhas and enemies or their hatred: *drúh* (RV 10.25.8). *dvíṣ*: (RV 6.2.4, 10.24.3, 10.164.4), *dvéṣas* (RV 2.33.2, 6.44.16), *durmatí* (RV 4.11.6).

IIIc

The third experience causing the impression of physical closure in the Rigvedic man is night. In the times of the *Rigvenda*, the only source of light were bonfires and torches, and night made it impossible to move around. Similarly to the descriptions of the fights with enemies, the descriptions of night echoing the notion of *ámhas* do not use the term. However, the Rigvedic depiction of morning highlights the relationship between the dawn and the possibility to move, e.g. paths appear together with the daylight.[23] In some verses, *ámhas* can be interpreted as referring to the darkness of night. According to the following examples, the poets ask fire to protect them from *ámhas* and to burn the enemies. However, we may presume that it is also implied that *ámhas* is destroyed by fire when enemies are destroyed by it:

> God-Fire, preserve us from *ámhas*, from the one that brings harm consume [it] with the hottest [flames], o ever-young! (7.15.13)
>
> Preserve us with the shining sign, the elevated, from *ámhas*, burn every demon, make us stand high up so that we could live for journey, find us a gift among gods! (1.36.14)[24]

The darkness of night is also dispersed by the morning light of the sun, which destroys *ámhas*:

Today, o gods, at sunrise, elevate us from *ámhas*, the state of contamination! (1.115.6)[25]

It is my conviction that, by the use of the term *ámhas*, the poets render the experience of night as the inability to move. Similarly, in the *Rigveda* 6.3.1, the light opposing *ámhas* is modified by spacious (*urú*), since light not only enables vision but also gives space for motion.

IV

There are three situations preventing the Rigvedic man from moving: becoming lost on the way, being enveloped by the enemies, being confined by night. The impossibility to move was understood in terms of physical closure, rendered in general by the term *ámhas*. It is the first step in generalization and abstraction, for it allows to capture the common feature of such different experiences. The term *ámhas* becomes the source domain for a general and abstract understanding of the state of life-threatening and mental discomfort.

[23] E.g. RV 5.80.2-3, 7.75.1.

[24] *Ámhas* opposes the light of fire in RV 3.15.3, 6.2.11, 7.1.15, cf. 6.48.8.

[25] *Ámhas* also opposes the light of the sun in RV 4.53.6.

It is still worth highlighting that the discussed experiences not only motivate the general notion of closure but also influence the understanding of the notion of discomfort. Firstly, the discussed experiences give rise to the idea of life-threat, since each of the experiences if prolonged would cause death. Secondly, all the experiences being the impossibility to move are the lack of freedom. And the idea of the lack of freedom is present in the term *áôhas* as the Ågvedic poets use the verb *muc* - ('to free')[26] in their continuous pleas for freedom from *áôhas*.

The two experiences, war and night, additionally influenced the conceptualization of the state of discomfort, which results in a further broadening of the semantic field of *ámhas*, as I shall argue.

IVa

The experience of war expands the meaning of *ámhas* to the idea of moral evil. After all, it is a common psychological mechanism to ascribe morally reprehensible or even demonic features to enemies.[27] This idea is present in the verses, in which *ámhas* is attributed to the sinner, and removing *ámhas* is connected with destroying godless people and demons.[28] Experiencing the necessity of protection against the violence of the enemy and other dangerous creatures motivates the understanding of discomfort as the state which forces a human being to find a secure shelter.[29] This is further developed in the idea of looking for protection against *ámhas* in strongholds in the below verse, *ámhas* is parallel to the darkness of night:

> With a hundred of strongholds, o the youngest [Fire], protect the one, who kindles you, from *ámhas*. (6.48.8)

Another verse develops the idea of finding protection against anhas in strongholds, and strongholds enable freedom from *ámhas*:

> O Fire, o descendant of Strength, o great friend, grant today a secure shelter to the singers, through iron strongholds rescue the singer from *ámhas*! (1.58.8)

The use of "iron stronghold" (*āyasī pūr*) does not refer to a genuine stronghold, but reflects a complex Rigvedic notion of a glittering stronghold full of the good bringing freedom which, on the other hand, is associated with

[26]RV 1.42.1, 4.12.6 = 10.126.8, 1.117.3, 1.118.8, 2.34.15, 2.28.6, 10.97.15, 8.24.27.
[27]Cf. Benedyktowicz 2000.
[28]RV 4.29.9, 4.3.14, 9.104.6.
[29]RV 1.93.8, 4.53.6, 10.66.5.

fire and the sun. *ámhas*, opposing the stronghold understood in such a way, is not only darkness but also an abstract state of captivity. Moreover, it seems that the description activates the Ågvedic cosmology, according to which the universe is light, life, cognition and freedom, while the surrounding chaos darkness, death, ignorance and captivity. This very dichotomy is expressed in the juxtaposition of "iron stronghold" - "*ámhas*".

IVb

The experience of morning participates in the meaning of lack of knowledge. For, according to the Rigvedic understanding of night, the night is a state of not only physical but also mental stillness. It makes cognition impossible since everything is covered by darkness.[30] In the verse below, the day light, described as "heavenly" (*svárvat*), opposes *ámhas*:

> May Aditi preserve us from all *ámhas* may we obtain the secure heavenly light! (10.36.3)

The expression "all *ámhas*" betrays a more general understanding of the term as an expression of the state characteristic of night. The word *ámhas* can be understood here not only as the darkness of night, but also as unawareness.

Conclusions The Rigvedic poets created an abstract and general term for an undesirable state connoted with danger, illnesses, misery, suffering, unawareness, evil, captivity and death. The state includes the physical, psychological and mental states as well as elements of the surrounding world and even spheres lying beyond the world.

The state is understood in terms of physical closure. The notion of physical closure is a generalized and abstract notion expressing impossibility to move, experienced in three situations: during a journey, when the way has been lost, during a war, when developed by the enemies, and at night, when everything is covered by darkness. These three experiences motivate not only the notion of closure, but also the state understood in terms of closure.

The transition from concrete experiences to the notion of closure is the first degree of abstraction and generalization, the degree which is not yet departed from the concrete. The second degree is when the target domain functions as an abstract and general term independently.

These conceptual operations are reflected in language. The semantic field of *ámhas* reflects the discussed metaphoric conceptualization. On the

[30] Jurewicz 2010, p 109 ff.

one hand, the word encapsualtes the idea of closure (the source domain), on the other the abstract and general target domain, i.e. the state of discomfort. Marginally, there are the ideas originating in the consecutive experiences in the conceptualizations of both domains.

The uses of the noun *áṁhas* show different aspects of its broad semantic field: some verses highlight difficulties and troubles, others a bad physical or mental state, and yet others that what brings fear and death threats. Some contexts distinctly echo the meanings originating in experience: enemy, mountain, darkness and chaos. It is not to say that one primary meaning precludes the remaining ones, narrowing the understanding of *áṁhas* to a particular concrete phenomenon. The ambiguity of the term, being an indication of the linguistic generality of the term *áṁhas*, results in that all of the semantic aspects contribute a specific background to the meaning present in a particular context, significantly influencing its understanding.

At the same time, as has been mentioned at the beginning, some verses lack not only the idea of traumatic experiences, but also the idea of physical closure. Then, the word *áṁhas* acquires a completely abstract sense of an undesirable state.

I believe that the appropriate Polish equivalent for *áṁhas* is the term "niewola" (captivity). The notion covers the idea of physical closure and lack of motion. Also, it can be extended to physical and psychological diseases, ignorance, and also evil and death. Finally, it can be an abstract construct, in separation from any concrete. The use of the above mentioned verb muc- ("to free") to denote removing anhas allows us to discover the idea of lack of freedom expressed by this Sanskrit term.

It is worth adding that although the term *áṁhas* disappeared in later Sanskrit, the idea of captivity as the most undesirable state, understood as a physical, psychological, mental and even metaphysical state significantly influenced the moral thought of Hindu philosophers. Freedom (mukti) from the limitations of temporality which bring ignorance, suffering and death was the aim of theoretical investigations as well as practical activities in the discipline of yoga. This thought-continuum acknowledges the fundamental significance of the Rigveda for the subsequent Hindu philosophising.

To conclude, I would like to add that the Latin word angustus, etymologically related to *áṁhas*, shows a similar metaphorical motivation for its semantic field.[31] As an adjective it means "narrow, tight" (with reference to both space and time); "scant, slight" (as a measure of things, with reference

[31]Mayrhoffer 1956. I would like to thank my Father, prof. Jan Doroszewski, for directing my attention to this issue.

to mind and behaviour); finally "doubtful, unpleasant" (with reference to situation). As a noun it denotes a "dangerous predicament", "stait" in the sense of closure, and "compact battle line" (Plezia 1959). A cognitive analysis of the meanings of angustus is beyond the scope of this paper, yet even the dictionary definition suffices to reconstruct the idea of closure which motivates various metaphorical meanings focusing around the same ideas as the ones present in the semantic field of *áṁhas*. At the same time, it is apparent that the Latin tradition develops specific extensions illustarated by e.g. the use of angustus with reference to time. The conceptual similarity between angustus and *áṁhas* is a further evidence for the existence of the Indo-European thought community, whose traces can be found in languages distant in space and time.[32]

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[32]See e.g. Nagy 1974, Watkins 1995.

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Agnieszka Sulich

HOW THE NAMES OF CHEMICAL ELEMENTS REPRESENT KNOWLEDGE

Originally published as "Odwzorowanie wiedzy w nazwach pierwiastków chemicznych," Studia Semiotyczne 27 (2010), 93–133. Translated by Małgorzata Szubartowska.

Introduction

The names of chemical elements constitute a certain microcosm – a closed but rich sign system, particularly interesting as it has taken a lot of time for it to arrive at its current form. Its oldest lexical units had been known long before the very notion of chemical element was introduced in 1661 in *The Sceptical Chymist* by Robert Boyle (words like *złoto* [*gold*], *węgiel* [*carbon*], or *siarka* [*sulfur*] have been present in the Polish language from time immemorial), and the newest ones have only just come into existence, like the lexemes designating transuranic elements, which were not discovered and named until the 20^{th} century (see Eichstaedt 1973, Heiserman 1997, Bergandy 1997, Mizerski 2004, *Powszechna Encyklopedia PWN*).

The studies discussed in this paper aim to extract and classify the knowledge represented in this lexical domain, to establish its characteristics in terms of its place within both national language and scientific jargon, as well as to provide an interpretation of certain peculiarities in the contemporary nomenclature of chemical elements, which does not quite conform to the general rules according to which other chemical substances are named.

This reconstruction of knowledge is based on historical and etymological evidence about particular units, meanwhile its classification rests upon two basic criteria: the type of object to which the names allude (apart from the obvious denotation) and the way in which the object is apprehended by the epistemic subject.

1. Delimiting the area of research

The analysis focuses on Polish names of chemical elements in their contemporary form. I leave out the semantics, the origin, and the usage of the elements' symbols, Latin equivalents and former Polish names that are no longer in use, as well as the names of isotopes (like *prot*, *deuter* or *tryt* [*protium*, *deuterium*, *tritium*]) and allotropes (like *polisiarka*, *oktasiarka*, *grafit*, *diament*, *lonsdaleit*, *fulleren*, *arsen szary* or *arsen żółty* [*polysulfur*, *octasulfur*, *graphite*, *diamond*, *lonsdaleite*, *fullerene*, *metallic grey arsenic*, *yellow arsenic*]). The names of groups and blocks in the periodic table, both single-word and compound (like *litowce*, *berylowce*, *halogeny*, *lantanowce*, *aktynowce*, *pierwiastki bloku d*, *pierwiastki przejściowe*, *gazy szlachetne*, *metale ziem rzadkich*, *grupa IIIA* etc. [*alkali metals*, *alkaline earth metals*, *halogens*, *lanthanide*, *actinide*, *d-block*, *noble gases*, *rare earth elements*, *group IIIA* etc.]), are outside my field of interest, so are terms such as *pierwiastek kryptomorficzny* or *endokryptny* [an element that does not form its own mineral in Earth's crust] or *ekapierwiastek* [*eka-element*], in other words, superordinates of the analyzed lexical units (obviously, neither are non-hypernymic names of individual eka-elements like *ekaglin*, *ekabor*, *ekakrzem* [*eka-aluminium*, *eka-bohrium*, *eka-silicon*] taken into consideration).

My main source is the periodic table of elements taken from *Chemistry Tables* by Witold Mizerski, which also serves as the criterion for delimiting the semantic field (see Mizerski 2004: 17).

2. General characteristics of the names of chemical elements

In terms of its linguistic status, the analyzed group of expressions is a subsystem of scientific terminology, so it is generally considered (with few exceptions such as *złoto* [*gold*], *węgiel* [*carbon*], *siarka* [*sulfur*], or magnez [*magnesium*]) a specialized vocabulary, used almost exclusively in texts on chemistry or on related sciences (cf. the statistics and the criteria for classifying the lexical repertory assumed in Kurcz, Lewicki, Sambor, Szafran, and Woronczak 1990).

Also in terms of their structure, the analyzed strings belong to an exceptional type of expressions in the general Polish language – they are common names, which sometimes may, just like proper names, be derived from the names of particular objects: places or people (*darmstadt* [*darmstadtium*], *berkel* [*berkelium*], *kiur* [*curium*] or *nobel* [*nobelium*]).

When it comes to their grammatical properties, all lexical units of the analyzed class are nouns, which means that they may be inflected for case (but not for number – they do not have a plural form, because they refer to an

uncountable substance). They can have all three genders: feminine (*platyna* [*platinum*], *rtęć* [*mercury*]), masculine (*wodór* [*hydrogen*], *sód* [*sodium*]), and neuter (*złoto* [*gold*], *srebro* [*silver*]). In terms of their origins, they can be divided into three main groups: borrowings, morphological derivatives, and semantic derivatives (cf. Biniewicz 1992, where the mechanisms for the formation of those names are discussed in detail).

3. Origins of the names of chemical elements

Generally speaking, the origins of the names of chemical elements have been well covered. Justifications for the names can be found in numerous studies concerning chemical nomenclature or the history of chemistry, in encyclopedias, glossaries, or even tables (e.g. Bergandy 1997, Eichstaedt 1973, Heiserman 1997, Kalembkiewicz, Lubczak, and Lubczak 1996, *Powszechna Encyklopedia PWN*, Sołoniewicz 1986, Śliwa and Zelichowicz 1994, Mizerski 2004).

As to the typically linguistically-oriented literature on the subject, there are two groups of works: etymological dictionaries and studies on chemical terminology. There are quite a few etymological dictionaries, but they tend to take into account only the rather narrow class of the oldest names adapted directly from the national language to the scientific vocabulary and they leave out the history of the names formed artificially. The second group of works is represented rather poorly. So far, I have come across only one, the abovementioned study by Biniewicz (1992), that would analyze the etymology of the expressions from the domain that is of my concern. The author takes an opposite approach than the lexicographers: he investigates only the origin of the names of the elements in the chemical nomenclature and excludes the origin of the oldest names in the national language. In other linguistic papers dealing with chemical terminology the naming of chemical elements is addressed in very general terms (see Biniewicz 2002).

For the sake of my analysis, I have decided to take into consideration the origin of the names of the elements in scientific terminology as well as in general language if a particular lexical unit was directly borrowed from it. This makes the description of this domain more complete, as it encompasses a certain 'prehistory' of some of the nominations. Nonetheless, what serves as the very basis for my reconstruction of the knowledge represented in the entire domain of my interest, is exclusively those acts of naming that were performed within the branch of science when a certain substance was recognized as an element.

3.1. History of the names of the elements in chemical terminology

When writing about the origin of the names of chemical elements in terminology, the authors of the aforementioned studies occasionally provide different interpretations. They also differ in the level of detail of the information they supply, as well as in the very number of analyzed expressions. Therefore, the following justifications are based on several different sources. If there are no discrepancies, I rely upon the study by Biniewicz, since it is a linguistic analysis. The only exceptions are the names of the elements which the author did not include – out of necessity, all information about these elements must come from other works. Particular strings are being analyzed in the order of the atomic number of the referent, which reflects the structure of the periodic table of elements and which is also in accordance with the convention adopted by Biniewicz.

Apart from the origin of the analyzed lexical units and their semantic justification, I will be also including the broader historical context connected with the acts of nomination – the element's year of discovery, its discoverer, and the original Polish name with its author, if, of course, the Polish version is a semantic calque. All the information comes from the following works: Biniewicz 1992 (which will appear later in the text as 'Bin'), Mizerski 2004 (Miz), Eichstaedt 1973 (Eich), Heiserman 1997 (Heis), *Powszechna Encyklopedia PWN* (PWN). When quoting the expressions originating in Greek, I am consciously omitting the diacritical marks, due to the different orthographic conventions adopted by the authors.

Wodór (Eng. hydrogen, Lat. hydrogenium, H, at. no. 1)

Date of discovery: 1766, **discovered by:** H. Cavendish (who demonstrated that water is produced through the combustion of this gas), **original Polish name:** *hydrogene* (introduced by A. Lavoisier who proved that hydrogen is an element).

Reasoning behind the name: element which produces water while burning; the contemporary Polish name is a shortened version of the word "wodoród", which is a calque of "hydrogen" (Bin).

Hel (helium, He, at. no. 2)

Date of discovery: 1868, **discovered by:** P.J. Janssen and, working independently, J.N. Lockyer (Heis) or J. Locker and P. Frankland (Bin), **original Polish name:** *helium* (named probably by its discoverers).

Reasoning behind the name: element which was detected by its spectra in the Sun's atmosphere (the name comes from the Greek *helios*, meaning "the Sun").

Lit (lithium, Li, at. no. 3)

Date of discovery: 1817, **discovered by:** A. Arfvedson, **original**

Polish name: *lithium* (named by J. Berzelius).

Reasoning behind the name: element which was discovered in a mineral (the name comes from the Greek *lithos*, meaning "stone") (Bin).

Beryl (beryllium, Be, at. no. 4)

Date of discovery: 1798 (in the oxide form), 1828 (in the elemental form), **discovered by:** L.N. Vauquelin (who isolated the oxide), F. Wöhler and, independently, A. Bussy (who isolated the element), **original Polish name:** *beryllium* (named probably by one of its discoverers).

Reasoning behind the name: element which was discovered in the beryl gem (Bin).

Bor (Eng. boron/bore, Lat. borium, Be, at. no. 5)

Date of discovery: 1808, **discovered by:** J.L. Gay-Lussac and L.J. Thénard as well as, independently, H. Davy (Heis), **original Polish name:** *borium* (named probably by one of its discoverers).

Reasoning behind the name: element which was isolated from the substance called borax (Bin).

Węgiel (Eng. carbon, Lat. carbonium, C, at. no. 6)

Date of discovery: unknown (as charcoal, it was already known in antiquity), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was associated with charcoal [Pol. *węgiel*], as it is its main constituent – the name was created on the basis of the word *węgiel*, already existing in Polish, but was given a new meaning (Bin).

Azot (Eng. nitrogen, Lat. nitrogenium, N, at. no. 7)

Date of discovery: 1772, **discovered by:** D. Rutherford and (independently) K.W. Schele, H. Cavendish, and J. Priestley (PWN) or A. Lavoisier (Bin), **original Polish name:** *azote* (named by A. Lavoisier) (Bin).

Reasoning behind the name: element which makes up air and which does not support life (the name originates from the Greek word *azotikos* – "which does not support life") (Bin).

Tlen (Eng. oxygen, Lat. oxygenium, O, at. no. 8)

Date of discovery: 1772 and 1774, identified as an element: 1775–1777, **discovered by:** K.W. Scheele, and then (independently) J. Priestley, later A. Lavoisier identified oxygen as an actual element (Heis), **original Polish name:** none.

Reasoning behind the name: element which is involved in the combustion process (the name originates from the Polish word *tlić* [*smoulder*] given by J. Oczapowski (Bin).

Fluor (Eng. fluorine, Lat. fluorum, F, at. no. 9)

Date of discovery: 1886, **discovered by:** H.F.F. Moissan, **original Polish name:** *fluorine* (probably named by its discoverer).

Reasoning behind the name: element which was discovered in minerals used as flux (Bin) or whose salts are easily fusible (Miz) (the name originates from the Latin word *fluere* – "flow") (Bin).

Neon (neon, Ne, at. no. 10)

Date of discovery: 1898, **discovered by:** W. Ramsay and M.W. Travers, **original Polish name:** *neon* (probably named by its discoverer).

Reasoning behind the name: the newly discovered element (the name originates from the Greek word *neos* – "new") (Bin).

Sód (Eng. sodium, Lat. natrium, Na, at. no. 11)

Date of discovery: 1807, **discovered by:** H.B. Davy, **original Polish name:** *sodium* (named by H.B. Davy) (Bin) or *sodanum* (Miz).

Reasoning behind the name: element which was discovered in caustic soda (Bin) or which is used in a medicine for headaches (from the Latin word *sodanum* meaning "medicine for headache", which comes from Arabic) (Miz).

Magnez (magnesium, Mg, at. no. 12)

Date of discovery: 1808 and 1829, **discovered by:** H. B. Davy, and later (independently) A. Bussy and J. von Liebig, **original Polish name:** *magnesium* (named by A. Lavoisier).

Reasoning behind the name: element which was discovered in the mineral called *magnesia alba* (Bin) or whose salts have properties similar to a laxative from the town of Magnesia (Manisa) (Miz).

Glin (aluminium, Al, at. no. 13)

Date of discovery: 1787 (existence predicted), 1807 (naming), 1825 (final isolation), **discovered by:** A. Lavoisier (anticipated existence of aluminium) H.Ch. Oersted (isolated), **original Polish name:** *aluminium* (named by H. Davy) (Heis).

Reasoning behind the name: element discovered in the aluminium oxide which was isolated from the substance called *potassium alum* (the name originates from the Latin word *alumen* – "alum") (Bin), or: element which is the main constituent of clay (Miz).

Krzem (Eng. silicon, Lat. silicium, Si, at. no. 14)

Date of discovery: 1823, **discovered by:** J.J. Berzelius, **original Polish name:** *silicium* (named by J.J. Berzelius).

Reasoning behind the name: element which was discovered in silica (the name originates from the Latin word *silica*, which comes from Latin

silex – "flint") (Bin).

Fosfor (phosphorus, P, at. no. 15)

Date of discovery: 1669, **discovered by:** H. Brandt, **original Polish name:** *phosphorus* (probably named by its discoverer).

Reasoning behind the name: element which shines in the dark (the name originates from the Greek word *phosphoros* – "light-bearer" (Bin).

Siarka (sulfur, S, at. no. 16)

Date of discovery: unknown (as a sedimentary rock it has been known since ancient times) classification as an element in 1777, **discovered by:** anonymous, classified as an element by A. Lavoisier, **original Polish name:** none (Heis).

Reasoning behind the name: element which was identified with the sedimentary rock which it makes up – for naming purposes Jędrzej Śniadecki picked an already existing name and attributed to it a new meaning (Bin).

Chlor (Eng. chlorine, Lat. chlorum, Cl, at. no. 17)

Date of discovery: 1774 (isolation), 1810 (identified as an element), **discovered by:** K.W. Scheele; H. Davy (Heis) identified it as an element, **original Polish name:** *chlorine* (named by H. Davy).

Reasoning behind the name: element which has fumes that are yellow and green (the name originates from the Greek word *chloros*, meaning "yellow and green" (Bin).

Argon (argon, Ar, at. no. 18)

Date of discovery: 1785 (existence predicted), 1894 (isolation), **discovered by:** H. Cavendish (suggested its existence), W. Ramsay, J.W. Rayleigh (isolated), **original Polish name:** *argon* (probably named by one of the discoverers).

Reasoning behind the name: element which is chemically inert, i.e. does not react with other substances (the name comes from the Greek word *argos* – "inactive, lazy") (Bin).

Potas (Eng. potassium, Lat. kalium, K, at. no. 19)

Date of discovery: 1807, **discovered by:** H.B. Davy, **original Polish name:** *potassium* (named by H.B. Davy).

Reasoning behind the name: element which was discovered in alkaline substances, called *potash* in English (Bin) or which was a constituent of potash – a lye obtained from wood (Miz).

Wapń (calcium, Ca, at. no. 20)

Date of discovery: 1808, **discovered by:** H.B. Davy, **original Polish name:** *calcium* (probably named by its discoverer).

Reasoning behind the name: element which is a component of lime (the name originates from the Latin word *calx* – lime (Bin).

Skand (scandium, Sc, at. no. 21)

Date of discovery: 1871 (existence predicted), 1879 (existence confirmed), **discovered by:** D. Mendeleev (predicted its existence), L.F. Nilson (confirmed its existence), **original Polish name:** *scandium* (probably named by L.F. Nilson).

Reasoning behind the name: the element was named to honour Scandinavia where it was discovered (Bin).

Tytan (titanium, Ti, at. no. 22)

Date of discovery: 1791 (PWN), 1792 (Bin) or 1795 (Heis) and 1910 (isolation and purification) (Heis), **discovered by:** W. Gregor (PWN, Heis) or, independently, M. Klaproth (Bin, Heis), **original Polish name:** *titanium* (probably named by one of the discoverers).

Reasoning behind the name: element which was named after the Greek mythological figures Titans (Bin).

Wanad (vanadium V, at. no. 23)

Date of discovery: 1801, 1830 or 1867 (isolation and purification), **discovered by:** A. Manuel del Rio and, independently, N. G. Sefström, later H. E. Roscoe (isolated) (Heis), **original Polish name:** *vanadium* (named by N.G. Sefström).

Reasoning behind the name: element which was named after the Old Scandinavian goddess Vanadis (Bin).

Chrom (chromium, Cr, at. no. 24)

Date of discovery: 1797 (PWN) or 1798 (Bin), **discovered by:** L. N. Vauquelin, **original Polish name:** *chromium* (probably named by its discoverer).

Reasoning behind the name: element which creates multicoloured salts (the name originates from the Greek word *chroma* – "color" (Bin).

Mangan (Eng. manganese, Lat. manganum, Mn, at. no. 25)

Date of discovery: 1774, **discovered by:** K. W. Scheele (recognized as an element), J. G. Gahn (isolation) (Heis), **original Polish name:** *manganesium* (named by A. Lavoisier).

Reasoning behind the name: element which was discovered in the mineral called *alabandicus manganese* or *manganesium* (Bin) or whose oxide MnO_2 is similar to the substance called magnetite which can be found in the vicinity of Magnesia (Manisa) .

Żelazo (Eng. iron, Lat. ferrum, Fe, at. no. 26)

Date of discovery: unknown (iron has been known as a metal since antiquity), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes Jędrzej Śniadecki took an already existing Polish word and attributed to it a new meaning (Bin).

Kobalt (Eng. cobalt, Lat. cobaltum, Co, at. no. 27)

Date of discovery: 1735 (Bin) or 1739 (Heis), **discovered by:** G. Brandt, **original Polish name:** *cobaltum* (probably named by its discoverer).

Reasoning behind the name: element which was discovered in the mineral called *kobold* or *kobelt* (German *Kobold* – "evil spirit", "treasure-guarding sprite", "hobgoblin") (Bin, Miz).

Nikiel (Eng. nickel, Lat. niccolum, Ni, at. no. 28)

Date of discovery: 1751, **discovered by:** A.F. Cronstedt, **original Polish name:** *niccolum* (possibly the Polish name was also affected by the German name discussed below), (probably named by its discoverer).

Reasoning behind the name: element which was discovered in the ore called *Kupfernickel* (German – "false copper, devil's copper") (Bin).

Miedź (Eng. copper, Lat. cuprum, Cu, at. no. 29)

Date of discovery: unknown (copper has been known as a metal since antiquity), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes Jędrzej Śniadecki took an already existing Polish word and attributed to it a new meaning (Bin).

Cynk (Eng. zinc, Lat. zincum, Zn, at. no. 30)

Date of discovery: unknown (zinc has been known as a metal since antiquity), **discovered by:** anonymous, **original Polish name:** *zincum* (named by: unknown).

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes the German name of the ore *Zinck* or *Zincken* was used and in the Middle Ages the element became known as *zincum* (Bin).

Gal (Eng. gallium, Ga, at. no. 31)

Date of discovery: 1875**, discovered by:** P.E. Lecoq de Boisbaudran, earlier D. Mendeleev predicted gallium's existence, **original Polish name:** *gallium* (probably named by its discoverer).

Reasoning behind the name: element was named to honour the discoverer's homeland – France (the word comes from the Latin name for France – *Gallia*) (Bin).

German (germanium, Ge, at. no. 32)

Date of discovery: 1871 (existence predicted) (Heis), 1886 (discovery) (PWN, Heis) 1866 (Bin), **discovered by:** D. Mendeleev (predicted its existence), C.A. Winkler (discovery), **original Polish name:** *germanium* (named by C.A. Winkler).

Reasoning behind the name: element was named to honour the discoverer's homeland – Germany (the word comes from the Latin name for Germany – *Germania*) (Bin).

Arsen (Eng. arsenic, Lat. arsenicum, As, at. no. 33)

Date of discovery: unknown (arsenic compounds were already known in antiquity) (PWN) or 1250 (Heis), (first description of arsenic appeared in the 13^{th} century), **discovered by:** anonymous (if we consider that discovery took place in antiquity) or Albertus Magnus (if the discovery date is 1250) (Heis), **original Polish name:** *arsenicum* (named by A. Lavoisier).

Reasoning behind the name: element which is connected to the ore called *arsenicon* in Greek (Bin) or to golden tint (Miz); the word *arsen* originates from the Persian word meaning "aureate" (Miz); if it really was the case, the names probably referred to an arsenic compound, to minerals containing this element or to an arsenic allotrope called *yellow arsenic* (which seems less likely as it is not the primary form of this element).

Selen (selenium, Se, at. no. 34)

Date of discovery: 1817 (Bin) or 1818 (Heis), **discovered by:** J.J. Berzelius, **original Polish name:** *selenium* (named by J.J. Berzelius).

Reasoning behind the name: element which was named in order to commemorate a celestial body – the Moon (the word originates from the Greek word *selene* – "moon" (Bin) or to honour the Greek goddess of the Moon called *Selene)* (Miz).

Brom (Eng. bromine, Lat. bromum, Br, at. no. 35)

Date of discovery: 1826, **discovered by:** A.J. Balard, **original Polish name:** *bromum* (probably named by its discoverer).

Reasoning behind the name: element which gives off a bad smell (the name originates from the Greek word *bromos* – "stench" or *bromon* – "stinking") (Bin).

Krypton (krypton, Kr, at. no. 36)

Date of discovery: 1898, **discovered by:** W. Ramsay, M.W. Travers, **original Polish name:** *krypton* (named by: W. Ramsay, M.W. Travers).

Reasoning behind the name: element which was hidden, difficult to isolate (the name originates from the Greek word *kryptos* – "hidden") (Bin).

Rubid (rubidium, Rb, at. no. 37)

Date of discovery: 1861, **discovered by:** R.W. Bunsen, G.R. Kirchhoff, **original Polish name:** *rubidium* (probably named by its discoverer).

Reasoning behind the name: element which burns with a red flame (the name originates from the Latin word *rubidus* – "dark red") (Bin).

Stront (strontium, Sr, at. no. 38)

Date of discovery: 1790 (its existence ascertained), 1808 (isolation), **discovered by:** A. Crawford (confirmed its existence), H.B. Davy (isolated) (Heis), **original Polish name:** *strontium* (named by H.B. Davy).

Reasoning behind the name: element which was discovered in the Scottish village Stronthian (Bin).

Itr (yttrium, Y, at. no. 39)

Date of discovery: 1794 (Bin) or 1789 (discovery) and 1828 (isolation) (Heis), **discovered by:** J. Gadolin (discovery), F. Wöhler (isolation), **original Polish name:** *yttrium* (probably named by one of the discoverers).

Reasoning behind the name: element which was discovered in the Swedish village Yterrby (Bin).

Cyrkon (zirconium, Zr, at. no. 40)

Date of discovery: 1789 (identification) or 1824 (separation), **discovered by:** M.H. Klaproth (identification) or J.J. Berzelius (separation) (Heis), **original Polish name:** *zirconium* (probably named by one of the discoverers).

Reasoning behind the name: element which was discovered in the mineral zircon (Bin) which is the color of gold (Miz) (the name originates from the Persian word meaning "golden") (Miz).

Niob (niobium, Nb, at. no. 41)

Date of discovery: 1801**, discovered by:** Ch. Hatchett, **original Polish name:** *niobium* (probably named by its discoverer).

Reasoning behind the name: element discovered in a mineral which contained another, previously discovered element – tantalum (both names derive from names of two relatives from Greek mythology – Tantalus and his daughter Niobe) (Bin).

Molibden (Eng. molybdenum, Lat. molybdaenum, Mo, at. no. 42)

Date of discovery: 1778, **discovered by:** K.W. Scheele, **original Polish name:** *molybdaenum* (probably named by its discoverer).

Reasoning behind the name: element which was discovered in a substance called *terra molibdaenae* (the name originates from the Latin word *molibdaena* which itself comes from the Greek word *molybdos* – "lead", "lead compound" (Bin)) or which exhibits properties similar to lead (Miz).

Technet (technetium, Tc, at. no. 43)

Date of discovery: 1937, **discovered by:** E.G. Segré, C. Perrier, **original Polish name:** *technetium* (probably named by its discoverer).

Reasoning behind the name: element which was the first element in the history of chemistry to be created by artificial synthesis (Bin).

Ruten (ruthenium, Ru, at. no. 44)

Date of discovery: 1828 (predicted existence) (Heis), 1844 (isolation) (PWN, Heis) or 1845 (Bin), **discovered by:** C. Claus, **original Polish name:** *ruthenium* (named by C. Claus).

Reasoning behind the name: the element was named to honour the ancient country Rus (the name originates from the medieval Latin name *Ruthenia*) (Bin).

Rod (rhodium, Rh, at. no. 45)

Date of discovery: 1803, **discovered by:** W.H. Wollaston, **original Polish name:** *rhodium* (probably named by its discoverer).

Reasoning behind the name: element whose salts are rose-colored in a dilute solution (the name comes from the Greek word *rhodon* – "rose colour") (Bin).

Pallad (palladium, Pd, at. no. 46)

Date of discovery: 1803 **discovered by:** W. H. Wollaston, **original Polish name:** *palladium* (probably named by its discoverer).

Reasoning behind the name: element which was named in honour of the planet Pallas discovered in 1802 (Bin) or after the Greek goddess Athena also called Pallas (Miz).

Srebro (Eng. silver, Lat. argentum, Ag, at. no. 47)

Date of discovery: unknown (as a metal has been known since ancient times), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes Jędrzej Śniadecki took an already existing Polish word and attributed to it a new meaning (Bin).

Kadm (cadmium, Cd, at. no. 48)

Date of discovery: 1817, **discovered by:** F. Strohmeyer and, independently, K.S.L. Hermann, J.C.H. Roloff (Heis), **original Polish name:** *cadmium* (probably named by one of the discoverers).

Reasoning behind the name: element discovered in calamine ore which in the Roman times was called by its Greek name *kadmeia* or *cadmia* (Bin).

Ind (indium, In, at. no. 49)

Date of discovery: 1863, **discovered by:** F. Reich, T. Richter, **original Polish name:** *indium* (probably named by its discoverers).

Reasoning behind the name: element which has a bright indigo spectral line (Bin) or burns with an indigo flame (Miz).

Cyna (Eng. tin, Lat. stannum, Sn, at. no. 50)

Date of discovery: unknown (tin as a metal was already known in antiquity or even in prehistoric times), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes Jędrzej Śniadecki took an already existing Polish word and attributed to it a new meaning (Bin).

Antymon (Eng. antimony, Lat. stibium, Sb, at. no. 51)

Date of discovery: unknown (antimony as a mineral component was already known in antiquity and was classified in the first half of 17^{th} century), **discovered by:** anonymous, **original Polish name:** *antimonium* (named by: unknown).

Reasoning behind the name: element which was a constituent of the mineral with two Latin names *stibium* and *antimonium* – for naming purposes Jędrzej Śniadecki used the latter name and turned it into a Polish form *antymon* (Bin); alternatively: element which never appears alone in nature (in that case the name would derive from the Greek – *anti* and *monos* – not alone) (Heis).

Tellur (tellurium, Te, at. no. 52)

Date of discovery: 1782 (PWN) or 1798 (Bin), **discovered by:** F.J. Müller von Reichenstein, who in 1782 ascertained the existence of tellurium or M. Klaproth, who was the first to isolate it in 1798, **original Polish name:** *tellurium* (named by M. Klaproth).

Reasoning behind the name: element was named to honour the planet Earth (the word originates from Latin *Tellus* – "Earth" (Bin).

Jod (Eng. iodine, Lat. iodum, I, at. no. 53)

Date of discovery: 1811, **discovered by:** B. Courtois, **original Polish name:** *iodum* (named by J. Gay-Lussac).

Reasoning behind the name: element with purple fumes (the word comes from the Greek adjective *iodes* – "violet, purple") (Bin).

Ksenon (xenon, Xe, at. no. 54)

Date of discovery: 1898, **discovered by:** W. Ramsay, M.W. Travers, **origin of the Polish name:** *xenon* (named by: W. Ramsay, M.W. Travers).

Reasoning behind the name: element which was discovered in liquid krypton as an additional, strange substance (the word originates from the

Greek word *ksenos* or *ksenon* – "stranger") (Bin).

Cez (caesium, Cs, at. no. 55)

Date of discovery: 1860, **discovered by:** R. W. Bunsen, G.R. Kirchhoff, **origin of the Polish name:** *caesium* (named by: R.W. Bunsen, G.R. Kirchhoff).

Reasoning behind the name: element which burns with a blue flame (the name originates from the Latin word *caesium* or *caesius* – "sky blue" (Bin)) or which has two blue spectral lines (Heis).

Bar (barium, Ba, at. no. 56)

Date of discovery: 1774 (Bin) or 1808 (Heis), **discovered by:** K.W. Scheele (Bin) or H. Davy (Heis), **origin of the Polish name:** *barium* (named by H. Davy).

Reasoning behind the name: element which was isolated from a mineral called *barite* (originating from the Latin word *baritea*, from Greek *barys* – "heavy") (Bin).

Lantan (lanthanum, La, at. no. 57)

Date of discovery: 1839 (PWN) or 1834 (Bin), **discovered by:** K. G. Mosander (PWN), **original Polish name:** *lanthanium* (named by J. Berzelius (Bin)).

Reasoning behind the name: element which was hidden, difficult to isolate (from the Greek word *lanthanein*, meaning "to conceal oneself" or "to lie hidden" (Bin).

Cer (cerium, Ce, at. no. 58)

Date of discovery: 1803 **discovered by:** J.J. Berzelius, W. Hisinger and, independently, M. H. Klaproth (Heis), **original Polish name:** *cerium* (named by M. Klaproth).

Reasoning behind the name: element which was named after the asteroid Ceres discovered in 1801 (Bin) or after Ceres herself, who was the Roman goddess of agriculture.

Prazeodym (praseodymium, Pr, at. no. 59)

Date of discovery: 1885, **discovered by:** C. Auer von Welsbach, **original Polish name:** *praseodymium* (probably named by its discoverer).

Reasoning behind the name: element which has green salts (Latin *prasinus*, Greek *prasinos*, meaning "green") and which was separated from the substance known as didymium (Latin *didymium*, Greek *didymos*, meaning "double", "twin"), which used to be considered an element (Bin).

Neodym (neodymium, Nd, at. no. 60)

Date of discovery: 1885, **discovered by:** C. Auer von Welsbach, **original Polish name:** *neodymium* (probably named by its discoverer).

Reasoning behind the name: a newly discovered element separated from the substance known as didymium, which used to be considered an element; the name comes from the combination of the Greek *neos*, meaning "new" and *didymos* (Latin *didymus)*, meaning "double", "twin" (Bin).

Promet (promethium, Pm, at. no. 61)

Date of discovery: 1912 (its existence was predicted) and 1947 (its existence was confirmed) (Heis) or 1945 (PWN) or 1946 (Bin), **discovered by:** H.G.J. Moseley (predicted its existence) (Heis), a team of American researchers: Ch.E. Coryell, J.A. Marinsky, L.E. Glendenin (confirmed its existence) (Bin, Heis), **original Polish name:** *promethium* (named by its discoverers).

Reasoning behind the name: element which was named after the Greek mythological figure Prometheus (Bin).

Samar (samarium, Sm, at. no. 62)

Date of discovery: 1879 **discovered by:** P.E. Lecoq de Boisbaudran, **origin of the Polish name:** *samarium* (named by its discoverer).

Reasoning behind the name: element which was isolated from the mineral samarskite (Bin) or named in honour of a Russian engineer, Samarski, who brought a sample of this mineral from the Ural Mountains (Miz).

Europ (europium, Eu, at. no. 63)

Date of discovery: 1896 (PWN) or 1901 (Bin), **discovered by:** E. A. Demarçay, **original Polish name:** *europium* (named by E. A. Demarçay).

Reasoning behind the name: element which was named to honour the continent of Europe (Bin).

Gadolin (gadolinium, Gd, at. no. 64)

Date of discovery: 1880 and 1886 (by another discoverer), **discovered by:** J.Ch de Marignac and P.E. Lecoq de Boibaudran, **original Polish name:** *gadolinium* (named by P.E. Lecoq de Boisbaudran) (Heis).

Reasoning behind the name: element which was named in honour of the eminent Finnish chemist J. Gadolin (Bin) or its name comes from gadolinite, the mineral in which the element was found (Heis).

Terb (terbium, Tb, at. no. 65)

Date of discovery: 1843, **discovered by:** K. G. Mosander, **original Polish name:** *terbium* (named by K.G. Mosander).

Reasoning behind the name: element which was isolated from a mineral found in the Swedish village Ytterby (Bin)

Dysproz (dysprosium, Dy, at. no. 66)

Date of discovery: 1886 or 1906 (isolated), **discovered by:** P.E. Lecoq de Boisbaudran or G. Urbain (isolated) (Heis), **original Polish**

name: *dysprosium* (named by P.E. Lecoq de Boisbaudran).

Reasoning behind the name: element which was difficult to isolate into its pure state (the name comes from the Greek *dysprositos* – "difficult", "hard' (Bin).

Holm (holmium, Ho, at. no. 67)

Date of discovery: 1879, **discovered by:** J.L. Soret and, independently, P.T. Cleve, **original Polish name:** *holmium* (probably named by one of the discoverers).

Reasoning behind the name: element which was named after the Latin *Holmia* for the city of Stockholm (Bin).

Erb (erbium, Er, at. no. 68)

Date of discovery: 1843, **discovered by:** K.G. Mosander, **original Polish name:** *erbium* (probably named by its discoverer).

Reasoning behind the name: element which was isolated from a mineral found in the Swedish village Ytterby (Bin).

Tul (thulium, Tm, at. no. 69)

Date of discovery: , discovered by: P.T. Cleve, **original Polish name:** *thulium* (probably named by its discoverer).

Reasoning behind the name: element which was named after the fairytale-like island known as Thule (from Greek), which is the most northerly part of Scandinavia (Bin) or after Scandinavia itself, as it used to be called Thule in ancient times.

Iterb (ytterbium, Yb, at. no. 70)

Date of discovery: 1878, **discovered by:** J.Ch. de Marignac, **original Polish name:** *ytterbium* (probably named by its discoverer).

Reasoning behind the name: element which was discovered in the vicinity of Ytterby, a village in Sweden (Bin).

Lutet (lutetium, Lu, at. no. 71)

Date of discovery: 1907-1908 (Heis), **discovered by:** C. Auer von Welsbach and, independently, G. Urbain, **original Polish name:** *lutetium* (named by G. Urbain).

Reasoning behind the name: element which was named after Paris, the French city (its Latin names is *Lutetia*) (Bin).

Hafn (hafnium, Hf, at. no. 72)

Date of discovery: 1923 (PWN) or 1922 (Bin), **discovered by:** D. Coster and G. de Hevesy, **original Polish name:** *hafnium* (named by: D. Coster and G. de Hevesy).

Reasoning behind the name: element which was named for the city Copenhagen, whose Latin name is *Hafnia* (Bin).

Tantal (tantalum, Ta, at. no. 73)

Date of discovery: 1802, **discovered by:** A.G. Ekeberg, **original Polish name:** *tantalum* (probably named by its discoverer).

Reasoning behind the name: element which was named to honour the Greek mythological figure Tantalos (Bin).

Wolfram (Eng. tungsten, Lat. wolframium, W, at. no. 74)

Date of discovery: 1781 (Bin) or 1783 (Heis), **discovered by:** K.W. Scheele (Bin) or brothers J. and F. d'Elhuyar (Heis), **original Polish name:** *wolfram* (named probably by one of the discoverers).

Reasoning behind the name: element which was isolated from a mineral known as wolframite (that name came from the German *Wolf* – "wolf" and *Rahm* – "foam") (Bin) or from the ores which impeded the extraction of tin (their name came from the German *Wolf*) (Miz) or the name was derived from the old, scornful name for a metal that was considered worthless – *wolfram* (Heis).

Ren (rhenium, Re, at. no. 75)

Date of discovery: 1925, **discovered by:** W. Noddack, J. Noddack-Tacke, O. Berg, **original Polish name:** *rhenium* (named by W. Noddack).

Reasoning behind the name: element which was named in honour of the German river the Rhine (Latin: *Rhenus*) (Bin).

Osm (osmium, Os, at. no. 76)

Date of discovery: 1803 (Heis) or 1804 (Bin), **discovered by:** S. Tennant, **original Polish name:** *osmium* (probably named by its discoverer).

Reasoning behind the name: element which gives off an unpleasant, pungent smell (the name comes from the Greek *osme*, meaning "smell") (Bin).

Iryd (iridium, Ir, at. no. 77)

Date of discovery: 1803 (Heis) or 1804 (Bin), **discovered by:** S. Tennant, **original Polish name:** *iridium* (probably named by its discoverer).

Reasoning behind the name: element which forms oxides with bright colours (the name comes from the Latin *iris*, meaning "rainbow" (Bin) or from *Iris*, the Greek goddess of the rainbow (Bin)).

Platyna (platinum, Pt, at. no. 78)

Date of discovery: 1735 (PWN, Heis) and 1741 (Heis) or 1750 (Bin), **discovered by:** A. de Ulloa (PWN, Heis) and independently, Ch. Wood (Heis) or W. Watson (Bin), **original Polish name:** *platinum* (named by W. Watson).

Reasoning behind the name: element which resembles silver (the name comes from Spanish *platina*, meaning "little silver" (Bin).

Złoto (Eng. gold, Lat. aurum, Au, at. no. 79)

Date of discovery: unknown (as a metal it has been known since ancient times), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes Jędrzej Śniadecki took an already existing Polish word and attributed to it a new meaning (Bin).

Rtęć (Eng. mercury, Lat. hydrargyrum, Hg, at. no. 80)

Date of discovery: unknown (as a metal it has been known since ancient times), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes E. Czyrniański took an already existing Polish word and attributed to it a new meaning (Bin).

Tal (thallium, Tl, at. no. 81)

Date of discovery: 1861, **discovered by:** W. Crookes, **original Polish name:** *thalium* (named by W. Crookes).

Reasoning behind the name: element which was named after the bright green colour of its spectra line (the name comes from *thallos*, Greek for "green twig") (Bin).

Ołów (Eng. lead, Lat. plumbum, Pb, at. no. 82)

Date of discovery: unknown (as a metal it has been known since ancient times), **discovered by:** anonymous, **original Polish name:** none.

Reasoning behind the name: element which was identified with the metal that it makes up – for naming purposes Jędrzej Śniadecki took an already existing Polish word and attributed to it a new meaning (Bin).

Bizmut (Eng. bismuth, Lat. bismuthum, Bi, at. no. 83)

Date of discovery: 1450 (isolated) and 1683–1737 (became considered an element), **discovered by:** B. Valentinus (isolated) and C. Neumann (started considering it an element – until 16^{th} century it was confused with tin and lead) (Heis), **original Polish name:** *bismuthum* (named by: unknown).

Reasoning behind the name: element which was discovered in the Earth's crust (the name comes from the German word *Wismut*, meaning "meadow" (Bin).

Polon (polonium, Po, at. no. 84)

Date of discovery: 1898, **discovered by:** M. Skłodowska-Curie and P. Curie, **original Polish name:** *polonium* (named by: M. Skłodowska-Curie and P. Curie).

Reasoning behind the name: element which was named in honour of the country Poland – the homeland of the element's discoverer (Bin).

Astat (Eng. astatine, Lat. astatium, At, at. no. 85)

Date of discovery: 1940, **discovered by:** D.R. Corson, K.R. McKenzie, E. Segré, **original Polish name:** *astatium* (named by its discoverers).

Reasoning behind the name: element which is prone to undergo nuclear decay (the name is from the Greek *astatos*, meaning "unstable") (Bin).

Radon (radon, Rn, at. no. 86)

Date of discovery: 1900, **discovered by:** F.E. Dorn, **original Polish name:** *radon* (named probably by its discoverer).

Reasoning behind the name: element which is a product of the nuclear decay of radium (Bin).

Frans (francium, Fr, at. no. 87)

Date of discovery: 1939, **discovered by:** M. Perey, **original Polish name:** *francium* (named by M. Perey).

Reasoning behind the name: element which was named after the country France – either because it is its discoverer's homeland (Bin) or because this is where it was discovered (Miz).

Rad (radium, Ra, at. no. 88)

Date of discovery: 1898, **discovered by:** M. Skłodowska-Curie and P. Curie (Bin) or only M. Skłodowska-Curie (PWN), **original Polish name:** *radium* (named by: M. Skłodowska-Curie and P. Curie).

Reasoning behind the name: element which emits radioactivity (the name comes from the Latin *radius*, meaning "ray") (Bin).

Aktyn (actinium, Ac, at. no. 89)

Date of discovery: 1899 (Bin, Heis) and 1902 (Heis), **discovered by:** A.L. Debierne (Bin, Heis) and F. Otto Giesel (Heis), **original Polish name:** *actinium* (named by A. Debierne).

Reasoning behind the name: element which emits radioactivity (the name comes from the Greek *aktis* meaning "ray" (Bin).

Tor (thorium, Th, at. no. 90)

Date of discovery: 1825 (Bin) or 1828 (PWN, Heis), **discovered by:** J.J. Berzelius, **original Polish name:** *thorium* (named by J.J. Berzelius).

Reasoning behind the name: element which was named after Thor, the Scandinavian (or Saxon) god of thunder (Bin).

Protaktyn (protactinium, Pa, at. no. 91)

Date of discovery: 1913 (unstable isotope) and 1917 (the most stable isotope) (Bin) and 1934 (isolation) (Heis), **discovered by:** K. Fajans and O.H. Göhring (the unstable isotope) O. Hahn and L. Meitner and, independently, F. Soddy (the most stable isotope) (Bin), as well as A.V.

Grosse (isolation) (Heis), **original Polish name:** *protactinium* (named by O. Hahn).

Reasoning behind the name: element which comes first before the element actinium in the decay chain, 'predecessor of actinium' (derived from Greek *proto* + *aktis*) (Bin).

Uran (uranium, U, at. no. 92)

Date of discovery: 1789 (discovery) (Bin, Heis) and 1841 (isolated) (Heis), **discovered by:** M. Klaproth (Bin, Heis) and E.M. Péligot (isolation) (Heis), **original Polish name:** *uranium* (named by: M. Klaproth).

Reasoning behind the name: element which was named after the planet Uranus or after the Roman god's name Ouranos (Bin, Miz, Eich).

Neptun (neptunium, Ne, at. no. 93)

Date of discovery: 1940, **discovered by:** E.M. McMillan, Ph.H. Abelson, **original Polish name:** *neptunium* (named by its discoverers).

Reasoning behind the name: element which was named after the planet Neptune or after the Roman god Neptunus (Bin); according to some sources, what inspired the choice of the name was the order of planets in the Solar System, which reflected either the chronological order in which the transuranic elements were discovered or their position in the table of elements: the planet Neptune is beyond Uranus just as neptunium was discovered after uranium and it is the next element in the periodic table (Eich).

Pluton (plutonium, Pu, at. no. 94)

Date of discovery: 1940 (Bin) or 1941 (Heis), **discovered by:** G.Th. Seaborg and co-workers, **original Polish name:** *plutonium* (named by its discoverers).

Reasoning behind the name: element which was named after the planet Pluto or after the Roman god Pluto (Plouton) (Bin); according to some sources, what inspired the choice of the name was the order of planets in the Solar System, which reflected either the chronological order in which the transuranic elements were discovered or their position in the table of elements: the planet Pluto is beyond Neptune just as plutonium was discovered after neptunium and it is the next element in the periodic table (Eich).

Ameryk (americium, Am, at. no. 95)

Date of discovery: 1944, **discovered by:** G.Th. Seaborg, R.A. James, L.O. Morgan, A. Ghiorso, **original Polish name:** *americium* (named by its discoverers).

Reasoning behind the name: element which was named after the con-

tinent of North America, where it was discovered just like other transuranic elements (Bin).

Kiur (curium, Cm, at. no. 96)

Date of discovery: 1944, **discovered by:** G.Th. Seaborg, R.A. James, A. Ghiorso, **original Polish name:** *curium* (named by its discoverers).

Reasoning behind the name: element which was named in honour of M. Skłodowska-Curie and P. Curie (PWN, Miz) or only after M. Skłodowska-Curie (Bin).

Berkel (berkelium, Bk, at. no. 97)

Date of discovery: 1949 (Bin) or 1950 (Heis), **discovered by:** G. Seaborg, S. Thompson, A. Ghiorso, **original Polish name:** *berkelium* (named by its discoverers).

Reasoning behind the name: element which was named after the research institute, in which it was discovered (University of California in Berkeley) or after the town itself (Berkeley). (Bin).

Kaliforn (californium, Cf, at. no. 98)

Date of discovery: 1950, **discovered by:** S.G. Thompson, K. Street, A. Ghiorso, G.Th. Seaborg, **original Polish name:** *californium* (named by its discoverers).

Reasoning behind the name: element which was named after the research institute, in which it was discovered (University of California in Berkeley)

Einstein (einsteinium, Es, at. no. 99)

Date of discovery: 1952 (PWN, Heis) or 1953 (Bin), **discovered by:** a team of American scientists – among others G.Th. Seaborg, A. Ghiorso, S. Thompson, **original Polish name:** *einsteinium* (named by its discoverers).

Reasoning behind the name: element which was named in honour of the eminent physicist Albert Einstein (Bin).

Ferm (fermium, Fm, at. no. 100)

Date of discovery: 1952, **discovered by:** the group of American scientists – among others G.Th. Seaborg. A. Ghiorso, S. Thompson, **original Polish name:** *fermium* (named by its discoverers).

Reasoning behind the name: element which was named after the eminent physicist Enrico Fermi (Bin).

Mendelew (mendelevium, Md, at. no. 101)

Date of discovery: 1955, **discovered by:** scientists from the Lawrence Berkeley National Laboratory – A. Ghiorso, B.G. Harvey, G.R. Choppin, S.G. Thompson, G.Th. Seaborg, **original Polish name:** *mendelevium* (named by its discoverers).

Reasoning behind the name: element which was named after Dimitri Mendeleev, an eminent chemist who created the periodic table of elements (Bin).

Nobel (nobelium, No, at. no. 102)

Date of discovery: 1958, **discovered by:** A. Ghiorso, T. Sikkeland, J.R. Walton, G. Th. Seaborg, **original Polish name:** *nobelium* (named by its discoverers).

Reasoning behind the name: element which was named after Alfred Nobel, Swedish chemist and inventor (Bin).

Lorens (lawrencium, Lr, at. no. 103)

Date of discovery: 1961, **discovered by:** the group of American scientists – A. Ghiorso and co-workers, **original Polish name:** *lawrencium* (named by its discoverers).

Reasoning behind the name: element which was named in honour of the American physicist known for his invention of the cyclotron – Ernest Orlando Lawrence (Bin, PWN).

Rutherford (rutherfordium, Rf, at. no. 104)

Date of discovery: 1962 (Bin) or 1964 (PWN, Heis) and 1969 (Heis), **discovered by:** G. Florow and his co-workers at the Joint Institute for Nuclear Research in Dubna (Bin, PWN, Heis) and later, independently, by American scientists from Berkeley (Heis), **original Polish name:** *rutherfordium* (probably named by its discoverers).

Reasoning behind the name: element which was named after Ernest Rutherford, an eminent British physicist (PWN).

Dubn (dubnium, Db, at. no. 105)

Date of discovery: 1967 and later, independently, 1970 (Heis) or 1974 (PWN), **discovered by:** scientists at the Joint Institute for Nuclear Research in Dubna (Russia), later, independently, by scientists at the Lawrence Berkeley National Laboratory (USA), **original Polish name:** *dubnium* (named by its discoverers).

Reasoning behind the name: element which was named after the laboratory that created the element or after the town itself (PWN).

Seaborg (seaborgium, Sg, at. no. 106)

Date of discovery: 1974, **discovered by:** scientists at the Joint Institute for Nuclear Research in Dubna (PWN, Heis) and, independently, by American scientists from Berkeley (Heis), **original Polish name:** *seaborgium* (named by its discoverers).

Reasoning behind the name: element which was named in honour of the eminent physicist – Glenn Theodore Seaborg (PWN).

Bohr (bohrium, Bh, at. no. 107)

Date of discovery: 1976, **discovered by:** the scientists at the Joint Institute for Nuclear Research in Dubna, **original Polish name:** *bohrium* (named by its discoverers).

Reasoning behind the name: element which was named in honour of the eminent physicist – Niels Bohr (PWN).

Has (hassium, Hs, at. no. 108)

Date of discovery: 1984, **discovered by:** scientists at the Institute for Heavy Ion Research in Darmstadt**, original Polish name:** *hassium* (named by its discoverers) (PWN).

Reasoning behind the name: element which was named after the German state of Hesse.

Meitner (Eng. meitnerium, Lat. meitner, Mt, at. no. 109)

Date of discovery: 1982, **discovered by:** scientists at the Institute for Heavy Ion Research in Darmstadt**, original Polish name:** *meitner* (named by its discoverers).

Reasoning behind the name: element which was named in commemoration of Lise Meitner, an eminent nuclear physicist who worked on radioactivity (but she was not the one to discover meitnerium) (PWN).

Darmstadt (Eng. darmstadtium, Lat. darmstadt, Ds, at. no. 110)

Date of discovery: 1994, **discovered by:** scientists at the Institute for Heavy Ion Research in Darmstadt, **original Polish name:** *darmstadt* (named by: its discoverers).

Reasoning behind the name: element which was created by scientists at the Institute for Heavy Ion Research in Darmstadt (PWN).

Roentgen (roentgenium, Rg, at. no. 111)

Date of discovery: 1994, **discovered by:** scientists from the Institute for Heavy Ion Research in Darmstadt**, original Polish name:** *unununium*

Reasoning behind the name: element which was named in honour of the eminent physicist Wilhelm Conrad Röntgen, who discovered electromagnetic radiation.

Kopernik (copernicium, Cn, at. no. 112)

Date of discovery: 1996, **discovered by:** scientists at the Institute for Heavy Ion Research in Darmstadt, **original Polish name:** *copernicium.*

Reasoning behind the name: element which was named in honour of Nicolaus Copernicus.

Ununtri (ununtrium, Uut, at. no. 113)

Date of discovery: no data available, **discovered by:** no data available, **original Polish name:** *ununtrium*

Reasoning behind the name: element with the atomic number 113 (systematic names of such elements are formed on the basis of the digits of their atomic number, each digit having a corresponding morpheme: 0-nil, 1-un, 2-bi, 3-tri, 4-quad, 5-pent, 6-hex, 7-sept, 8-oct, 9-enn and each word ending with -ium). This type of nomination is used with reference to the elements, which have not yet been officially accepted by IUPAC (Heis, 423) (PWN, Miz, Heis).

Ununkwad (ununquadium, Uuq, at. no. 114)

Date of discovery: 1999, **discovered by:** Russian scientists from a research centre in Dubna and American scientists from a research center in Berkeley, **original Polish name:** *ununquadium.*

Reasoning behind the name: element with the atomic number 114 (PWN, Miz).

Ununpent (ununpentium, Uup, at. no. 115)

Date of discovery no data available, **discovered by:** no data available, **original Polish name:** *ununpentium.*

Reasoning behind the name: element with the atomic number 115 (PWN, Miz).

Ununheks (ununhexium, Uuh, at. no. 116)

Date of discovery: 1999**, discovered by:** American researchers from a laboratory in Berkeley, **original Polish name:** *ununhexium.*

Reasoning behind the name: element with the atomic number 116 (PWN, Miz).

Ununokt (ununoctium, Uuo, at. no. 118)

Date of discovery: no data available, **discovered by:** no data available, **original Polish name:** *ununoctium.*

Reasoning behind the name: element with the atomic number 118 (PWN, Miz).

The element with the atomic number 117 has not yet been discovered.[1] It must be noted, however, that research is still conducted which aims to synthetize new transuranic elements. Scientists do not rule out the possibility of extending the periodic table even up to the atomic number 168. A hypothetical periodic table which includes super-heavy elements was presented and commented upon by David Heiserman (Heiserman 1997: 423–425). It is highly unlikely that elements above the atomic number 168 are created, but

[1]This element was still unknown at the time when the paper was written. Element 117, called ununseptium, was created in 2010 [translator's note].

the absolute upper-limit of research is the atomic number 200, beyond which gigantic force is required to keep the atomic nucleus together (Heiserman 1997: 423).

3.2. History of the oldest names of the elements in the general language

The origins of the oldest names of chemical elements go back to the very roots of the Polish language: to Proto-Slavic and in some cases even to Proto-Indo-European times. The history of these lexemes and their genetic connections with the expressions present in other languages are interesting enough to be discussed separately.

At this point of my analysis I am referring to the following etymological dictionaries: Brückner 1993, Boryś 2005, Długosz-Kurczabowa 2003 (which includes only two of the analyzed names: *złoto* [*gold*] and *żelazo* [*iron*]), and Bańkowski 2000, which accounts only for the names *miedź* [*copper*], *cyna* [*tin*], and *ołów* [*lead*].

The scope of this research is very limited. It covers the names selected according to the general historical information presented in Biniewicz's study (Biniewicz 1992: 21–39) and in Mizerski's tables (Mizerski 2004: 330–331).

The touchstone of my analysis, which helps to establish the scope of the subsystem, is the age of the lexical form, with no regard to how long it has been functioning in the Polish language as a chemical term to designate an element, because the term "element" itself was introduced to science relatively late – in 1661, as I already mentioned in the introduction. And the first reasonable definitions of an element and of chemical compounds were offered even later. The definition of an element was provided by John Dalton in 1808 in his *New System of Chemical Philosophy*. Therefore, if one was to consider the time when the names of chemical elements were formed from such a perspective, it would turn out that all of the names are quite new – their origins would go back to the second half of the 17^{th} century or even to the 19^{th} century.

In any cases which raise doubt, I resort to yet another helpful 'litmus test'. Namely, I take into consideration only those names that were adopted in the chemical nomenclature from the general language in an unchanged form – as readymade lexemes. I do not include here any derived names, in which only some morphological elements preserve their ancient origin – such as *wodór* [*hydrogen*], which is a shortened version of the word *wodoród* formed from the ancient words *woda* [*water*] and *rodzić* [*to give birth*], or *tlen* [*oxygen*] which comes from an equally ancient word *tlić* [*to smoulder*]. By analogy, I exclude the name *polon* [*polonium*], formed on the basis of the

French word *Pologne*, although it could have been borrowed from Polish, as it derives from the name of Poland, which itself comes directly from the name of the Polan tribe. Derivatives like *glin* [*aluminium*] (from the word *glina* [*clay*]), *krzem* [*silicon*] (from *krzemień* [*flint*]) or *wapń* [*calcium*] (from *wapień* [*limestone*], *wapno* [*lime*]) are not included either in this class of lexical units, although the words that formed them have a very fascinating and ancient etymology. I also leave out, which seems obvious, the names that do not have Slavic origins, even if they might have been known in the Polish language from time immemorial. Namely, the word *ren* [*rhenium*], which derives from the identically-sounding name of a German river. Incidentally, this form is very old, it has Celtic origins and it contains in its morphological structure the stem that forms the very word *rzeka* [*river*] (Brückner 1993: 457).

Now, after having selected the linguistic material, a list of the oldest Polish names of the elements can be made. It looks as follows: *węgiel* [*carbon*], *siarka* [*sulfur*], *żelazo* [*iron*], *miedź* [*copper*], *srebro* [*silver*], *cyna* [*tin*], *złoto* [*gold*], *rtęć* [*mercury*], *ołów* [*lead*].

All the substances, which are the referents of the above lexemes were already known in antiquity (in the form of minerals or metals), but naturally they were not considered chemical elements, as the very notion was unknown at the time. Their discoverers cannot be traced. The authors of the Polish nominations are Jędrzej Śniadecki and Emilian Czyrniański. For naming purposes they resorted to already existing Polish words and they attributed to them new, specialized meanings (Biniewicz 1992). Almost each one of those names was the result of the association of the element with the substance (mineral or metal) in which it occurs as its primary constituent, i.e. a substance which retains its chemical properties after its purification.

It is only in the case of carbon (*węgiel*) that things get more complicated, because originally, there were attempts to differentiate the name of the element from the name of the mineral, which resulted in such proposals as *węglik* (Śniadecki) or *węglan*, but those names never caught on.

Here is the historical and etymological background of individual lexical units of the discussed group:

węgiel (carbon) – formerly: *wągl*, *wągiel*, plural: *wągle*; the word has Proto-Slavic (earlier on Proto-Indo-European) roots and it sounds similar in different languages: Old Church Slavonic *ꙗglь*, orv-olr. *ugol',* srp. *ugal',* ces. *uhel,* lit. and prg. *anglis,* lav. *uogle,* san. *angārah* (Brückner 1993: 609, Boryś 2005: 686); reconstructed Proto-Slavic form: **ęglь* meaning "carbonized wood", "charcoal"; masculine; originally, the stem with *-ĭ-*, deriving from

Proto-Indo-European **angli-* (or **angelo-*) had the same meaning (Boryś 2005: 686).

siarka (sulfur) – a word with Proto-Slavic origin with alternations in Old Polish: *siarka / szarka / sarka*; doublet of such lexemes as: *siara* ("a mother's first milk", but also "sour milk"), *siarnik, siarczysty, szary, sierak* ("dusk"), *siermięga* (a type of clothing named after its grey color) as well as *siny* and *siwy* – it contains the morpheme *si-,* which designates a bright color (Brückner 1993: 487, 489, 492, 541); its semantic equivalents in other languages with similar etymology: hsb. *syra*, ces. *síra, sírka*, orv. *sěra* "siarka", "smoła", rus. *séra*, ukr. *sira*, *sirka*, chu. *sěra*, bul. *sjára*, srp. dialect, *sjera* "mother's first milk"; all of these words derive from Proto-Slavic **sera*, which has two meanings: "sulfur" and "colostrums", but it is unknown which of these two meanings is the original one, as no certain etymology is available (Boryś 2005: 543–544); the name of the mineral is probably justified by its primrose yellow colour.

żelazo (iron) – a word with Proto-Slavic origins with alternations in Old Polish: *żalazo / żalezo / zielazo*; it is a doublet of the word *żeliwo* (which is a shortened version of *żelaziwo* "piece of iron", "iron items") and it sounds similar in different languages: chu. *želězo,* ces. *železo*, lit. *gel(e)žis*, lav. *dzèls*, prg. *gelzo*, *gelso*, slk. *železo*, rus. *želézo*, ukr. *zalízo*, *zelizo*, bul. *želázo*, slv. *želézo*, possibly also ell. *khalkós* (Brückner 1993: 664; Długosz-Kurczabowa 2003: 557–558, Borys 2005: 753–754); those strings derive from the Proto-Slavic form **železo* or **želězo*, whose origin can be interpreted in two ways: (1) it derives from the Proto-Indo-European stem **g'hel-*, which used to mean "stone or something hard" (incidentally, if that was the case, the word *głaz* [*boulder*] would also be a derivative of this unit's doublet) (Długosz-Kurczabowa 2003: 557–558) and (2) the origin of the word is unclear; possibly, it is an ancient borrowing from some Asian language, but I did not manage to pin down the exact source (Boryś 2005: 753–754).

miedź (copper) – a word originating in the Proto-Slavic lexeme **mědь* (feminine, "copper", "bronze", "red brass"), which probably derives from the Pre-Slavic form **(s)moid-i-s* ("wrought metal"); in Old Polish it was also used in reference to copper alloys with other elements as additives ("red brass", "bronze"), related with Polish lexemes: *miedziak*, *miedzianka*, *śniady* (formerly: *śmiady*) and with foreign lexemes: eng. *smith* ("blacksmith"), deu. *Schmied* ("blacksmith") i *Geschmeide* ("ore valuables"), ces. *měd*, rus. *med'*, Old Church Slavonic *mědь* (Brückner 1993: 332, 533; Boryś 2005: 323; Bańkowski 2000: 175).

srebro (silver) – a word with Proto-Slavic origins, its Old Polish

forms are: *śrebro / śrzebro / strzebro / jrzebro* and in dialects: *srebło / śrebło / ščebro / śrybno / ślybrno*, cognate of words: ces. *stříbro*, Old Czech *střiebro*, chu. *sȋrebro*, orv-olr. *sierebro*, rus. *serebró*, Little Russian *sribło*, Old Church Slavonic. *sьrebro*, wen. *slebro*, lit. *sidabras*, lav. *sidrabs*, prg. *sirablis*, got. *silubr*, goh. *silabar*, deu. *Silber*; reconstructed Proto-Slavic form: **sьrebro* ("silver"), whose origin is unclear – it is a borrowing from a non-Indo-European language of the Middle East; perhaps the ultimate source is, for example, the Assyrian form *šarpu* "silver" (Brückner 1993: 511, Boryś 2005: 573).

cyna (tin) – in Old Polish: *cena*, adjective: *ceniany* ("stannic"); cognate of the German form *Zinn* and with the lexeme *cynober* ("vermilion", "red color") (Bańkowski 2000: 209, Brückner 1993: 70); according to Bańkowski (2000: 209) the name of the element derives directly from German, not from Old Polish.

złoto (gold) – a word with Proto-Slavic and Proto-Indo-European roots derived from a Proto-Slavic form **zoł-to* (Brückner 1993: 653, 654) or **zoltь* , which is a continuation of a Proto-Indo-European stem **g'holt-, *gholt-* alternately: *g'helt-* (Długosz-Kurczabowa 2003: 547–548) or **g'holto-* "golden" and **g'hel-* "shine" – the latter used to refer also to bright colours, especially to gold, yellow, and green, which were not distinguished linguistically once; it is possible that the noun *złoto* was derived from an adjective which was neuter (Boryś 2005: 741); cognate lexemes: ces. *zlato*, orv-olr. *zoloto*, rus. *zóloto* "gold" i *zolotój* "golden", Old Church Slavonic *zlatь* "golden" i *zlato* "gold", lit. *želtas* ("yellow" or "golden"), lav. *zèlts*, goh. *gold* "golden", ave. *zari* ("yellow", "green", "golden"), *zaranja* ("gold"), as well as pol. *zieleń*, *zioło* (Brückner 1993: 653, 654, Boryś 2005: 741).

rtęć (mercury) – a word with three forms in Old Polish: *rtęć*, *trtęć*, *trztęć* and synonyms: *merkury* and *żywe srebro* [*quicksilver*], cognate of rus. i ces. *rtut'*, slk. *ortut'*, orv. *rьtutь*, derived from the North Slavic form with uncertain origin **rьtętь* "mercury" – most probably, it was an Asian borrowing; some linguists connect this string with the Arabic lexeme *utārid* "mercury" (as it used to appear in medieval alchemical literature beside the name of the planet Mercury) and Turkish *utarıd* "mercury", but this poses phonetical problems, while others with Lithuanian verbs: *rìsti, ritu* "roll", *riẽsti* "deflect", "bend", "turn", "roll up", which are supposed to be based on the Proto-Indo-European morpheme **rt-* derived form **ret-* "flee", "roll" – the name of the element would then be justified by the appearance of spilled mercury, which takes the shape of small, rolling balls (Brückner 1993: 466, Biniewicz 1992: 36, Boryś 2005: 525).

ołów (lead) – a word with Proto-Slavic origin, masculine in Polish, but neuter in other Slavic languages; in all East Slavic languages its secondary meaning is "tint"; cognate of words: ces. *olovo*, rus. *ólovo* "tint", hrv. i srp. *olovo* "lead", dsb. *wuloj*, hsb. *wołoj*; there is also a formal similarity with semantic equivalents of "lead" in Baltic languages: lit. *álvas*, lav. *alvs*, Old Prussian. *alvis* – possibly, these are all Slavic borrowings; their source was the Proto-Slavic form with uncertain origin **olovo* or **olovъ*, masculine, which meant "lead"; there may be some undetermined etymological connection with Indo-European colour adjectives like goh. *ëlo* "yellow", lat. *albus* "white", ell. *alphós* "white"; the analyzed lexeme would then be justified by the characteristic dark grey colour of the referent, but its precise structure cannot be reconstructed (Bańkowski 2000: 408, Brückner 1993: 379, Boryś 2005: 390).

It is worth adding that the oldest names of the elements discussed above have a very rich pool of reference in the Polish language, which is connected with folk tradition and folk imagery.[2]

4. Typology and structure of the knowledge represented in the semantic field of the names of chemical elements

The history of the names of chemical elements and the reasoning behind them, as discussed above, can serve to recreate the knowledge represented in this entire domain.

4.1. Epistemic subjects of the knowledge represented in the names of chemical elements

The epistemic subject of the knowledge represented in the name of a chemical element is the one who named the element and who often, but not in all cases, may be identified with the very discoverer of this element.

4.2. Objects of the knowledge represented in the names of chemical elements

The knowledge represented in the names of chemical elements may concern two different types of objects:

(a) the chemical element itself, analyzed in various contexts, for example in the context of its properties (see *tlen* [*oxygen*] or *iryd* [*iridium*]), of how it was discovered, of which sample it was part (see *lit* [*lithium*]) and of when it was discovered in comparison with other elements (see *neon*),

(b) objects other than the named element, which are designated by proper names[3] – this is a much more rare case when names are given only to

[2]The associations commonly called up by the oldest names of the elements were examined by cognitive linguists and described in Bartmiński 1996 (see e.g. "węgiel").

[3]I use the term "designation" in the broadest sense it appears in the literature on

commemorate and honour a real or a fictitious person or an object (which is considered very important by the author of the name, recognized by a lot of people and worth being universally known and remembered) without any connection with the named element itself (see *kiur* [*curium*], *ren* [*rhenium*], *wanad* [*vanadium*], *nobel* [*nobelium*]).

The first case is the most common.

Apart from the names which represent knowledge about one object (or one type of objects), there are those which represent a much more complex knowledge. It can concern both the element and the person (like the string *samar*, which was said to come from both the name of the mineral that contained the element and the name of Samarski).

4.3.Types of knowledge represented in the names of chemical elements

The knowledge represented in the names of chemical elements is very diverse (incidentally, it encompasses all the main Aristotelian categories, to which correspond the questions: *What? How numerous or how big is it? What is it like? In relation to what? Where?* and *When?*). It concerns the atomic core of an element or a structure of higher order of which the element is part (i.e. a chemical compound, a crystal, etc.), which is examined with respect to the inherent properties that every sample holds, as well as with respect to the non-inherent properties, related only to certain samples.

The inherent properties that are preserved in the analyzed lexical units are:

– element's atomic number; see systematic names such as *ununokt* [*ununoctium*],

– element's ability to undergo nuclear reactions, see *astat* [*astatine*],

– stage in the decay chain, see *radon*, *protaktyn* [*protactinium*],

– ability to emit radiation during nuclear reactions, see *rad* [*radium*], *aktyn* [*actinium*],

– reactivity or its lack, see *argon*,

– type of chemical reaction that the element undergoes, see *tlen* [*oxygen*],

– product formed during chemical reactions of the element, see *wodór* [*hydrogen*],

– identification of the element with a substance which was not previously considered an element or with one that has a given element as its primary constituent, see *złoto* [*gold*], *węgiel* [*carbon*], *siarka* [*sulfur*],

– similarity to another substance, see *platyna* [*platinum*],

the subject, i.e. also in reference to empty names (Pelc 1984: 296).

– biological properties, see *azot* [*nitrogen*],

– ability of phase transitions, see *fluor* [*fluorine*],

– smell, see *osm* [*osmium*],

– ability to emit visible light, see *fosfor* [*phosphorus*],

– colour (of the spectrum, of the flame in which the sample is burnt, or of the very compound that contains the element), see *tal* [*thallium*], *cez* [*caesium*], *iryd* [*iridium*].

Knowledge other than the inherent properties of the elements preserved in their names includes all circumstances related to the discovery itself:

– people who contributed to the discovery of the element, see *samar* [*samarium*],

– time of discovery in comparison with other elements, see *neon*,

– technical difficulties encountered during the discovery procedure, see *dysproz* [*dysprosium*],

– unusual method of discovery (synthetic production), see *technet* [*technetium*],

– co-occurrence of a different element in the analyzed sample, see *niob* [*niobium*], *tantal* [*tantalum*],

– source of a given sample, see *hel* [*helium*], *bizmut* [*bismuth*],

– type of sample in which an element was detected, see *magnez* [*magnesium*], *lit* [*lithium*].

Moreover, as I already mentioned, some lexical units within the discussed area of research reflect knowledge which refers to proper names and their referent. They are the names of the following objects:

– people, both real and imaginary[4], see *kiur* [*curium*], *wanad* [*vanadium*],

[4]It is worth noting that when it comes to the names of elements which derive from the names of real people, there are two interesting naming customs. Firstly, the person who gives the name to the element never does it on the basis of her own name, even if that person actually discovered the element, in which case she would have every right to leave this particular kind of 'signature'. It probably results from an unwritten principle of modesty that is followed by independent researchers. Meanwhile the only names indirectly connected with the discoverers are those which derive from the names of the discoverers' research institutes. Secondly, surname-based names of the elements usually derive from the names of distinguished natural scientists – physicists, chemists, and an astronomer – or, in the case of *samar*, from that of an engineer. So far, there has been no naming act that would commemorate individuals who made their mark in human sciences, arts, medicine, social activism, etc. and who could serve as inspiration for such names as *humboldtium*, *platonium*, *leibnitium*, *wellsium*, *galenium*, *leonardium*, *davintium*, *chopinium*, etc. Indeed, in some historical analyses there are mentions of the name *columbium*, but it was eventually withdrawn from the nomenclature. Such names, as well as the names of the compounds that these elements form, would sound

– astronomical objects, see *cer* [*cerium*], *pluton* [*plutonium*], *neptun* [*neptunium*],

– continents, see *europ* [*europium*], *ameryk* [*americium*],

– countries, see *polon* [*polonium*], *frans* [*francium*], *ruten* [*ruthenium*],

– cities, see *berkel* [*berkelium*], *iterb* [*ytterbium*], *hafn* [*hafnium*],

– landscape elements (e.g. rivers), see *ren* [*rhenium*].

The structure of knowledge represented in the analyzed semantic field is illustrated in Figure 1, but it needs to be emphasized that this diagram refers only to content. This means that the singled out classes are MERELY CLASSES OF KNOWLEDGE ABSTRACTED FROM THE NAMES OF THE ELEMENTS and not classes of the names themselves when analyzed in terms of the knowledge they represent. Analyzed expressions can contain elements which conceptually are of a different kind, therefore the classification would not be disjunctive. A categorization of the names themselves based on the knowledge they represent is impossible.

as good as the existing ones – let us take for example hypothetical Polish names like: *szopenek galu*, *dwutlenek humboldtu*, or *platonek indu*.

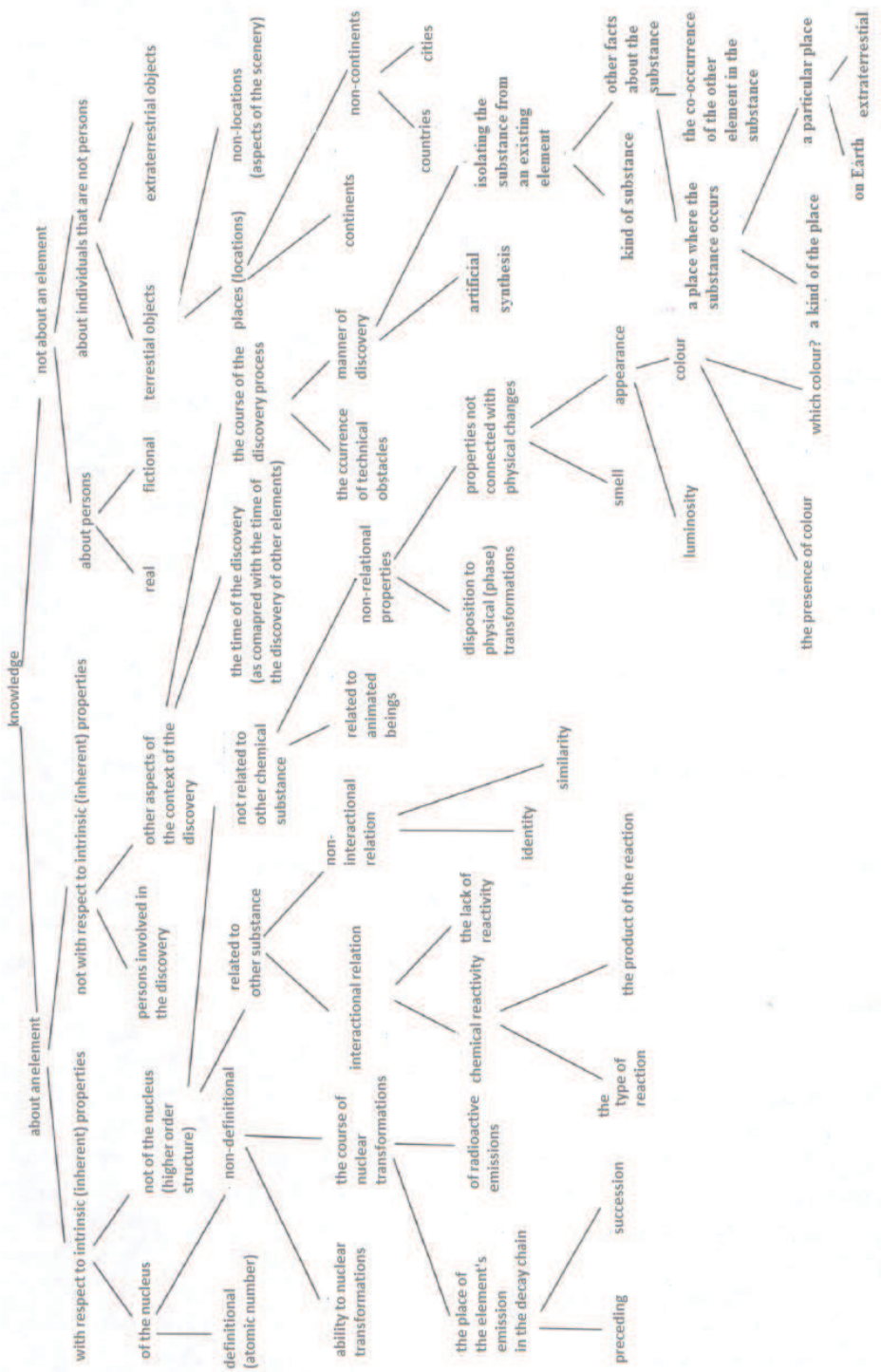

Figure 1. Structure of the knowledge reflected in the names of chemical elements.

5. Sign functions of the names of the elements in contemporary chemistry and the knowledge reflected in them

Sign functions of the names of the elements in contemporary chemistry are not correlated in any way with the knowledge that is represented in their form. This knowledge is absolutely irrelevant when it comes to transmitting information in scientific papers, proof of which being the fact that the knowledge of the etymology of the analyzed expressions is not indispensable for the decoding of such texts.

Moreover, the above-mentioned knowledge may be completely absent from the meaning of the name, even as its subordinate constituent. This may be illustrated by an example of the lexical unit *neodym* [*neodymium*], whose form represents its author's knowledge that the referent was part of a substance called *didym* [*didymium*], which used to be considered an element. The contemporary encyclopedic definition, although quite detailed, left out this fact completely:

neodym, Nd, *neodymium*, chemical element with the atomic number 60; standard atomic weight 144,24; it belongs to the lanthanide series; it is a silvery white metal; melting point 1024°C, boiling point 3027°C, density 7,004 g/cm3; highly reactive; it breaks down water and oxidizes in air (hence the necessity to store it in kerosene or in an inert atmosphere), it reacts with halogens, hydrogen, sulfur, and nitrogen; in its compounds, neodymium is in the +3 oxidation state; in the +2 and +4 states it forms unstable compounds; natural neodymium occurs in minute amounts, mostly in the minerals monazite and bastnasite; it is used in laser technology (neodymium-doped lasers) and in high-strength magnets (e.g. $Nd_2Co_{14}B$, NdFeTi), its glasses are used in astronomy and in the production of welding safety glasses; along with other lanthanides it is sometimes used in catalysis; neodymium hydroxides (NdH_2, NdH_3) are important energy carriers. Neodymium was discovered in 1885 by C. Auer von Welsbach. (*Powszechna encyklopedia PWN*)

What is also irrelevant is the knowledge related to the etymology of the oldest names of chemical elements in the national language and to the associations it evokes within the community, which means that this knowledge is not correlated in any way with the semiotic functions performed by the names of the elements in contemporary scientific texts on chemistry. These functions are connected with denotation only and they can be of two kinds: predicative (establishing the substance's type) or indicative (indicating a particular substance sample).

From a morphological standpoint, one might say that the real meaning

of the names of the elements differs from its structural meaning; as it is for example, by analogy, with the contemporary real meaning of the lexeme *miednica*, which no longer refers to a container made of copper – the difference is such that in this case it is a result of a gradual historical change, while in the case of the names of the elements such a discrepancy between meanings was not only present, but also intended by their authors from the very beginning. In a synchronic approach, these names are original and morphologically indivisible lexical units. They can be considered derivatives (and rather unusual ones) only from a diachronic perspective and only as long as we apply only the formal criteria for such a qualification, i.e. the very fact that the lexeme derives from another string with no concern about the aforementioned 'semantic dualism', which the supposed derivative manifests from the very moment of its formation.

The names of chemical compounds, however, are an entirely different case. Every single one of them is a derivative of a name of either a chemical element or a functional group and its real meaning is identical with its structural meaning. What indirectly confirms this, is the fact that these names represent knowledge that is relevant only from the point of view of scientific description, like the composition of the compound. In other words, the morphemes that derive from the names of chemical elements are merely carriers of information about corresponding referents. The structural meaning of those strings is never transferred to the derivative as part of its real or structural meaning.

Thus, when talking about knowledge represented in the names of chemical elements, one must recognize several separate levels of this representation:

a) knowledge represented in the name which functions in general language, on the level of its etymological meaning,

b) knowledge represented in the name which functions in general language, on the level of its real meaning including denotation and connotation,

c) knowledge represented in the name which functions as a scientific term, on the level of its form, including the epistemic subject, that is, the author of the nomination,

d) knowledge represented in the name which functions as a scientific term, on the level of its real meaning, in *langue*, including the epistemic subject, that is, every user of Polish who has it in his linguistic competence,

e) knowledge represented in the name which functions as a scientific term, on the level of its real meaning, in *parole*, including the epistemic subject, that is, the sender of the message who at that moment is using it as a predicate or a definite description.

6. Names of chemical elements as a language system

To conclude the analysis, it is worth considering the area of research in terms of its structure and its functioning as a language system. As it turns out, the field of the names of the elements is governed by analogical mechanisms as the lexical subsystems of the general language. It can be proved by reference to the model of sign and of language proposed by Ferdinand de Saussure.

According to this theory, a linguistic sign is arbitrary – this means that the relation between the form and the content (*signifiant* and *signifié*) does not stem from any natural link but is a result of an unwritten social agreement. Diachronically, the sign displays two opposite tendencies: on the one hand it changes with time, on the other its constancy is conditioned by tradition. As to the language system, difference is its true essence. Each item is defined by features opposite to the properties of other items and it can exist only because of these oppositions. It can be seen on every level on which the sign functions: on the semantic as well as on the morphological or phonetic level (de Saussure 1959).

The domain of the names of chemical elements functions in quite a similar way. Each lexeme belonging to this domain is arbitrary; one might even say 'super-arbitrary', since not only are there no natural links between how it sounds and what it means, but also, in many cases, there is a complete discrepancy between its structural and its real meaning (names derived from proper names). Every new name is formed by virtue of social agreement – not in the metaphorical sense that it is a custom handed down for generations, but quite literally in the form of specific, codified recommendations of nomenclature committees appointed by the IUPAC. Hence, paradoxically, the names of chemical elements conform to the Sausurrean model to a much greater extent than the signs of the general language. Metaphorically speaking, they are 'hyper-structuralist' linguistic signs.

The discussed expressions have been changing over time, which is amply demonstrated in works such as Biniewicz's historical linguistics dissertation (Biniewicz 1992: 19–40). On the other hand, the names of the elements cannot change, given the fact that it would be impossible to introduce, certainly not overnight, an entirely new nomenclature by the power of a single IUPAC ruling so that it would replace the names established by tradition. It applies particularly to the names that are commonly known and that are used also outside the specialized context of chemical texts, in everyday verbal communication (lexemes like *tlen*, *wodór*, *azot*, *jod*, *platyna*, *złoto*, *srebro*, *magnez*, *ołów*, *fluor*, *krzem*, *chlor*, *wapń*, *selen* [*oxygen*, *hydrogen*, *nitrogen*,

iodine, *platinum*, *gold*, *silver*, *magnesium*, *lead*, *fluorine*, *silicon*, *chlorine*, *calcium*, *selenium*], etc.). This is how the Saussurean unchangeability of the linguistic sign manifests itself (de Saussure 1959).

What deserves special attention and an individual discussion, is the issue of the oppositions within the analyzed system, as they are connected with a particularly interesting aspect of the system's contemporary development. Namely, the practice of replacing systematic names of newly discovered elements with common names as soon as their discovery is officially approved by the IUPAC. Scientists do that even though it is highly disadvantageous in terms of the economy of information: systematic names define the elements in a precise and unequivocal manner (since they reflect the knowledge about the element's atomic number), while common names, derived almost solely from proper names nowadays, neither define the elements, nor do they say anything about their properties. Moreover, such a procedure is an exception from the dominant tendency in contemporary chemical nomenclature to replace common names with systematic ones, since they are more precise and convenient – all this makes this practice even more significant and worthy of analysis.

Probably, one of the reasons for this phenomenon is the attempt to make the new names structurally resemble the old ones that are already established within the system, but there seems to be another, even more important factor involved. It is the tendency of language to differentiate at all levels. It is not hard to notice that the forms of systematic names are obviously unnaturally monotonous and similar – former names of *bohrium*, *hassium*, *meitnerium*, and *darmstadtium* are: *unnilsept* [*unnilseptium*], *unnilokt* [*unniloctium*], *unnilenn* [*unnilennium*], *ununnil* [*unnunnilium*] (Mizerski 2004: 330) and the systematic names still in use are: *ununun*, *ununbi*, *ununtri*, *ununkwad*, *ununheks*, *ununokt* [*unununium*, *ununbium*, *ununtrium*, *ununquadium*, *ununhexium*, *ununoctium*]. Changing these into common names, which derive from lexemes formed in natural language, increases the general number of phonetic oppositions by making the subsystem of the names of the heaviest transuranic elements similar to ordinary semantic fields of the general language, for example selected lexemes from the semantic field of colour terms: *żółć*, *czerwień*, *błękit*, *zieleń*, *oranż* [*yellow*, *red*, *blue*, *green*, *orange*]. Metaphorically, one might say that those who name the elements are letting the natural language 'speak for itself' – this means that they are intuitively aiming to follow the structural pattern of a language system, which is part of their linguistic competence as users of their national languages.

After having taken into account all characteristics of this area of research, it may be concluded that this domain has strong connections with the national language. It allows us to draw a more general conclusion concerning the status of scientific terminology, namely, that it is indeed part of the national language, which is congruent with the opinions of some researchers (e.g. Buttler 1979, Szymczak 1979).

The tendency described above to replace systematic names of the elements with common names attests to one more property of terminological systems. Apart from their general disposition towards regularity (which was discussed e.g. in Łuczyński 1986), these systems can also reveal an opposite tendency to keep a certain amount of irregularity, if it can be justified by deep-rooted tradition or by the necessity to achieve the minimal level of diversification of lexemes (e.g. common names of certain organic compounds like *metan* [*methane*], *etan* [*ethane*], *propan* [*propane*]).

Conclusion

To sum up, the entire domain of the names of chemical elements can be characterized as a lexical system built in its entirety out of original, morphologically indivisible units – at least in a synchronic view. It represents knowledge on several levels.

Knowledge represented by the forms of analyzed strings is not part of their real meaning and is irrelevant from the point of view of chemical description. Moreover, it is diversified when it comes to the type of objects to which it refers – it can concern not only the elements themselves and their properties, but also other objects or individuals. The represented properties themselves are very diverse as well: they may be attributed either to the types of chemical elements or to specimens of the elements.

As a language system, the analyzed domain is characterized by a strong similarity of its structure and of the way it functions to semantic fields of the national language, which may serve as a proof that it is part of this language; especially as some names of the elements happen to be used in everyday verbal communication by people who are not necessarily chemists.

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SCHWYZERTÜÜTSCH, BAMBARA, AND CONTEXT-FREE LANGUAGES

Originally published as "Schwyzertüütsch, bambara i języki bezkonstekstowe," Studia Semiotyczne 27 (2010), 135–149. Translated by Rafał Jantarski.

1. INTRODUCTION

In his oft-cited, if rarely read book, Noam Chomsky (Chomsky 1956) ventured to propose a hierarchy of formal grammars. He defined them as rules for rewriting strings of terminal and nonterminal symbols into different strings of terminal and nonterminal symbols, thus giving birth to what is today known as the Chomsky hierarchy. The author himself claimed the theory applied exclusively to formal languages, but in his considerations he also happened to formulate a problem relating to natural languages, namely, to which formal grammar category descriptive grammars of natural languages belong? While restraining from siding with any answer to the problem, Chomsky sparked a long philosophical and linguistic discussion revolving around complex structures in natural languages.

At the very beginning of his considerations, Chomsky rejected two categories of the hierarchy, judging them inadequate for description of natural languages: type-0 grammars (unrestricted grammars, generating recursively enumerable languages), and type-3 grammars (regular grammars). The first was deemed too broad. Assuming, which Chomsky does, that adequate description of natural languages can be done via formal methods, the fact that natural languages can be described by unrestricted grammars to generate any formal language is practically useless. Regular grammars are rejected as too weak, a claim first introduced in *Syntactic Structures* (Chomsky 1957), an earlier book which appeared in print later than the hierarchy theory. The problem, therefore, relates to only two levels: context-free and

context-sensitive grammars.

2. MOTIVATIVES

There are several reasons why it would be interesting to ask whether context-free grammars are all we need to describe any natural language.

The first one is purely practical: essentially, recognition (and parsing) of context-free languages is multinomial, i.e. practically calculable. For context-sensitive languages, however, such calculation is problematic. In the IT industry, from data search to automated translation, there is an increasing need for processing texts and recordings that appear in natural languages. It would be good to know whether our computing capabilities are robust enough to handle natural languages.

Second, there are some general theoretic questions concerning the relationship between the traditional linguistic description and formal description. Having established purely formal properties of natural languages, we may be well positioned to try to judge whether their respective descriptive grammars are adequate.

Third, there are philosophical questions regarding mechanisms and computational capabilities of the human brain. If, on a daily basis, we use structures that machines are unable to process in a reasonable time, one may come to the conclusion that the brain mechanisms responsible for linguistic competences have computational capabilities far exceeding those of machines.

Note, however, one thing. Any (valid or invalid) argument for natural languages not being context-free always points to a specific syntactic structure in a specific language. Implicit or explicit conclusions drawn from that kind of reasoning are that finding one natural language that defies complete description in context-free grammar must mean by necessity that no natural language is ever context-free. This assumes linguistic universalism, inherent to both Chomsky's concept and generativism at large (Mecner 2005), although many linguists, psychologists and philosophers find universalism controversial. That said, it is not without reason to explore whether formal languages can be useful in describing natural languages, even if one is not subscribing to universalist inclinations.

3. INVALID ARGUMENT — ENGLISH COMPARATIVE

Early on in the discussion, some contributors formulated arguments that Gazdar and Pullum billed as folklore (Pullum, Gazdar 1982). It is not

the goal of this paper to discuss invalid arguments, but it might be of use to mention one less banal example, particularly because it was provided by Chomsky himself.

One popular artificial context-sensitive language is the *xx*-language. Assume a nonempty alphabet $\Sigma = \{a,b\}$. Language $\mathrm{L} = \{xx : x \in \Sigma^+\}$ is an *xx*-language. More generally, *x*-strings can be separated by any given string of symbols, but for a language to belong to the *xx*-type it needs to have two identical strings of alphabetical symbols (Hopcroft et al. 2006). ***xx***- and similar languages are often used to demonstrate that some language phenomena are not context-free.

In 1963, Chomsky argued that the syntax of English comparative is context-sensitive. Consider the following:

(1) That one is wider than this one is deep.

Chomsky argues that it is ungrammatical to say

(2) *That one is wider than this one is wide,

its grammatical equivalent being

(3) That one is wider than this one is.

He concludes that sentences with recurring adjectives[1] are incorrect, and that the right form requires a different adjective in each part of the sentence. He then goes on to argue that English comparative is not context-free because it creates an *xy*-language in which two constituent parts must differ and which very much resembles an *xx*-language. Let's assume a vocabulary $\Sigma = \{a,b,\alpha,\beta,\gamma\}$.

$$L' = \{\alpha x \beta y \gamma : x,y \in L \wedge x \neq y\}$$

is an *xy*-language, where L is any language with words consisting of a and b. Chomsky claims that if L' is context-sensitive, then so is English, by virtue of having such structures as (1). But he does not provide any arguments to substantiate the claim that *xy*-languages are context-sensitive, although his reasoning perhaps works on the implied premise that *xy* is context-sensitive

[1]Note that one adjective is in comparative, while the other is not, although in this particular example the difference is irrelevant.

by the same token as *xx* is. Gazdar and Pullum, however (Pullum, Gazdar 1982), came up with the following context-free grammar for an *xy*-language:

(4) a. S → $aS'\gamma$|aS"γ
b. S' → $CS'C|D\beta|\beta D$
c. S'' → $AB'|BA'$
d. A→ $CAC|a(D)\beta$
e. B→ $CBC|b(D)\beta$
f. A' → $a(D)$
g. B' → $b(D)$
h. C → $a|b$
i. D → $C(D)$

This makes *xy*-languages context-free and Chomsky's argument goes by the board.

Gazdar and Pullum note that we can generate an infinite number of independent grammars for any given language, therefore to argue convincingly that a language is context-sensitive one cannot demonstrate that all its grammars are non-context-free. However, trivial as this remark may be, many authors quoted by Gazdar and Pullum seemed to have overlooked this simple fact. Now, a convincing argument that a certain language is context-sensitive needs to depend on formal properties of context-free languages. The three most popular are:

– pumping lemma for context-free languages,
– closure under homomorphism,
– closure under intersection with regular languages.

It is particularly the latter that produces the most powerful and popular arguments, those being Shieber's argument based on Swiss German, the argument based on Dutch, and Culy's argument based on Bambara spoken in Mali.

4. SCHWYZERTÜÜTSCH AND SHIEBER'S ARGUMENT

Schwyzertüütsch (also: Schwyzerdütsch or Schweitzerdeutsch) is a group of Allemanic dialects of German used in Switzerland and Lichtenstein. They dominate the spoken language, while Standard German remains the preferred option in writing (although St. Gallen and Zürich publish books in

local Allemanic dialects). In his 1985 paper, Shieber explored some interesting syntax structures in Schwyzertüütsch which are not found in Standard German. These are present only in subordinate clauses and concern syntax requirements for verbs. Much like in Polish, verbs in Schwyzertüütsch may require, apart from the subject in the nominative, that other phrases also have specific grammatical case, namely accusative and dative. Further, some verbs may require other verbs (also a familiar Polish feature). This is why in subordinate clauses there are characteristic strings of verbs, preceded by the string of valence requirements in specific cases. Let's now consider a few examples (since the focus is on subordinate clauses, we may assume that each sentence begins with *Jan säis das...*, which means "*Jan says that...*"):

(5) ...mer em Hans es huus hälfen aastriiche
...we Hans-DAT house-ACC helped paint
'...we helped Hans paint the house.'

At the end of the phrase there are two verbs, *hälfen* and *aastriiche*, each requiring a different case, respectively dative and accusative. In Schwyzertüütsch, and particularly in the example above, case exponents are such words as *em* or *es*.

(6) ...mer d'chind em Hans es huus
...we the children-ACC Hans-DAT house-ACC
lönd hälfeaastriche.
let help paint.
'... we let the children help Hans paint the house.'

In (6), there are three verbs at the end of the phrase: the first requires accusative, the second — dative, and the third — accusative. In theory, there are no limits for construction of such sentences. Examples (7) and (8) graphically illustrate relationships in (5) and (6).

(7) ...merem Hans es huus hälfen aastriche.

(8) ... mer d'chind em Hans es huus lönd hälfe aastriche.

Knowing how the structure works, we may now read through Shieber's argument. Having provided linguistic data, Shieber enumerates the following four properties of Schwyzertüütsch:

– Swiss-German subordinate clauses can have a structure in which all the verbs follow all the noun phrases;
– Among such sentences, those with all dative noun phrases preceding all accusative noun phrases, and all dative-subcategorizing verbs preceding all accusative-subcategorizing verbs are acceptable;
– The number of verbs requiring dative objects must equal the number of dative noun phrases and similarly for accusatives;
– An arbitrary number of verbs can occur in subordinate clauses such as (5) or (6).

Now, assume any given language L that satisfies these claims (e.g. Schwyzertüütsch) and contains sentences such as (5). Consider the following homomorphism f, where

$$
\begin{aligned}
f\ (\text{"d'chind"}) &= a \\
f\ (\text{"em Hans"}) &= b \\
f\ (\text{"lönd"}) &= c \\
f\ (\text{"hälfe"}) &= d \\
f\ (\text{"Jan säitdasmer"}) &= w \\
f\ (\text{"eshuus"}) &= x \\
f\ (\text{"aastriche"}) &= y \\
f\ (s) &= z \text{ - otherwise}
\end{aligned}
$$

When intersecting $f(L)$ with the regular language $\mathrm{r} = wa^*b^*xc^*d^*y$, we arrive at the language $f(L) \cap \mathrm{r} = wa^m b^n x c^m d^n y$ which does not fit into the context-free category (it's a classic example of context-sensitive language, see Hopcroft et al. 2006).

Since context-free languages are closed under homomorphism and intersection with regular languages (see Hopcroft et al. 2006), also L is not context-free. Therefore, also languages that contain structures like (5) are not context-free. This concludes Shieber's argument.

5. DISCUSSION

In his paper, Shieber identified several counterarguments to challenge his

reasoning, and tried to refute them. It seems, however, that he wasn't really committed to the task and didn't fully explore their disruptive potential.

5.1 CASE IS NOT SYNTACTIC

One of the potential counterarguments offered by Shieber goes as follows: maybe verb case-marking (used to make the Schwyzertüütsch argument) is of semantic, not syntactic, nature. This would naturally imply that a context-free grammar could be used to describe Swiss German. This, however, is at odds with traditional research in inflectional languages. As far as inflection goes, Schwyzertüütsch is closer to Polish than to English, and both Polish and German linguists consider case marking as a syntactic issue. Making a semantic problem out of it is very much possible, but highly problematic.

One may of course go as far as to claim that inflection, semantics, or word formation is merely a matter of convention and preferred point of view. But even those leaning toward semantic interpretation of various structures in Polish wouldn't go as far as to consider case-marking in semantic terms. This seems to chime with everyday intuitions. Sentences where verb valence does not correspond with subject or object, e.g.

(9) * Jaś lubi jabłek. [John likes apples(gen.)]

are not perceived as semantically derailed, but grammatically incorrect. Without stirring much controversy one may argue that a regular user of Swiss German has a comparable perception of similar structures in his native speech. Shieber approached his informants with similar examples, and all deemed them ungrammatical (not just semantically bizarre).

5.2 OTHER CONSTITUENT ORDERS ARE POSSIBLE

Schwyzertüütsch, much like Polish, doesn't have a strictly fixed order, therefore the examples above explore just one from among a number of acceptable variations. Furthermore, there are reasons to believe that other orders are more natural. That is not to say that the structure itself is incorrect, Schwyzertüütsch permits such order and its grammar should be robust enough to describe it. Shieber's argument holds even if other structures are possible; his method is to consider one subset of sentences in Swiss German, concluding that it cannot be generated by context-free grammars.

Let's now turn to the pragmatic implications of this situation. Shieber's argument is informed by the idea that the verb string will be ordered according to the case — first go all verbs with dative, then all with accusative (or the other way round). Noun phrases must be ordered accordingly. It is not required, however, that the noun phrase required by *i*-verb is positioned on the *i*-slot in the string of noun phrases. Shieber himself provides examples where noun phrases swap their slots, while their respective verbs stay in the previous order. In highly inflectional languages, unconstrained word order is a fairly common occurrence. But if this is the case, sentences considered by Shieber are extremely ineffective in terms of pragmatics, as structures have neighbouring phrases in the dative and accusative. The number of possible syntactic interpretations of such a sentence rises exponentially, relative to the length of verb strings, because each verb needs to be interpreted against each phrase that has the required case. Hence, they will hardly ever be used in real life, the sheer number of possible interpretations making it pragmatically inefficient.

5.3 CLAUSES ARE BOUNDED IN SIZE

Another counterargument provided by Shieber (later accommodated by others) is that verb strings are limited in number — which would mean that structures could work under a context-free grammar. Indeed, it would be rather unusual to use more than five verbs in a single sentence. But if we were to further this reasoning, we would be quickly compelled to conclude that the natural language structures that we perceive as recurrent and potentially infinite are, in fact, finite and constrained. We may even go as far as to conclude that there is, say, an upper limit of simple sentences that can be linked with coordinators. But it would be equally legitimate to say that, since natural languages are finite, they can be described by both context-free and regular grammars. Such a defense of context-freeness is however difficult to accept.

Further, one must separate two things: adequate theoretical description of a language and implementation of the theory in question. Implementation permits simplification due to technical limitations, but a robust theory should be free from such shortcuts.

One more pragmatic remark: extension of such Swiss German structures is possible by application of verbs with specific valence requirements. They must be able to link to a noun phrase in its specific case and another verb in the infinitive. Polish has only a handful of those, and one may assume

that Schwyzertüütsch is not entirely different. Again, building longer structures of this sort is pragmatically (although not grammatically) constrained. But again, given the pragmatic constraints outlined above, the phenomenon in question is extremely rare.

6. SIMILAR ARGUMENTS

Let me now reiterate arguments based on Dutch and Bambara, two languages often analyzed in this context. Dutch came to attention early on in the discussion, but the resulting arguments were often dismissed as not being entirely relevant. I will present a later version of the Dutch argument, but each of those builds on cross-seriality, also present in Swiss German. Bambara provides another interesting example, with its arguments being not of syntactic, but morphologic nature.

6.1 CROSS-SERIALITY IN DUTCH

One of the earliest examples of cross-seriality was found in Dutch. Several authors explored structures that are quite similar to the ones existing in Schwyzertüütsch, but for various reasons those interpretations were challenged (Pullum, Gazdar 1982, among others). Dutch arguments may not be adding anything new to what has already been said in relation to Swiss German, but I shall nevertheless briefly discuss one of them, provided by Alexis Manaster-Ramer (Manaster-Ramer 1987).

In Dutch, cross-seriality occurs, like in Schwyzertüütsch, in subordinate clauses and in certain types of interrogative. For the sake of greater argumentative diversity, I will focus on the latter. Consider the following:

(10) of Jan Piet Marie zag kussen?
Did John Peter Mary saw kiss?
Did John see Mary kiss Peter?

As we can see, there is a verb string preceded by noun phrases satisfying valence requirements of those verbs. Adding a structure with coordination, we arrive at the following:

(11) Of Jan Piet Marie horde ontmoeten en zag omhelzen?
Did John Peter Mary heard meet and saw embrace?
Did John hear that Peter met Mary and embraced her?

The important thing in this example is the relationship between the number of noun phrases (*Jan*, *Piet*, *Marie*) and verb phrases in two verb strings (*horde ontmoeten* and *zagomhelzen*). We have two intersecting structures here: cross-seriality between verbs and their valence requirements, and coordination. The result is the following interrogative in Dutch:

$$\mathrm{NP}^n \quad \mathrm{V}^n \quad \& \quad \mathrm{V}^n.$$

Let's consider the following language:

$$L = \{\text{Of Jan } N^n \text{ Marie horde } V^n\text{ontmoeten zag } W^n\text{omhelzen}\},$$

where N = {Joop, Alexander, Jan, Wim, Piet, Marie, Willem, ...), V = {horen, zien, helpen}, W = {laten, leren}. We can easily see that, by applying a homomorphismtransposing N, V, W from L into a, b, c and other symbols from L into the empty symbol $\in$, we arrive at the language $a^n b^n c^n$, which is context-sensitive (more specifically, it belongs to index languages, a subcategory of context-sensitive languages, see Hopcroft et al. 2006).

6.2 MORPHOLOGY IN BAMBARA

Bambara, or Bamana, a Niger-Congo language belonging to the Mande group, is used primarily in Mali. It is spoken by ca. 2.7 million people, with another four million using it as lingua franca. Bambara inspired Christopher Culy (Culy 1985) to come up with a proof that language generating word-formation structures in Bambara (i.e. language over the set of morphemes) is not context-free. However, in the context-freeness dispute this argument is weaker because the generative syntax theory (under which the problem was formulated) assumes that the vocabulary (all possible word structures in the language) is already given. It is therefore of no interest to those preoccupied with sentence structures or parser constructors.

Culy combines two word formation constructions from Bambara to make his case. In first, the noun is duplicated to create a non-definite structure. Two identical nouns are separated by the morpheme *o*, giving N *o* N, which translates into "whatever N" or "whichever N."

(12) wulu o wulu
dog dog
"whichever dog"

(13) malo o malo

rice rice
"whichever rice"

(14) *wulu o malo
dog rice

The above examples show that on both sides of *o* there must be the same noun, other configurations must be dismissed as incorrect.[2]

The other interesting structure in Bambara is an agentive structure N + TV + *la*, which translates into "*one who TVs Ns*".

Consider the following examples:

(15) wulu + nyini + la = wulunyinina
dog search for
"one who searches for dogs" i.e. "dog searcher"

(16) wulu + filé + la = wulufiléla
dog dog watch
dog "one who watches dogs" i.e. "dog watcher"

(17) malo + nyini + la = malonyinina
dog rice search for
dog "one who searches for rice" i.e. "rice searcher"

(18) malo + filé + la = malofiléla
dog rice watch
dog "one who watches rice" i.e. "rice watcher"

Words in (15) and (17) end with *na*, not with *la*, because some sound clusters in Bambara change *l* to *n*, but this morphological phenomenon is irrelevant to the argument.

Agentive structure is recursive, which means that produced words produced can in turn function as its arguments:

(19) wulunyinina + nyini + la = wulunyinina nyinina
dog searcher search for
"one who searches for dog searchers"

(20) wulufiléla + nyini + la = wulufilélanyinina

[2]Generally, reduplication frequently occurs in morphology of many languages (both in word formation and flection). The above is an example of full reduplication (one repeats the whole word, as opposed to partial reduplication, where one repeats e.g. a morpheme). In Indo-European languages full reduplication doesn't occur, but elsewhere it is quite common and serves various purposes.

dog watcher search for
"one who searches for dog watchers"

Nouns formed in the second structure can be then embedded in the first structure:

(21) wulunyinina o wulunyinina
dog searcher dog searcher
"whichever dog searcher"

(22) wulunyininanyinina o wulunyininanyinina
one who searches for one who searches for
dog searchers dog searchers
"whoever searches for dog searches"

And so forth...

Thus, we arrive at a structure similar to the one explored by Shieber in his Schwyzertüütsch argument. Let B be Bambara vocabulary (a complete set of words, and by extension a set of morpheme strings). Let R be the following set:

$$R = \{\text{wulu(filéla)}^h\text{(nyinina)}^i \quad \text{o} \quad \text{wulu(filéla)}^j\text{(nyinina)}^k\text{:}$$

$$h,\, i,\, j,\, k \geqslant 1\}$$

Intersection of B and R produces the following:

$$B\text{'} = B \cap \text{r} = \text{wulu(filéla)}^m\text{(nyinina)}^n \quad \text{o} \quad \text{wulu(filéla)}^m\text{(nyinina)}^n\text{:}$$

$$m,\, n \geqslant 1\}$$

B' has the general from of $\{a^m b^n a^m b^n\text{: } m,\ n \geqslant 1\}$, which makes it a context-sensitive language. Context-free languages are closed under intersection with regular languages (R being regular), therefore, if B' is not context-free, then neither B can be context-free.

As indicated before, this argument is considered to be weaker, as is concerns morphology rather than syntax. Note, however, that such structures are very rigid in terms of word order, while syntax structures based on case requirements permit a more liberal approach, as, traditionally, word order in inflectional languages is more free.

There is another reason tohave a closer look at Culy's argument as he identifies an interesting problem: in which category under Chomsky's

hierarchy one should classify not only syntax of natural languages, but also other linguistic subsystems. In a brief answer to that question we should first note that subsystems have different complexity. The lowest level, phonetics, is undeniably the simplest subsystem of them all. Ever since the emergence of modern linguistics, phonetics has occupied a separate place within the field. This is because it focuses on a relatively small and finite number of units, making the calculation, from Culy's point of view, the least problematic. The next level is morphology: inflection and word formation. In Polish, automatic inflectional analysis is performed via finite-state machines (i.e. regular grammars), a practical and effective solution to the problem. Derivative (word-formation) analysis in Polish has so far made little progress, but there is nothing to indicate that it would be of greater complexity than inflectional analysis. Another linguistic subsystem, syntax, is explored in the greater part of this paper. Undoubtedly, syntax analysis would require at least the power enabled by context-free grammars. Some arguments presented in this paper show that natural language structures are too complex for context-free grammars. Finally, semantics: this level seems the most complex of all, but the level of complexity remains difficult to estimate. It seems interesting (but not entirely surprising) that subsequent levels of linguistic systems show increasing complexity.

7. SUMMARY

The paper has explored the most popular arguments against context-freeness of natural languages. It is interesting to note that for the greater part of the 50 years since formulation of this problem it has been tacitly assumed, without really demonstrating it, that natural languages require power that only context-sensitive languages can provide. However, when the matter is attended to with due care, it suddenly appears that this perception is far from self-evident. Further, the strongest arguments supporting the case are derived from rather exotic languages. Take Shieber's argument, which bases itself on a language that has almost no presence in writing and exists exclusively in its spoken variation. Therefore, even if, generally, natural languages require the power of context-sensitive grammars, this covers linguistic phenomena occurring rather infrequently, which at the end of the day makes the problem negligible in practical applications. As it is, context-sensitiveness in languages is rather rare — over the years quite a large group of linguists and philosophers tried to find it, but so far the results have been modest to say the least. This would mean that it is a rather undesired phenomenon — perhaps due to difficulties that our brains

experience while processing such structures.

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Andrzej Zaporowski

THICK DESCRIPTION AND THE CRISIS OF REPRESENTATION – AN ANTHROPOLOGICAL STUDY

Originally published as "Opis zagęszczony a kryzys przedstawienia – przypadek antropologiczny," Studia Semiotyczne 27 (2010), 167–176. Translated by Rafał Jantarski.

In 1986 two American cultural anthropologists, George E. Marcus and M. J. Fisher, published *Anthropology as Cultural Critique. An experimental moment in the human sciences* where they reflected on the discipline as it presented itself in the penultimate decade of the 20^{th} century. It appears, they argued, that the field was experiencing a crisis of representation that causes unsettling troubles with narrative depiction of the cultural reality. Empirically driven humanities (including cultural anthropology) apply "abstract, generalizing frameworks" with specific "paradigmatic style," which results in depicting the said reality in an incomplete manner. The problem was, they said, that "macro" level of generalizing concepts and "micro" level of cultural phenomena were incommensurate.

For the authors, the epitome of the style in question was the post-war sociology of Talcott Parsons, the prevailing force of American social thought until as late as the 60's. (One may similarly judge earlier theories of Herbert Spencer or Karl Marx, or contemporary structuralism). Since it had failed to accommodate real-life events, the model was exposed to criticism. In the 70's and 80's it was irony which served as a tool to dismantle the dominant system. Marcus and Fischer suggested that it was not for the first time in history that this specific approach had emerged in the humanities. It is rather of cyclic, or, better still, spiral character (i.e. the ironist is positioned further up than his ironic predecessor). These two decades thus

bear resemblance to the 20's and 30's when the great theories of liberalism, socialism and Marxism found themselves under heavy critique. Works of encyclopaedic structure were replaced by essays, pieces documenting varying social experiences, fragmentary studies, or even surrealistic experiments.

As the post-war USA took the reins of the global economy, one could sense a demand for equally overarching and synthetic social theory that would bring answers to crucial issues in sociology, anthropology, psychology, politics and economy. One sought to provide a complete abstract model of social systems and its linkages with culture and identity. The 60's witnessed a decline in those endeavours, since, as it was touched upon above, it could not have done justice to complex, multi-dimensional and fragmented phenomena of social change in America and elsewhere. "The current period, like the 1920s and 1930s before it, is thus one of acute awareness of the limits of our conceptual systems as systems" (Marcus, Fisher 1986: 12).

This comparison is for the above-quoted American anthropologists only a point of departure; inspired by *Metahistory*, an influential book of Hayden White published in 1973, they further explore the book's narrative on changes within nineteenth century European history (or historiography) and social theory to map out the way to follow their own field of study in the century to come. "Nineteenth-century historical writing, according to White, began and ended in an ironic mode. Irony is unsettling: it is a self-conscious mode that senses failure of all sophisticated conceptualizations; stylistically, it employs rhetorical devices that signal real or feigned disbelief on the part of the author toward the truth of his own statements; it often centers on the recognition of the problematic nature of language, the potential foolishness of all linguistic characterizations of reality; and so it revels — or wallows- in satirical techniques." (Marcus, Fisher 1986: 13).

Early nineteenth-century irony is, however, different from the irony practiced later in the age (remember its spiral character). In this period, historians and social theorists employed three paradigmatic representations of historical process to purify the representation marred by irony — Romance, Tragedy and Comedy. The first found its exponent in James Frazer, British ethnologist envisaging Reason on a quest to battle superstitions, much like Saint George fighting his dragons. Then tragedy came in the form of Marx and class conflict, derived from his earlier explorations on the alienation of human labour. Finally, the figure of Comedy inhabits the idea of social solidarity professed by Emile Durkheim. Contrary to Tragedy, Comedy allows us to recognise a momentary triumph and reconciliation, the role of festivities and rituals that bring competitors together. If we were to follow

White, the nineteenth-century historiography witnesses the transition from Romance to Tragedy, and from there to Comedy, ending (as the century draws to the close) in a deeply ironic mode. Works of Benedetto Croce and Friedrich Nietzsche are here exemplary.

The latter plays a crucial role in this paper; however, before we proceed further, let us first follow the thread we have already started to investigate. Marcus and Fischer suggest that in the 70's and 80's the ironic mode is rekindled, thus equipping those examining social life with a tool for distancing themselves from theories closed in uniforming universals. "The only way to an accurate view and confident knowledge of the world is through a sophisticated epistemology that takes full account of intractable contradiction, paradox, irony, and uncertainty in the explanation of human activities. This seems to be the spirit of the developing responses across disciplines to what we described as a contemporary crisis of representation" (Marcus, Fisher 1986: 14-15). In this context, American scholars turn to Clifford Geertz, who in the *Blurred Genres* advocates a specific strategy for the on-going exchange of concepts and ideas between the disciplines. This would serve the purpose of refreshing and redefining the field's theoretical baggage, releasing it from abstract entities, too stiff and incongruent with the ever-fluctuating reality. Geertz earned praise especially for his pioneering anthropological method that employed certain symbols or representations to discover intelligible (cultural) patterns of thinking (take note, this strategy resembles the romantic move). On the other hand, Geertz, to quote the authors, asked questions on the validity of "'scientific' objectivity" (Marcus, Fisher 1986: 14). In this way, Geertz's interpretive anthropology (being a discipline of semiotic origins) is utilized by Marcus and Fischer as a contemporary point of reference for handling the crisis of representation troubling the age.[1] I shall elaborate on this topic further on, but let me for now carry on with the analysis of the ideas developed by the American scholars.

Irony seems to be a flywheel of changes made to modes of representation of (social) reality. It pervades the 70's and 80's in their abandoning of uniform theory in pursuit of capturing the context of cultural phenomena, be it made from a political or historical perspective. Marcus and Fischer particularly underscore "a matter of representing in a narrative form social

[1]By the way, Marcus and Fischer offer two techniques of cultural critique to remedy the crisis of representation: the epistemological critique and cross-cultural juxtaposition. I shall not pursue this topic here as it falls outside the main focus of my paper.

and cultural realities" (Marcus, Fisher 1986: 15). This idea, hermeneutic in its core, indicates the long way anthropology (ethnology) has come since its origins in nineteenth-century modernity, whether we trace its roots in geography or history (Europe), or in biology (America). Through a chain of internal transformations, authors argue, the discipline fulfils or is set to fulfil the task of cultural critique – eventually becoming a field of studies conscious of the environment it operates in, capable of redefining its research objectives. One may venture to ask where it stands today, years after the publication of the book (being one of the major texts of the discipline in the 80's). As it is not the goal of this paper, we shall not seek to answer that question. And what, precisely, is the goal?

Upon proclaiming the crisis of representation, Marcus and Fischer point to the key role played by Geertz in the process of redefining the methods of anthropological study. I would like to follow this thread by examining the means applied to depict cultural reality. For here arises a problem of critical importance, although never considered by the authors in the part of the book discussed. The problem is one of text thickness — a narrative tool used by Geertz elsewhere. I am aware, however, that in order to both adopt my own perspective and closely follow the narrative on historical changes presented by Marcus and Fischer I must precede the discussion on the issue of thickness with some remarks regarding the crisis of representation that springs to my mind when I confront the topic at hand with Nietzsche. Let me first refer to his text (curiously absent in the analysis carried out by American writers) and then revisit Geertz position with Nietzsche's reading in mind.

Some hundred years before Marcus and Fischer published their study, Nietzsche wrote an essay entitled *On Truth and Lies in a Nonmoral Sense*. It advances a critique of epistemology and in this regard sits uneasily with American anthropologists' understanding of the German philosopher. This is not to say that his essay does not respond to the challenge identified by the authors of *Anthropology as Cultural Critique*. First, it may be of use to ask how Nietzsche understands truth. It is "a mobile army of metaphors, metonyms, and anthropomorphisms — in short, a sum of human relations which have been enhanced, transposed, and embellished poetically and rhetorically, and which after long use seem firm, canonical, and obligatory to people: truths are illusions about which one has forgotten that this is what they are; metaphors which are worn out and without sensuous power; coins which have lost their pictures and now matter only as metal, no longer as coins (Nietzsche 1976: 46-47). Whereas his claim pertaining to a non-moral

context of truth and lies is fairly clear, it may be worthy to elucidate the core of Nietzsche's view on the cognitive context of such a defined state of affairs.

Why does he insist on metaphor as the constructive force of the world picture? The German philosopher exploits here the theme of the unavoidable imperfection of human perception and subsequent sharing with results thereof with other members of the community. Nietzsche's account of the double metaphorisation leading to a lie goes as follows: "nerve stimulus" (Nietzsche 1976: 46) is a human reaction to anything occurring in the world. (Today we would speak of sensory receptor field(s) being subject to stimuli, this clarification, however, is not fundamental to our discussion). The human mind then transforms this stimulus into an image. This is what Nietzsche calls the first metaphor. An image created in such a way is further transformed into sound, giving birth to the second metaphor. Let us remark here that the sound represents a concept, it is thus a product created by abstracting what is common (property or relation) from what is singular. For Nietzsche, metaphor is a relation (1) binding two incommensurable worlds, where (2) the world emerging later, i.e. the *residuum* of the transformed, is a disfigured reflection of the world that surfaced earlier.

Let us examine those two cases. In the context of (1), one may argue that the said transformations indicate that what we witness is transition from the physical world (nerve stimulus) towards the mental world (mind image), and then again to the physical world (sound). Why would those two worlds, physical and mental, be incommensurate? Certainly we deal here with the inherited Cartesian problem, but Nietzsche, following Kant, suggests that the human being has no (cognitive) access to noumena. She may only "perceive" things in an indirect way — through mental images, or physical sounds (already mediated by the former[2]). Since there is no master relation of conformity superior to both worlds, she can only "see" one through the prism of the other. Which brings us to (2). The transformation in question is of causal character, but it is not causality in the exact sense of the word. One may go on to say that it is the nerve stimulus that is the

[2]One may add that reading of Kant may produce conclusions different from what is offered by Nietzsche. In this vein, Nietzsche is criticised by Heinrich Rickert, the German neo-Kantist of the Baden School. Two alternative perspectives of Kant's legacy are also put in the spotlight by Hilary Putnam, who seems to follow Rickert in what is called internal realism, or realism with a human face (or realism with a lowercase 'r', as put by Jerzy Kmita, a Polish scholar working in cultural studies). In this sense, Nietzsche may be treated as a "father" of postmodernism (or poststructuralism), which chimes with the interpretation favoured by Marcus and Fischer.

cause for occurrence of the image in the mind, but Nietzsche suggests here that what in fact comes into play is a relation of semblance (sealed in the form of illusion). If one was tempted to define the relation between the thing and the concept arguably corresponding to the former, it would occur that the concept "originates through our equating of what is unequal" (Nietzsche 1976: 46).

One can provide one example to support the case. Imagine one individual, John, looking at the table. Nerve stimulus is transformed in his mind into the image, and further into the sound representing the concept of the table. John can thus communicate the word "table" to his friend, Peter, who has not as yet seen this particular table. The question is: did Peter, upon hearing the word "table," imagine the table perceived by John? The answer must be "no." This, precisely, is Nietzsche's lie of words. Obviously, the German philosopher resorts to a shortcut that equates sound with a concept (concept does not belong to the physical world; moreover, one should differentiate between the concept and conception[3]), but it is interesting to follow his train of thought suggesting that there is a negative tone in the said incommensurability.

It resonates in two Nietzschean figures: a man of intuition and a man of reason. While interacting with the world, the first uses only the first metaphor, while the other both. What is the outcome? Equally dramatic for both. Whereas the man of intuition is arrested by mental images of things and is thus unreflectingly exposed to inconstancy and momentariness of the world, the man of reason shuts himself in stiff concepts and is therefore unable to experience the world of singular things. Nietzsche delivers here a truly dramatic conclusion. If people communicate through sounds, which represent concepts, therefore humans are inescapably forced to lie when trying to use them to render the world of things. It appears that the author of *On Truth and Lies...* testifies to a permanent crisis of representation.

If we were to settle with this conclusion, there would be no reason to await any positive answer from Marcus and Fischer who resolved to face the crisis of representation challenging the humanities (taken especially hard in anthropology). Let us take a closer look at one of the main characters in the story, Geertz, in hope to find this much-sought answer. More precisely, I shall turn to Geertz's essay *Thick Description: Toward an Interpretive Theory of Culture*. Its reading lets us grasp characteristic elements of anthropology as semiotic discipline that studies culture as webs of significance.[4] What is

[3]The problem was considered already by Plato and Descartes. It was also tackled by, *inter alia*, Kazimierz Twardowski.

[4]In his definition of culture, Geertz follows Max Weber.

significant is unearthed by the interpretation of human activity, being by its very nature not reflexive (albeit, as I show later, the observer may here find himself trapped) but intentional.

One method used in anthropological studies is ethnography, understood as giving meaning (or maybe intentions) to human activity. We cannot forget that the task before the anthropologist is twofold. First, when carrying out a field study, she encounters a potentially alien set of one's activities. This is when one tries to decode meanings. Secondly however, she produces an account of this endeavour for her likes. So ethnography consists in an actual contact with the alien (contrary to literature studies or history, anthropology seeks to understand activity experienced in a real-life spatiotemporal set-up) and delivering the report on this activity. According to Geertz, ethnography is defined by thick description. How does it work?

Geertz borrows the idea from Gilbert Ryle,[5] the exponent of British analytical philosophy. Thick description is an accumulation of meanings hidden behind the activity that can be recorded by body movements. Ryle gives the following example. Imagine there is a boy, let it be John that we have already met. John contracts the eyelid. Now his friend, Peter, appears and does that too. And then comes their buddy, Tom, who does the same. If we were to provide a description based on what we see, we would produce the same report in the case of John, Peter, Tom, and any other boy. This sort of description Ryle terms "thin," suggesting, as it were, that we record something obvious, simple, explicit. Note there are no questions regarding the cause(s) or motive(s) of the activity. One suggests that the activity, so to say, "speaks" on its own to the receiver.

But the scholar may investigate its causes (or motives). And so John may have a nervous tic, Peter "gives the eye," Tom parodies one of them. Of course, the difference between the report on John, and Peter or Tom lies in the application of different vocabularies, respectively physical and mental.[6] Let us remark that there may be some misunderstanding afoot. For example, a nervous tic may be interpreted as an intentional activity, but one may also construe it differently.[7] Mistakes notwithstanding, there exists one common element — namely the search for factors independent from but initiating

[5]Ryle discussed thick description in his essays (Ryle 1971a; Ryle 1971b).

[6]Physical vocabulary defines the man as an (biological) adaptive system. Mental vocabulary sees her as a free being that grounds its acts in propositional attitude (which includes intentions). I discuss this elsewhere.

[7]Of course, while considering ethnography we generally mean intentional (not reflexive) activity, but it is secondary to the presented argument.

what is being ("thinly") described. Building on the case stated by Ryle, Geertz uses the category of thick description to analyse multidimensional aspects of cultural reality. For if asked what is the purpose of the said description, he would respond that it gives account of "a stratified hierarchy of meaningful structures in terms of which twitches, winks, fake-winks, parodies, rehearsals of parodies are produced, perceived, and interpreted, and without which they would not... in fact exist, no matter what anyone did or didn't do with his eyelids" (Geertz 1973: 7).

Geertz embarks on a highly ambitious endeavour. He is left dissatisfied by descriptions or explanations of human behaviour that would fit frameworks constructed by humanists, who since the Enlightenment modelled their undertakings on natural sciences and their stiff, generalizing hypotheses (which is part of the reason why one endures the crisis of representation today). For this pioneer of the subjective approach to culture it is human activity itself that lends meanings (or maybe even propositional attitude). This approach frees them from the stiff girdle of theory, instead, they are allowed to be imposed — as individual products — by acting subjects. Attempts to understand the (essentially) symbolic character of the activity of indigenous inhabitants of Bali or Morocco (studied in due time by Geertz himself) turns into the opportunity to reiterate the understanding of ourselves who, by interpreting others, gradually come to do the same with their own activities. But does not Geertz fall into the trap left by Nietzsche? Is not thick description, allowing us to access ever-deeper layers of meanings (and intentions), by nature burdened by lie (thus prolonging the crisis of representation)?

It is not, and for one reason. Geertz himself would never deny that thick description cannot penetrate the web of significance completely or perfectly. For understanding is meant as an infinite process. One may recall here the idea of truth as non-secrecy. Undoubtedly, this solves nothing, since one may assume that getting to what is significant is of processual character but nevertheless remain arrested by the illusion that one arrived somewhere. Something else is at stake here, namely the revision of one's own description of somebody else's activity. In other words, it is the capability of distancing from the image constructed hitherto. This is precisely the moment where the power of irony comes into play – irony that even Nietzsche cannot escape. For it is fair to ask whether the condition, on which the absolute conclusion (that words lie out of necessity) holds, is always met. Let us assume that two individuals share common experiences, their agreement on certain fragments of the world may be highly improbable, but still possible. Further, if words

are by nature burdened by lie, why do we accept this currency when provided by Nietzsche himself?[8] It is the possibility of revision of the results produced by the (thick) description that gives opportunity to receive feedback that we are on one of the paths leading to meanings and intentions, if maybe never finally reaching them.

And so we arrive at another issue related to what has been said above, namely the opposition of thin description and thick description, offered by Ryle and adopted by Geertz. The question is: where lies the value of thin description? What information do we gain when it is applied? I venture to say that, detached from thick description, thin description says nothing, is description in name only. Why? Let us resort again to the eyelid example. When I hear that John (or any other boy) made such a gesture, how do I understand what happened? Obviously, I am capable of completing certain operations, mental or formal associations. I know that under the eyelid there are muscles that can contract if ordered so by the nervous system, and that such contractions may be reflexive or intentional. It is a wholly different matter whether these (and other) associations are correct; it does not, however, change the fact that failing to make associations renders it impossible to understand the given activity. (I do not consider here any pre-understanding, or mystical understanding, as it is not possible to give any description of it).

Owing to this, I believe it is futile to separate thin description as something intelligible and independent that perfectly stands on its own, without resorting to other descriptions of factors generating the examined activity. I suggest, therefore, that the researcher never entirely deals with thin description, but that it rather must always be thick in the first place. What we need is an awareness that description is gradable. In this vein, writing about eyelid contraction would contain less thickness than writing about the parodying of one's "making the eye." This take on the issue allows us to eliminate the ostensible entity and preserve the idea of description that does justice to the holistic nature of language, and we can also treat understanding as a process. And one more thing: all that was said here testifies that a research activity cannot escape the crisis of representation. But this is not to say that crisis must be permanent. A combination of irony (or other forms of distance or revision) and gradation of a description's thickness allows the scholar to confront anytime descriptions produced in various periods of time thus making the crisis of representation manageable (or at least making us aware

[8]See *supra 3*. It may be of use to mention here Jacques Derrida's critique of Edmund Husserl.

that it is an ever-present threat). Knowing, however, that too large a distance triggers unwelcome consequences (Nietzsche's example seems to deliver a satisfying account on the matter), the scholar should never deny the value of the thick description, however little it may be. So, what is there to avoid in a scholar's research (of cultural reality)? She should navigate between the Scylla of crisis of representation and Charybdis of thick description, bearing at the same time in mind that it rarely happens that one accomplishes this feat unscathed. But that's another story.

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Grażyna Dydel-Wróblewska

PERSONAL COMMITMENT IN ACADEMIC WRITING

Originally published as "Język do celów akademickich. Unikanie osobistego zaangażowania w tekstach naukowych," Studia Semiotyczne 27 (2010), 177–184. Translated by Grażyna Dydel-Wróblewska.

Hedging

Being informative without becoming persuasive when writing for academic purposes seems to be a difficult task connected with the use of natural language as the language of science.

According to Master until a fact is absolutely proven, scientists can only make sophisticated guesses based on their research. When reporting the results of such research, scientific writers must be careful to indicate whether their results are proven facts or probable facts. They do this by means of **hedging, the qualification of the truth of a statement**. Hedging is accomplished by means of 1) modals or 2) a statement of probability with a subordinate clause. (Master 2004: 240).

White and McGovern in *Writing* provide a list of **ways of avoiding personal commitment (hedging)**. Discussing the nature of academic writing[1] they state that one can hedge by using:

- non-personal nouns or noun phrases
- passive verbs
- indirect statements: *X appears to be Y*

[1]In academic argument, it is common to be impersonal, even when the writer is personally involved in the argument. Impersonality is a way of putting a distance between the writer and the argument. (White and McGovern 1994: 60).

- soft proposals: *may*

- attitudinal signals such as*apparently, unexpectedly, surprisingly, no doubt*,[2] etc. and by avoiding the use of verbs like think, believe.

Furthermore, the authors maintain that using attitudinal signals such as certainly, undoubtedly, obviously, in my view, etc. we show personal commitment (White and McGovern 1994: 61).

Firstly, the reader is provided with two different definitions of hedging. For Master it is specifying the qualification of the truth of a statement, in other words evaluating the degree of probability of a given assertion. White and McGovern identify hedging as the ways of avoiding personal commitment. Secondly, if the sentences 1 and 2 are based on the conducted research, there is little difference in the meaning of the two sentences, though the first one would be classified as personal and the second as impersonal writing style.

1. *Undoubtedly, X is an efficient method of object recognition.*

2. *Apparently, X is an efficient method of object recognition.*

From a logical point of view both *1* and *2* state that: *X is an efficient method of object recognition* (the statement may be verified) and at the same time express the speakers believe that the proposition *X is an efficient method of object recognition* is true,[3] (1), or may be true[4] (2). Finally, the structure of 3 and 4 seems to be fairly similar.

3 *It seems to me that p.*

4 *It seems that p.*

However, sentence *3* with the personal pronoun would be classified as personal, while *4* as impersonal style.

Thus, to deal with the problem of hedging and to discuss various types of personal commitment in academic writing, the following factors are taken into consideration:

- Vocabulary: token-reflective words, and words with emotional impact

[2]Putting *no doubt* on this list seems to be an editorial error.
[3]E.g. when the research was done many times in various centres.
[4]When the research was conducted only once.

- Presuppositions

- Self-referential statements and the difference between metalanguage and language. *I think, In my opinion, I am sure, It must /may /might /have been very difficult, No doubt, etc.*

Tarskis semantic definition of truth based on classical theory of truth and two-valued logic is adopted. P is true if, and only if, p. For example: X is an efficient method of object recognition is true if, and only if X is an efficient method of object recognition. In other words, if a given language is L, then the definition should be formulated in another language M, known as the metalanguage (Tarski 1952).

Furthermore, it is assumed that the speaker/writer has the knowledge of the presented or discussed subject and wants to tell the truth (Olech 2007), i.e. that he/she wants to inform, not to persuade or manipulate.

It is also assumed that the meaning of the word is its connotation and proposition is the connotation of sentence stating and denoting. (Ajdukiewicz 1979: 81).

Choice of Words

Personal pronouns such as *I*, *we* and *you* are token-reflective words and their meaning changes depending on by whom, when, and where they are used. As stated by White and McGovern they should be avoided. Nevertheless, the advice is rather difficult to follow because not all token-reflective expressions are so easy as personal pronouns to identify. The concept of *sustainable development* introduced by Ms Brundtland in 1987, used in environmental science and defined as a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Ryden 2003: 767) or as a growth that satisfies to-days needs without jeopardizing the needs of future generations (Korshuk 2003: 17) should be classified as token-reflective. Even for a given place and time, e.g. the Rozpuda Valley 2008, depending on who expresses the opinion, a certain project may or may not be sustainable as the connotation of the expressions *present needs* and *future needs* may be entirely different for various writers.

Words with emotional impact e.g. *mob* for *crowd*, *coterie or gang* for *group or team*, and in Polish *collaboration for cooperation* seem to constitute no problem and they hardly ever appear in the writing of the author wanting to be objective. However, adjectives such as *Polish, German* although seem to be neutral, may have a negative emotional impact particularly in contexts

referring to the World War II e.g. *Nazi-German concentration camps* is politically correct while *Polish concentration camps* (meaning located in Poland occupied by Nazi-Germans) is evidently anti-Polish.

Presuppositions

Presuppositions are very common in natural languages. Any wh-question assumes a certain statement e.g. *Why did the climate change?* states that the climate changed. Question: *How much did average temperature in Poland increase last year?* presupposes that the *average temperature in Poland increased last year.*

B. Russells famous sentence *The present king of France is bold* takes for granted that there is such a person as the present king of France. Therefore, to decide whether it is true or false, it is analysed as a conjunction: *There is such an entity as the present King of France and this entity is bold* (Russell 1967: 270). The same refers to the definite description *Polish concentration camps.*

To avoid giving misleading information resulting in false claims such as the described above, whenever possible, precise descriptions and/or data should be presented. When writing about the quantity of something the exact amount or number of items is preferable. Words like *only, mere, majority* and *minority* may imply false presuppositions that may be challenged by others.

Students doing the test from *Market Leader Test File* were asked to read the text: With around 40 carmakers, the market was crowded. Less than half of these had market shares of over 1% and mark the statement: *Only ten car manufactures have a market share of more than 1%.* as T (true), F (false) or C (cant tell) (Johnson, 2000: 11). 43 students of technology from various faculties at the Technical University of Lodz, all of them at B2 level of CEF, were tested. The answer expected by the author of the test was C. However, the majority of them, i.e. 23, chose the answer F due to the word only, declaring that it was not mentioned in the text that *less than a half* is considered to be *many* or *few.* C was chosen by 17, they maintained that the phrase *less than a half* is inaccurate and was used to avoid giving precise information. T was chosen by the remaining 3 students, their argument was based on the fact that the formula: 10 ¡ 20 is true.

In natural languages it is possible to state a fact and to comment on it in one sentence. The word only when used in a sentence introduces a presupposition that the writer expected more. Thus, the statement: *Only ten cars were sold* is not a simple sentence but a conjunction: *Ten cars were sold*

and I expected/ it was expected/ there would be more. This may explain why so many students chose the answer false. An apparently easy test of reading skills based on true/false questions may be difficult to solve. While reading very quickly students may interpret sentences in various ways depending on the memorised context.

Metalanguage and Language

In academic writing it is often necessary to make comments on the conducted research and/or to generalise to draw conclusions. R.R. Jordan in *Academic Writing* Course, when dealing with generalisations, suggests, like Master, qualifying the statements or hypotheses to make them less definite. (Jordan 1996: 64)

Master gives the following examples of hedging with modals and modal paraphrases: (Master 2004: 240):

Fact	Truth Probability
Cancer is caused by a faulty gene.	
Cancer is caused by a virus.	98-100%
Hedge:	
5. Cancer must be caused by a faulty gene.	
Cancer is certain to be caused by a virus.	80-98%
6. Cancer should be by caused by a faulty gene.	
Cancer is likely to be caused by a virus.	40-70%
7. Cancer may be caused by a faulty gene.	
Cancer is perhaps caused by a virus.	20-40%
8. Cancer might/could be caused by a faulty gene.	
Cancer is possibly caused by a virus.	5-20%

The second way of qualifying and weakening an assertion or generalisation is to subordinate it either by using a that-clause or by a passive-infinitive structure and is illustrated by Master with the following example:

Gasoline fumes cause kidney cancer.
Gasoline fumes are believed to cause kidney cancer.
It is possible that gasoline fumes cause kidney cancer.
There is a slight possibility that gasoline fumes cause kidney cancer
(Master 2004: 242).

In brief, to avoid personal commitment scientific writers should inform the readers about the probability of achieving the same results and to what extent their generalisations are hypothetical.

From a semiotic point of view Whites and McGoverns attitudinal signals introduce self-referential sentences i.e. sentences which state a certain fact and at the same time express speakers attitude evaluating the truth or falsity of the proposition. Hedging with modals or with a subordinate clause proposed by Master and Jordan is also accomplished by self-referential statements. Let us examine the following hypotheses referring to the past event:

9. The drug must have caused a malfunction in the liver.
10. Im sure the drug caused a malfunction in the liver.
11. No doubt, the drug caused a malfunction in the liver.
12. It is possible that the drug caused a malfunction in the liver.
13. I think, the drug caused a malfunction in the liver.
14. The drug probably caused a malfunction in the liver.
15. The drug may/ might have caused a malfunction in the liver.
16. The drug cant have caused a malfunction in the liver.

All the sentences given above i.e. 9 to 16 state *that the drug caused a malfunction in the liver*. In 9, 10 and 11 the speaker declares that the proposition *the drug caused a malfunction in the liver* is true. In 12, 13, 14, 15 it is said that the proposition may be true. In 16, the same proposition *the drug caused a malfunction in the liver* is assumed to be false. Therefore, sentences 9, 10, 11 have the structure *It is very likely that p*; 12-15 *It is likely that p*, and 16 *It is unlikely that p.*

Illustrating the problem of personal commitment, a specialist in EAP1 demonstrates proper ways to make generalisations more precise by qualifying them (Jordan 1996: 62). Since they do not analyse the statements from the psychological point of view, it may be assumed that the presented methods of hedging lead to the use of metalanguage and language in one assertion.

Conclusions

Although objectivity is a very important quality of academic writing, the term hedging has not been properly defined. The problem is reduced to the correct choice of words since Jordan, Master, White and McGovern only enumerate phrases which, in their opinion, allow the avoidance of personal commitment. Their list seems to be too short to describe the objectivity of academic texts thoroughly.

A variety of grammatical structures is used to put a distance between the writer and the argument. Thus, to deal with personal commitment in writing,

four aspects of natural languages should be taken into consideration, namely: token-reflective words, words with emotional impact, presuppositions, and self-referential sentences.

From a logical point of view all the attitudinal signals and other ways of hedging listed by White and McGovern (1994: 71), Jordan (1997: 66-67) and Master (2004: 242) do not reduce our subjectivity. We show personal commitment because statements structured according to the proposed patterns (see sentences 5 to 16) can be rewritten as follows: *it is highly possible that p, it is quite possible that p, it is possible that p, it is remotely possible that p and it is impossible that p.* Although in academic writing the evaluation of conclusions and generalisations is based on research and accurate analysis, it is done by the author and his/her assessment may be subjective. Consequently, it may also be maintained that an impersonal style statement *it seems that p*, is in fact understood as *it seems to the author that p* and is quite similar to personal style *it seems to me that p.*

In conclusion, academic papers should inform accurately, i.e. the problem, input data, research and results should be described very precisely to eliminate false or misleading presuppositions. Semiotic analysis shows that the most efficient method of avoiding personal commitment is to use verifiable sentences allowing the reader to asses conclusions himself/herself. In other words, instead of generalising as in *17* which is classified as an impersonal style:

17. *Apparently, X is an efficient method in medical diagnostics.*

it is better to hedge by stating:

18. *The conducted research shows/The computer simulations show/that X is an efficient method in medical diagnostics.*

In general, academic writers write in an impersonal style. In some cases, however, it is better to use the first person to become more direct and convincing, particularly when there is no or little empirical evidence available.

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COMMUNICATION BEYOND WORDS[1]

Originally published as "Komunikacja poza słowami," Studia Semiotyczne 27 (2010), 185–216. Translated by Małgorzata Szubartowska.

One of the fundamentals of our civilization is the efficient and strictly codified system of linguistic messages, called verbal communication. Yet, there is no doubt that beyond this system there is also something like nonverbal communication.

Tokarz, *Argumentacja, perswazja, manipulacja*

INTRODUCTION

It is no accident that we begin this article with a quotation from Marek Tokarz. His article entitled Komunikacja poza gramatyką [eng. Communication beyond grammar], which was published in the commemorative book in honor of professor Jerzy Pelc W świecie znaków: księga pamiątkowa ku czci profesora Jerzego Pelca (Tokarz 1996), was one of the chief inspirations for *this paper. In his articl*e, Tokarz studied the possibility of achieving communication without syntax. In what follows, we intend to go one ste*p further and analyze the possibility of achieving communication wi*thout verbal means. Let us begin with specifying the term 'nonverbal communication'. According to the common definition, it is a communication which involves giving signs (signals) other than words (Tokarz 2006: 327). Verbal communication is not identified with oral, spoken communication, but with a communication established through words. That is why emitting sounds such as muttering or humming are considered nonverbal messages. On the other hand, sign language and written language are treated as verbal communication.

[1]Kacprzak's contribution was supported by the Bialystok University of Technology grant S/W/1/2014.

A mere confirmation that nonverbal communication exists is by no means a revolutionary thesis. The importance of nonverbal signs for natural communication is a well-known fact in psychology and advertising, as well as, to some extent, in informal logic or communication theories. It would seem that there is no need to restate some of these theses in this article. However, the notion of nonverbal communication is almost entirely unfamiliar to formal approaches (perhaps with the exception of Tokarz who takes into consideration some of these aspects). The communication studied in formal systems either has a verbal character or is reduced to or identified with verbal communication. According to such systems, locutions which are well-formed syntactically are represented by verbal signs (sentences).

Let us imagine an action movie in which criminals kidnap a wealthy man, lock him in a basement and try to make him reveal where he keeps his money. What kind of arguments do we expect them to use? Verbal? If the criminals are truly 'serious', we will probably have a scene where they tie down the victim and torture him. Is it the same argument to say "I'll punch you" and to actually deliver the punch? Does it really make a difference to the criminals whether they perform the verbal or the nonverbal action? Finally, is there a point in distinguishing these two types of messages in the communication model? The aim of this article is to discuss two issues around nonverbal communication. Firstly, we intend to examine if nonverbal signs can be reduced to their verbal equivalents. Secondly, we plan to answer the question of how to shape nonverbal communication.

The article has a three-part structure. In chapter one we will be giving an overview of various theories on nonverbal communication, which can be found in contemporary literature. In chapter two we will proceed to discuss the problem of bringing nonverbal messages down to their verbal equivalents. Finally, in chapter three we will be presenting an example of a formal model of communication, which enables the representation of nonverbal acts of communication.

1. CONTEMPORARY RESEARCH IN NONVERBAL COMMUNICATION

We shall begin by outlining the background for our considerations, that is, by putting together those theories which 'notice' the existence of nonverbal communication. First, we shall discuss two concepts derived from informal logic. The first one is the theory of coalescent argumentation proposed by Michael Gilbert (part 1.1). The acknowledgment of the speakers' attitudes, such as their emotions or intuitions, can be interpreted as an emphasis

on factors w[2]hich exceed the mere use of words during message exchange. Another interesting idea is the theory of visual argumentation developed by Leo Groarke (part 1.2). In this case, the nonverbal quality is expressed by the use of image as either a premise or a conclusion. Finally, we will discuss certain concepts from psychology and communication theory, which examine such nonverbal symptoms of social interactions as facial expressions, gesticulation or clothing (part 1.3).

1.1 COALESCENT ARGUMENTATION (MICHAEL GILBERT)

In his works (Gilbert 1994, 1995, 1997) Michael Gilbert introduces the concept of coalescent communication. The goal of such communication is to produce effective argumentation, which is not focused on attacking the opponent's arguments, but on establishing agreement by analyzing points of disagreement and consequently, by identifying differences and similarities in the reasoning of the conflicted parties. Coalescent argumentation involves bringing together two disparate claims by uncovering the crucial connection between the content of a message and its sender's position, that is, his beliefs, feelings, emotions, values and needs. On such a basis, dispute partners are able to identify what they share and what differs between them. This knowledge is used to effect coalescence, a merging of divergent positions.

Arguments are often assumed to be claims, that is, messages which convey a certain thesis. This theory, however, assumes that such claims are in fact icons for positions adopted by the participants and that the essence of the argument is much more complex and profound than the content of the message. An argument-claim is like the tip of the iceberg — it points to where the problem lies, but it does not embrace its nature, which usually remains concealed. In order to understand somebody's position, you ought to uncover as many aspects directly or indirectly connected with the thesis as possible. Note that arguments very rarely arise over directly expressed claims. What is more important is where the difference in opinions comes from, why somebody thinks this or that and why they hold a particular view. Therefore, in order for persuasion to be successful, one must impact on somebody's entire position. Attacking only the claim will not produce the

[2]Informal logic is one of the contemporary approaches focused on analyzing arguments. It aims to develop tools, criteria and procedures for identifying, analyzing and assessing arguments typical for every-day conversations. Informal logic is particularly interested in arguments found in advertising, political debates, court and social commentary in newspapers, television or the Internet.

desired result. If we concentrate only on the content of the message, we will shift the emphasis towards a different aspect of the conflict, but we will not resolve it. We will be efficient only if we go to the heart of the matter and determine the goals and motivations of our dispute partner. What must be also taken into account is the self-awareness of a dispute's participants, i.e. the fact that they can be either aware or unaware of their every motivation. Some factors, such as fear, concern or uncertainty, may be concealed (they may exist at the subconscious level). The more the opinions differ, the more important it is to uncover those hidden components which influence the opponent's and the proponent's positions.

Gilbert draws on a theory according to which arguments have two levels of goals. The macro level is all about cooperation and maintaining the relationship between the participants. These goals, treated as 'face goals,' are the actual goals of an interaction and they involve attention to role, status and power relationships between people. At the micro level 'strategic' goals are found, referred to as 'dark-side goals.' These goals describe the desired outcome, which was the stimulus for the argumentative encounter. For example, when a student asks his professor for a meeting to discuss an essay, his face goal is to improve his knowledge and to establish a working relationship with the professor, while he has as a strategic goal of having his grade raised. The awareness that both parties in a dispute have face and strategic goals is the basic ingredient of coalescent argumentation. It is vital to establish the participants' expectations, which allows for the possibility of satisfying them. Therefore, the main function of the process of argumentation is uncovering and determining the goals and needs of the arguers. Thus, the first stage of coalescent argumentation is to answer the question "Why are we arguing?." If we do not know what our opponent expects, what his beliefs are, what he is feeling, then it is difficult for us to satisfy his needs and consequently, to bring him around to our point of view throughout argumentation. Hence, determining these items is the key to successful argumentative communication.

The second stage of coalescent argumentation is an attempt to answer the question "What are we arguing about?" by exploring the participants' positions. Understanding somebody's position requires far more than simply knowing the content of a message and its immediate supporting reasons. What is crucial is to know why somebody holds that particular position and what he might think or feel. This means that one must not only collect the facts that support the claim, but also establish what values and emotions go along with it. Obviously, uncovering a position is much more difficult than

simply hearing a claim. It includes exploring all aspects of an argumentation, that is, the logical, emotional, visceral (situation) and kisceral (intuition) aspects of a view. Beliefs derive from many sources, only one of which is the logical. In order to go beyond a simple examination of the content of a claim, i.e. to comprehend somebody's entire position, one needs to explore all of these sources and the connections between them. As we already mentioned, arguments may be based on logic, emotions, feelings, physicality or intuition. Logical arguments are those which are grounded in the laws and rules of logic. For example: Henry states "John is in that room." "Why?", Anne asks. "John entered through the door on the right or through that on the left — both lead to that room." "John must be inside then," Anne confirmed. We have just followed a rule based on the formula: if A or B and if A then C and if B then C, therefore C. However, in disputes between humans the arguers' emotions are as important a factor as logical arguments. Let us take a look at the following situation: when talking with Professor Nowak, Susannah is canvassing for a good grade. "If I do not get a good grade, I will not receive a scholarship. I am in a very bad financial situation and unless I get this scholarship I will be forced to drop out," says the teary-eyed student and passes her record book to the professor, her hands shaking. She is hoping to succeed by emphasizing how important it is for her to have the grade raised. She achieves that mainly through body language. Another set of arguments refers to the circumstances of a dispute. Let us consider, as an example, the following: John is making shrimps for dinner and Mary is trying to convince him to add some curry to the dish. John doubts that it will improve the flavor. Mary is not going to use logical or any other verbal arguments to explain why adding curry powder is the right thing to do. Instead, she walks up to the cupboard and starts searching for the spice. It turns out that the spice is on the top shelf, so Mary climbs on a stool and rummages through the cupboard making a lot of noise and fuss. Finally, she passes the curry to John, satisfaction spreading all over her face, and says: "Are you sure you don't need some curry?" "Fine", says John, resigned. The effort that Mary had put into finding the spice convinced John to change his original plan. Mary engaged in a physical activity that ensured her success. Notice that what convinced John was not a verbal description of why it was worth adding curry, but Mary's dedication and involvement. The last set of arguments is connected with intuition. Intuitions play an important role in many argumentations, even though they are often dismissed as silly and illogical. These arguments usually concern religion, spirituality, mysticism etc. The following dialogue may serve as a good illustration for these kinds

of arguments: ”Did you buy that house?”, Jake asked. ”No. When I went to see it, I suddenly felt this strange fear,” Sebastian answered. ”But it was such a good offer!”, said Jake amazed. ”So what? It made me feel ill at ease, I wouldn't have the courage to move in there,” Sebastian explained. It is hard to account for Jake's behavior by referring to ”logic.” His fear was unjustified. And yet, he decided not to buy the house despite favorable terms of agreement. In practice, arguments which are based on intuition are often irrational, but very effective nonetheless. Obviously, there is a wide group of nonverbal arguments, which facilitate achieving the desired outcome. They refer to all the factors which affect people's beliefs and behaviors.

The third stage of coalescent argumentation is to find the answer to the question ”How can we come to an agreement?” The word 'coalescent' means resulting from a joining of different elements. Obviously, it is difficult to merge conflicting positions into one. For that reason, we should speak of the degree of coalescence, that is, the extent to which disparate views can be reconciled. The degree to which coalescence may be attained is a function of the degree to which we can answer the question ”Why are we arguing?” It is obvious that revealing the full position of both arguers, all of their motivations, feelings, beliefs etc. is not always possible. The key is empathy, that is, the ability to put oneself in other people's position. Empathy allows us to predict the goals and needs of a person who holds a particular position and consequently to discover their true motivation. What is also crucial is the empathic awareness that certain beliefs, attitudes, situations and intuitions are common to both dispute partners. That is why some shared knowledge about each position must be established — why it is held, what it means to its holder, how important it is for the person's worldview and which needs it fulfills. It is indeed difficult to attain coalescence when one person finds a particular argument irrelevant or incidental, while for the other person the same argument is fundamental. The move towards coalescence requires the participants to first understand each other's beliefs and needs, and then to satisfy, as much as possible, their needs and desires.

1.2 VISUAL ARGUMENTATION

Visual arguments have recently become a hotly debated issue. A theory of such argumentation is developed primarily by Leo Groarke (e.g. 1996a, 1996b, 2002, 2007), as well as by J.A. Blair (1996), D.S. Birdsell (e.g. 1996, 2006), C. Shelley (e.g. 2001, 2003), M. Gilbert (1997) or Ch. Slade (2002).

A visual argument can be defined as a set of premises and a conclusion, which are wholly or partially expressed by visual (nonverbal) means (Groarke

2007: 535). Not all arguments which are accompanied by visual images are considered visual arguments, since an image can perform a different function than leading to conclusions — it can be purely aesthetic or function as a 'visual flag' to attract our attention. Photographs, drawings, logos or documentaries may all be part of visual arguments, but sometimes nonverbal signals may also be accompanied by verbal signs.

In this theory images count as indirect speech acts and their interpretation is based on three principles of visual communication: (1) such images can be understood, (2) such images ought to be interpreted in a way that makes sense of the main (both visual and verbal) elements contained in them, (3) such images should be interpreted appropriately to the social, critical, political or aesthetic context in which they occur (Groarke 2002). Knowing the modes of visual meaning can be helpful when it comes to interpreting visual arguments (Shelley 2003, Birdsell, Groarke 2006): (1) *argument flags* are images which are supposed to attract attention to a message, e.g. a picture of a beautiful woman used to advertise cars, (2) *visual demonstrations* are images used to convey information which can be best presented visually, such as colors, shapes or abstract relations e.g. charts presenting election results, (3) visual metaphors are images used to convey information figuratively, e.g. David Siqueiros's painting *Nuestra imagen actual* (*Our present image*) which presents a man with a rock instead of head, (4) visual symbols are images which function as signs standing for the things they represent, e.g. the image of a scull may represent death, (5) visual archetypes are images whose meaning is generally recognized, e.g. Pinocchio's long nose, which began to symbolize lying.

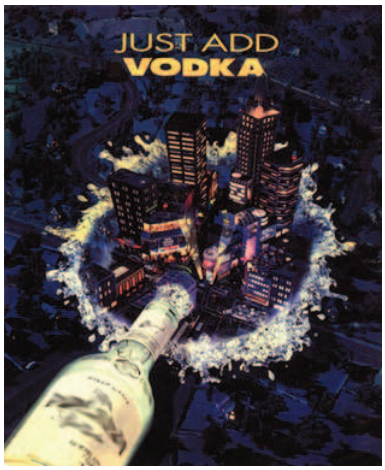

Fig. 1. A vodka advertisement as an instance of a visual argument (Groarke 1996b)

Leo Groarke's primary goal is to advance such a theory of visual argument, which would enable an evaluation of the correctness of such argumentation with the tools offered by informal logic. A vodka advertisement (see Fig. 1) is an example of a visual argument analyzed by Groarke (1996b). It features an oversized bottle of vodka spilling its content onto a motionless city plunged into darkness. But in the part of the picture where the vodka splashes, the city springs to life, bursting with lights and colors. Above the image it says: "Just Add Vodka." The advertisement is a visual metaphor transmitting a message, which, according to Groarke, can be put verbally as follows: "Vodka can transform your sleepy life into one full of cosmopolitan excitement" (Groarke 1996b). A more detailed interpretation of the image shows that the argumentation here is as follows:

Premise 1: If you add vodka to your life, your boring life will be transformed into one full of colors and excitement.

Premise 2 (implicit): You want your life to be colorful and exciting.

Conclusion: You should add vodka to your life (i.e., purchase vodka).

Once nonverbal argumentation is reconstructed, it can be analyzed in the same way that informal logic assesses verbal arguments. For example: premise 1 can be easily questioned by pointing out that the consumption of vodka leads not so much to fun, as to addiction. In addition, the analyzed reasoning can be accused of being a normative variant of 'affirming the consequent' fallacy, since it follows the scheme: "If A, then B" and "B is desirable," therefore "A is desirable." In conclusion, Groarke claims that nonverbal argumentation contained in an image can be treated as an equivalent to

verbal argument, which makes it possible to examine it with the tools developed by informal logic.

1.3 NONVERBAL COMMUNICATION (PSYCHOLOGY AND COMMUNICATION THEORY)

Nonverbal communication, especially the classification of nonverbal signals, is a particularly interesting problem for psychology and communication theory. Let us begin then with the classification proposed by Marek Tokarz (Tokarz 2006, 336-339). Some nonverbal messages are sent in an uncontrolled way, that is, without their sender's will (see Fig. 2). Such signals include a face turning red or trembling hands. However, from the point of view of communication studies, a more important class would be formed by those messages, which are not only controlled by the sender, but ones which are also purposeful, in other words, messages that are intentionally controlled. A criterion for recognizing controlled signs is whether they can be simulated (faked). Since we can pretend to laugh at someone's joke, even though we did not find it funny, the criterion of laughter would count as a controlled signal. However, depending on whether, in a particular communicative situation, laughter acts as an expression of a purposeful or unintentional action, such a controlled message would be put in the subclass of either intentional or spontaneous signs. Intentional messages can be further divided into two more categories. Although nonverbal communication is much less codified than verbal communication, the meaning of several nonverbal signs is determined to some extent by the convention adopted by a given community. Conventional intentional signals are, for example, pointing a direction with the index finger or nodding. In the case of nonverbal communication the convention may be adopted by any group of people, whatever their number, and remain unrecognizable to other participants of communication, who may codify it differently. For example, a Pole would interpret nodding as sending a message of agreement, while a Bulgarian would read it as a sign of disagreement. Similarly, a gesture done by connecting the thumb and the index finger would be perceived in Poland and in the US as a sign of approval ("A-OK"), whereas in France it would mean 'zero' and in Greece it would be considered offensive. Individual intentional signals are behaviors characteristic for a particular person — their interpretation (decoding) is only possible for those who know this person well.

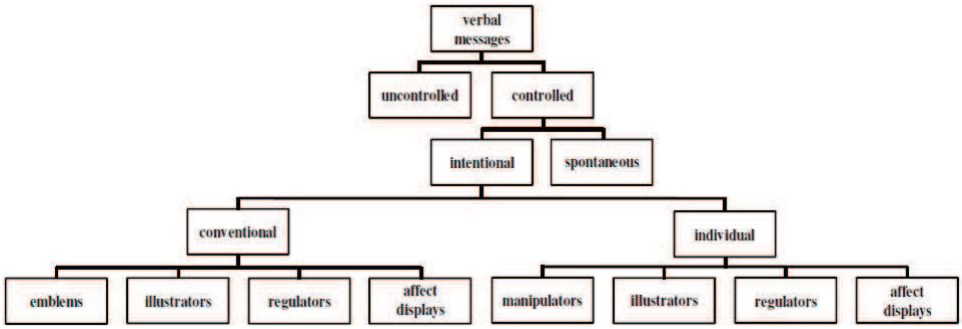

Fig. 2. Classification of nonverbal messages (Tokarz 2006, 339)

Both conventional and individual signals can take the form of illustrators, regulators or affect displays. Illustrators are signals which accompany verbal signals to complement them. When I point my index finger and at the same time say "You should go that way," my pointing of the finger would be an illustrator. Regulators are signals which regulate the whole communicative situation, like the speed of speech or raising intonation. Whereas the function of affect displays is to indicate the current emotional state of the sender, which is usually conveyed by facial, vocal or gestural means. Conventional messages may also take the form of emblems, that is, signals with a specified meaning, which can replace some words or phrases. Nodding would be an example of an emblem. Notice that such a gesture is an emblem only if we do not at the same time express our agreement verbally. Otherwise, that gesture would be classified as an illustrator. Meanwhile, individual messages can take the form of manipulators (or adaptors), that is, movements which increase the comfort of the sender, such as changing one's position in a chair, crossing one's legs, scratching or rearranging objects on the table. Notice that most types of visual signals listed by Groarke (such as visual demonstration, metaphor, symbol and archetype) would often fall into the category of emblems, as he seems to emphasize those communicative situations in which image acts as an autonomous message that constitutes a particular argumentation. Images could also play the role of illustrators, if they were repeating or complementing a message sent simultaneously via a verbal channel or the role of affect displays, if the message was illustrating its sender's emotions. However, it seems that the function referred to by Groarke as the flag argument does not belong to any of the categories mentioned by Tokarz. It results probably from the fact that Tokarz's classification takes into account only what function a certain message performs from the perspective of its sender (whether it replaces a verbal sign or supports it,

whether it regulates the communicative situation or conveys information about emotions), while flag arguments are distinguished in terms of what function they have for the receiver (attracting his attention).

Another interesting and important classification can be found in the work of Nęcki (1996: 213). He distinguishes the following nonverbal signals: gestures – movements of body parts (e.g. hands, legs or head), body position — the way of sitting or standing, open and closed posture, facial expressions — facial movements and positions (smile, eyebrow position), touch — stroking, hugging, pushing away etc., presence — physical appearance constituted by clothes, hairdo and makeup, parlanguage — sounds other than words (muttering or humming), way of speaking — the speed of uttering words, pauses, intonation, way of looking – direction of the gaze (e.g. looking into the interlocutor's eyes), length of eye contact, distance — physical distance between the interlocutors, arrangement of the setting — furniture, paintings, the way of piling documents etc. Practically all of the above signals can function as emblems or illustrators, but most often we use gestures (e.g. nodding), presence (e.g. military uniform) and setting (e.g. elegant office) to perform these functions. Facial expressions (like smile) and touch (e.g. hugging) usually play the role of affect displays, while the way of speaking is usually a regulator.

According to Knapp and Hall (2007: 12-17), verbal and nonverbal signals can interact in one of the six ways: (1) repeating — a nonverbal message repeats a verbal message in order to reinforce the message, (2) conflicting — the two channels of communication can be sending contradictory messages, for example, when the sender says "I like you a lot" in a sepulchral voice, with his arms crossed and eyes down, (3) complementing — signals can complement each other's meanings, (4) substituting — a nonverbal message is sent independently and replaces its verbal equivalent, (5) regulating — nonverbal behavior can regulate the whole communication, (6) accenting — nonverbal signals can amplify or tone down the meaning of verbal signals, e.g. shaking one's fist may accent verbally expressed anger.

2. REDUCIBLITY OF NONVERBAL COMMUNICATIONS TO VERBAL ONES

Some time ago, a certain remark was made in a review of our article, a remark, which made us doubt for a while whether we understand correctly the specific character of nonverbal messages. In this article, we put forward a model of persuasion which would enable the representation of not only verbal arguments, such as deductive inferences, but also nonverbal arguments like

smiling or threatening with a fist. We used the example of a poker game, in which one player, during a betting round, tosses a pile of money on the table in an attempt to convince the other player that he has a strong hand. The reviewer, however, was skeptical towards that example and argued against this case being a nonverbal argument, since this argument could be brought down to a verbal one. He concluded that there is no point distinguishing nonverbal arguments in the model of persuasion until we find such examples of nonverbal arguments, which could not be reduced to their verbal equivalents. We were perplexed, as it is hard to deny that in this case a player could indeed just say the amount of his bet instead of putting the money on the table. We started wondering if it was possible at all to complete the assignment set by the reviewer. The answer seems negative — after all, every situation can be described through a sentence. So if Anne smiles in the attempt to convince us of something, it can be brought down to a sentence "Anne smiles" and the implication, which is a kind of topos,[3] can be formulated e.g. as follows: "If x smiles, then y will likely accept whatever x claims." In this chapter we intend to accurately define this problem (paragraphs 2.1 and 2.2) and offer a solution to it (paragraph 2.3.).

2.1. CONFLICTING PERSPECTIVES

What is the common practice when it comes to constructing models of communication on the ground of logic? The most common approach identifies nonverbal communication with (reduces it to) verbal one. Tokarz's theory of persuasion is an example of that practice (Tokarz 2006: 197). For the purpose of the analysis, the theory holds that a message is always the same message, no matter if it is produced verbally or nonverbally. For that reason, saying the words "Get out of here" and showing somebody the door is denoted here by the same symbol. Another model, which identifies the two types of messages is the theory of visual argument. As we demonstrated in paragraph 1.2., such researchers as Leo Groarke answer affirmatively to the question about the possibility of reducing visual arguments to their verbal equivalents..

But would the creator of the vodka advertisement, which we described in that paragraph, give the same answer? His view must differ from the one given by an informal logician. Otherwise, he would probably prefer

[3]In rhetoric, topos is an argumentative strategy, which determines the method of choosing premises for a given conclusion (cf. e.g. Budzyńska 2008).

using verbal equivalents reconstructed by Groarke to paying huge sums of money to graphic designers. How to account for such a difference in opinions between a logician and an advertiser? The answer seems obvious after a moment of consideration: a logician is interested in correctness, while an advertiser in the effectiveness of communication. The former evaluates the correctness of the reasoning behind a visual message (if it is formally correct, if the premises are true etc.). The latter is interested only in the effect of the message on the product's sale, no matter if the argumentation used is correct in terms of logic or not. Obviously, the frequency of using images in advertisements suggests that visual arguments are much more effective than their verbal equivalents.

2.2 THE EFFECTIVENESS OF A MESSAGE: THE GOAL AND THE RESULT

The division into verbal and nonverbal messages becomes crucial when we intend to analyze communication in terms of the goal of a message, the possibility of achieving that goal (effectiveness) and the actual result of that message. Particularly important types of goals, which are the main point of sending messages, are persuasive goals. A message has a persuasive function if it is sent with the intention of changing the receiver's beliefs, attitudes or behaviors. Not all messages have that goal. If we are in a hurry and someone at the bus stop asks us for the time, we could say out of politeness that it is, for example, 6 p.m., but we may be completely uninterested in what the receiver does with that message — if he believes us and as a consequence changes his belief (that is, instead of identifying with a sentence "I don't know what time it is," he will begin to identify with "It's 6 p.m.").

The theory of persuasion by Tokarz, mentioned in the previous paragraph, is an interesting attempt to include communication goals in the formal model (Tokarz 2006: 197-218). Messages which are sent with the intention of producing a certain effect are called here persuasive acts. As we mentioned earlier, that model identifies verbal types of messages with nonverbal ones. Therefore, we propose expanding Tokarz's model of persuasion, so that it is possible to express the difference between the two. Let us adopt the following designations:[4]

k — the message,

[4]The original symbols of Tokarz's theory were changed to ensure uniformity with symbols used throughout this article.

s — the sender's goal (that is, the situation that the sender intends to provoke),

ver, nver — the way of conveying the massage, where

ver stands for communicating through sending verbal cues like saying the words "Get out of here,"

nver stands for communicating through sending nonverbal cues like pointing at the door with a finger,

p — the situational context in which the message was sent,

R(p, k, δ) — the result of sending the message k in the way δ ($\delta \in$ {ver, nver}) in the situation p,

a = (k, s, δ) — persuasive action performed by sending the message k in the way δ
($\delta \in$ {ver, nver}) with the intention to attain situation s.

This model allows for the possibility to express the goal of a message and to distinguish it from the actual result (R) of that message.[5] Sending a message can only be successful if the actual result overlaps with the intended goal of the message (or if the result exceeds the goal). We say that the persuasion a = (k, s, δ) is effective in the initial situation p when $s \leqslant R(p, k, \delta)$, $s_1 \leqslant s_2$ meaning that the situation s_2 is at least as advantageous to the sender as the situation s_1. In other words, the action of sending the message k (e.g. the Vodka advertisement from paragraph 1.2) with the intention of triggering situation s (achieving an increase in the sales of vodka at rate *x)* in the way δ (nonverbally, through an image) is effective when the actual result of that message achieves or exceeds the desired goal (achieves or exceeds value x – the desired rate of increase in the sales of vodka).

Notice that the same message k sent in two different ways (ver and nver) may have different results in attaining the goal s, the success may be full or limited, the goal may be achieved quickly or slowly, at a great or small expense etc. Let us assume that the two persuasive acts a_1 and a_2 differ only in terms of the way in which they achieve the goal s, that is, in the case of a_1 the message k is conveyed verbally, while in the case of a_2 – nonverbally. In other words, a_1 = (k, s, ver) and a_2 = (k, s, nver). It may

[5]Sending every message produces (at least potentially) a certain result. In the theory of speech acts this result is referred to as a perlocutionary act (Austin 1962).

so happen that R(p, k, nver) > s and R(p, k, ver) < s. This means that the message sent nonverbally yielded a better result than expected, while the same message sent verbally did not achieve the desired goal. Therefore, even though the content of the message itself does not change, the way in which the message is delivered can change the result of the persuasion. This could be the case of the criminals trying to squeeze out the information of where the wealthy man keeps his money (the situation mentioned in the introduction). Verbal threats could prove ineffective, while nonverbal ones could even be effective beyond their expectations, if the wealthy man revealed where he had hidden not only the money, but also e.g. the jewels. Another concept taken from Tokarz's theory — the notion of the degrees of success — is useful when it comes to expressing such situations. If the hierarchy of the sender's preferences looks as follows: $s_1 < s_2 < s_3 \leqslant s_4 < s_5$, where $s_3$is the minimal goal of the sender, then the higher R(p, k, δ) ranks in that hierarchy the more effective the persuasion. Nonverbal persuasion (k, s_3, nver) will be more effective than the verbal (k, s_3, ver), when e.g. R(p, k, nver) = s_5, while R(p, k, ver) = s_4.

Certain messages may perform merely an auxiliary function in a persuasion. To illustrate that phenomenon, we shall use the example discussed by Tokarz (2006: 209). A man wants to ask s his colleague out for dinner. The woman however is in a bad mood. The man can try out at least two tactics to achieve his primary goal – he can either just say it straight out, or first lay the foundations for his offer. Let s_1 be the initial situation (the moment the two colleagues meet). So in s_1 the man can either say straight away: "Would you like to go to dinner with me today?", or try to lift her mood first by paying her a compliment "You look lovely today." Notice that the goal of the latter message – improving the woman's mood — is merely an auxiliary for the primary goal – asking her out for dinner. Once the man succeeds in achieving the auxiliary goal and changes the situation s_1 (bad mood) into s_2(good mood), only then can he attempt to ask her out. This tactic is much more likely to pay off than the offer of dinner straight out. Formally, we shall put it as follows:

Persuasion 1:

R(s_1, "Would you like to go to dinner with me?" ver) = rejection.

Persuasion 2:

R(s_1, "You look lovely today." ver) = s_2.

R(s_2, "Would you like to go to dinner with me?" ver) = acceptance.

Thus, the function of the first message in persuasion 2 is to change the situation in which the "proper" message, offering to go dinner together,

is going to be uttered. The offer rejected in situation s_1, turns out to be successful when it is sent in the situation s_2. We shall return to the problem of the auxiliary function in relation to nonverbal communications in paragraph 3.3.3.

There are other properties that make the verbal and the nonverbal modes of sending messages different. A message sent through a nonverbal channel can be more effective at times, but usually it is also more costly, not only in the financial sense. Why is it that only 'truly evil' criminals would use rather torture than verbal persuasion? Because torturing a victim entails the risk of a heavy penalty and only 'truly evil' criminals can afford that.

Finally, we should also mention the degree of codification of the rules governing these types of communication. Encoding nonverbal messages relies "heavily on intuition and there is a lot of freedom in that domain" (Tokarz 2006: 328). From the point of view of the sender, it is much easier today to tell a story in modern cinema than it was during the time of silent movies. Encoding a particular content nonverbally took much more creativity. Similarly, from the perspective of the receiver, there is a much higher risk of misunderstanding while decoding nonverbal messages. One of the accusations against the theory of visual argument is the lack of definite rules for interpreting images (i.e. rules that would allow for the transformation of images into their verbal equivalents in an unquestionable way) (Johnson 2005). In his commentary to an example given by Groarke (Groarke 2002), Ralph Johnson demonstrates that Groarke's interpretation of the conclusion is not the only one possible. On the poster, one can see three men (chief administrators) in front of the entrance to the University of Amsterdam. Groarke offers the following reconstruction of the argumentation included in the poster:

Premise: The University of Amsterdam's three chief administrators are all men.

Conclusion: The University of Amsterdam needs more women.

Johnson proves that the same conclusion could be decoded differently, e.g. "The University in Amsterdam needs more women in administrative positions," "The University wants to hire more women in administrative positions" or even "Woman, do not even try to apply for a job at the University of Amsterdam (because of the barriers imposed by men)."

2.3. A POSSIBILITY OF ACCOMMODATING THE PERSPECTIVES

Whether the distinction between verbal and nonverbal messages can

be ignored depends on the aims and the applications of the proposed model of communication. So if a model's function is not to include the influence of messages on their receivers, but only to acknowledge e.g. the correctness of argumentation or the interactions between the content of various messages, then this distinction can indeed be discarded as irrelevant. In those cases, the two communicative activities with the same content, one message being verbal and the other nonverbal, may be reduced to one symbol only, e.g. pointing at the door and saying "Get out of here" may both count as message k.

However, this distinction starts making sense, when we want to discuss the effectiveness of messages.[6] In other words, when we take into consideration the persuasive function and the parameters of success connected with that function, such as the odds, the cost or the speed of achieving the goal. The parameters may have different values if the message is sent through the verbal, the visual or some other nonverbal channel. It may so happen that the same message k sent in the same situation s, but in a different way may produce a different result — e.g. it may be that for saying "Get out of here" and pointing at door

R(s, get_out_of_here, ver) = failure and R(s, get_out_of_here, nver) = success.

Notice that using such nonverbal messages as illustrators (or such interactions as repeating or accenting) would be unjustifiable or could be ignored without taking into account the goal and the effectiveness of communication. Let us imagine a scene, in which a girl tells her boyfriend "You hurt me, so..." and points at the door with her finger, unable to utter another word. Formally speaking, she sent two messages: "You hurt me" (verbally) and "Go away" (nonverbally), which respectively could be marked with symbols P and W. The argumentation was: "P, therefore W." At this point a logician could examine the correctness of such an argumentation — i.e. he could ask if the premise was true or how the conclusion was justified etc. Now imagine that the girl says "You hurt me, so go away" while pointing at the door. Formally speaking, we have here two verbal messages "You hurt me" and "Go away" plus one nonverbal message "Go away" (conveyed through the gesture of pointing at the door). If we were to adopt the same designations as before, her argumentation looks as follows: "P, therefore W and W." Obviously, logic would ignore that doubling of the conclusion. If we are interested in the

[6]Obviously, modeling communication in terms of effectiveness , not always necessities distinguishing how the message was conveyed. We may be just as well interested in other aspects of a communication's effectiveness, which are unrelated to its verbal or non-verbal character.

interactions between the components of argumentations, such a repetition is indeed meaningless. But if we are interested in a persuasive argumentation, the use of an illustrator cannot be ignored, precisely because its role is to increase our effectiveness in achieving the goal of the message.

It seems that an equally problematic situation, from the formal point of view, is one when a verbal message is sent which comes into conflict with the message conveyed through nonverbal channels. Imagine a situation, where a girl says in a sepulchral voice, with her arms crossed and eyes down: "I'll go to the movies with you today, because I've grown to like you a lot." Her reasoning, expressed verbally, can be represented as "W, because P," where W stands for the sentence "I'll go to the movies with you today" and P for the sentence "I've grown to like you a lot." However, her posture may also be treated as a message that communicates "I don't like you at all." In that case, the argumentation should rather be represented as "W, because P and ¬P." Although, from the perspective of classical logic, there is a logical consequence ("p $\wedge$ ¬p $\rightarrow$ q" is a tautology of this logic), such a representation of that scene seems peculiar. Interestingly enough, there is a rule in psychology that makes it possible to determine the ratio between the effectiveness of a verbal message and of a nonverbal message in a situation where the two messages are contradictory in terms of meaning. It is the so called Mehrabian's rule (Mehrabian, Ferris 1967; Wiener, Mehrabian 1968), according to which, if a verbal and a nonverbal message are in conflict, then the receiver's conviction about the sender's attitude (A_{total}) is a weighted sum of the attitude expressed in words ($\mathrm{A}_{content}$) and two attitudes conveyed through a nonverbal channel — through tone of voice (A_{tone}) and facial expression (A_{face}). Their relation is represented in the following formula:

$$(\mathrm{A}_{total}) = 0.07 \cdot (\mathrm{A}_{content}) + 0.38 \cdot (\mathrm{A}_{tone}) + 0.55 \cdot (\mathrm{A}_{face}).$$

To put it more casually, this equation indicates that in the case of conflict, the nonverbal message is much more effective than the verbal one (ratio: 0.93 to 0.07). In other words, in such an instance the sender goes by the information sent through the nonverbal channel.

3. THE AG_n LOGIC

As we demonstrated in the previous chapter, formal models of argumentation can perform two types of functions. Some models are built in such a way as to allow the examination of the correctness of an argument. Others make it possible to grasp certain aspects related to the effectiveness

of argumentation. Each of these approaches generates completely different research questions. The AG_n logic is one of the formalisms focused on analyzing effectiveness. Similarly to Marek Tokarz's approach, it allows for the examination of arguments' results. Moreover, it has a complete axiomatization (Budzyńska, Kacprzak 2008), that is, a set of axioms and rules of inference, on the basis of which there can be constructed formal proofs of the validity of formulas which describe particular properties of a given argumentation. In the following chapter we will present the main ideas behind that logic (paragraph 3.1), as well as its formal syntax and semantics (paragraph 3.2) and finally, we will try to demonstrate how chosen aspects of nonverbal communication, described in those two preceding paragraphs, can be expressed in that logic (paragraph 3.3).

3.1. PERSUASION AND NONVERBALITY

In the model upon which the semantics of the AG_n logic is built, the persuasive goal of a communication comes to the forefront. It also emphasizes those aspects which are connected with the nonverbal cues in communication, especially in a communication with a persuasive function. The AG_n logic was created on the basis of two formalisms: epistemic logic of graded modalities (Hoek 1992) and dynamic logic (Harel, Kozen, Tiuryn 2000). The former inspired the creation of the model for testing what, if any, elements of an effective persuasion are fulfilled in a communication in consideration. The latter became a basis for modeling nonverbality.

3.1.1. GRADES OF BELIEFS

Before we proceed to formally define the gradation of beliefs, we shall consider the following example. Let us assume that John wants to open a safe. He is in possession of two keys, but he does not know if they match the lock of the safe. He may exchange them for Jake's keys, but is not sure if that bargain is in his favor. To simplify the analysis, let us assume that there are 5 keys in the investigated model (in the beginning John has two and Jake has three keys), but only one of the keys unlocks the safe. John knows that he has the keys numbered 1 and 3. He does not know which key opens the safe, but he suspects it is an odd-numbered key. For that reason, John considers three options as the possible description of his situation, i.e. has three subjective visions of reality. The first one is $(1, 3\,|2, 4, 5|\,1)$, the second one $(1, 3\,|2, 4, 5|\,3)$ and the third $(1, 3\,|2, 4, 5|\,5)$, where the two initial numbers refer to John's keys, the following two stand for Jake's keys and the

final number refers to the key which opens the safe. Let us also assume that the key which actually matches the safe is key number 3, so the description of the present situation would be $(1, 3\,|2, 4, 5|\,3)$. Both the actual situation and John's vision of it (represented by the so called doxastic relation RB_{John}) are illustrated in figure 3. Notice that John holds three separate visions of reality and the fact that key number 3 opens the safe is true only for one of them. Therefore, we would say that John believes with a degree of certainty 1 to 3 (1/3) that the key he needs is number 3. Meanwhile, it is true for all of his visions that the safe can be opened by an odd-numbered key, which means that he believes with a degree of certainty 3 to 3 that he needs an odd-numbered key. Since the fraction 3/3 equals 1 (which is the maximum possible value), we can say that John is sure that to be able to unlock the safe, he should have an odd-numbered key. We can assess likewise the degree of John's belief in other facts. For example, John is absolutely sure that the safe cannot be opened with the fourth key, because it does not take place in any of his visions of the world. More precisely, his degree of belief is 0 to 3 (0/3). Such an instance will be marked as $M!^{0.3}_{John}$, (key_number_four), where "key_number_four" is a formula which describes the advanced thesis.

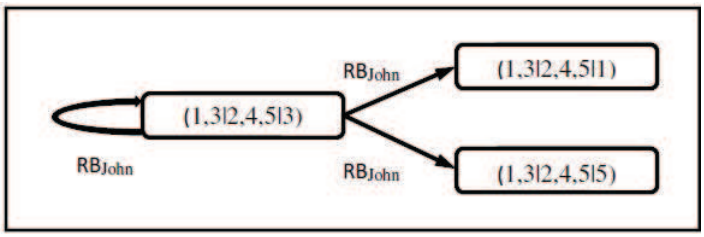

Fig. 3. John's doxastic relation

In a general case, we determine the set of arguers and the set of states (or possible situations). Next, relation RB is assigned to each of the arguers, a relation which specifies what visions are considered by a given person in a particular situation. Once we have added the valuation of propositional variables (examining the truth-value of those elementary propositions belongs to the scope of our consideration), we can assess the degree of the arguers' belief in the truthfulness of analyzed facts. A precise semantics will be given in paragraph 3.2.

There are a few modalities in the AG_n logic which allow us to infer beliefs. The basic $M^k_i(T)$ operator expresses that an agent i considers more than k visions of reality, in which a thesis T is true. Dual operator $B^k_i(T)$ expresses that an agent i considers k visions of reality at most, in which a thesis T is

untrue, which is formally defined as $B_i^k(T) \leftrightarrow \neg M_i^k(\neg T)$. Moreover, there is operator $M_i^k(T)$, which intuitively means that an agent i considers precisely k visions of reality, in which a thesis T holds, and there is the aforementioned operator $M_i^{k_1 k_2}(T)$, which indicates that an agent i considers precisely k_2 possible visions and in precisely k_l of them a thesis T is true. Let us assume that T means that the key number 3 opens the safe. Then, on the basis of figure 3, we can say that $M_i^0(T)$ reads: John considers more than zero visions (at least one), in which T holds, $B_{John}^2(T)$: John considers two visions at most, in which T is false, $M!_{John}^1(T)$: John considers precisely one vision in which T holds and $M!_{John}^{1,3}(T)$: John considers three visions of the world and in only one of them it is true that the key number 3 opens the safe. The final formula is the one we use the most often, as it says not only how many desired visions there are (visions in which a thesis holds), but also how many visions overall a given agent considers. There is an enormous difference between a situation where John accepts one vision out of three in which a thesis holds and where he also accepts one vision in which a thesis holds, but it is at the same time the only vision he is considering. In the former case, we would intuitively say that John is convinced about a thesis t being true to a degree 1/3 (one vision out of three possible fulfills T). In the latter case, we would say that John believes in a degree 1/1, which means that he is absolutely certain that a thesis T is true.

3.1.2. ARGUMENTS AS ACTIONS THAT CHANGE THE GRADES OF BELIEFS

Gradation of beliefs is a perfect tool for evaluating the effectiveness of a particular persuasion. Returning to our example, let us assume that Jake wants to exchange the fourth key for John's third key. So he tries to persuade John that such an exchange would work in his favor. He puts forward a verbal argument a_l: "I've heard that the safe can be unlocked with an even-numbered key and that it is the key number 4. I can give it to you if you give me the key number 3." As a result of that argumentation, John is willing to accept that the fourth key may actually be the desired key, but at the same time he clings to his previous belief that it is an odd-numbered key that opens the safe. Hence, as a consequence of adding argument a_1John now has four visions of the situation: the former three $(1, 3\,|2, 4, 5|\,1)$, $(1, 3\,|2, 4, 5|\,3)$, $(1, 3\,|2, 4, 5|\,5)$ and a new one $(1, 3\,|2, 4, 5|\,4)$. As a result, the degree of belief in the validity of the thesis T: "The fourth key opens the safe" is 1 to 4 (it is true in one out of four visions). The degree of belief changed to a higher one from 0/3 to 1/4. We can now start evaluating the effectiveness of

argument a_1. If we are satisfied only when John is absolutely sure about the thesis T, then the argument is not successful. But it may happen that any rise of the degree of belief is desired. In that case we would consider this argumentation a success. Obviously, in our example, the bigger the rise, the better. If there was an argument that could cause a rise in the degree of belief to e.g. 3/4, we would consider it more effective than argument a_1. Thus, grades of beliefs allow us to both determine and compare the effectiveness of particular arguments

Notice that the aforementioned argument $a_1$is a verbal one. Indeed, most models and formalisms only consider argumentative dialogues for argumentations, without taking into account arguments that take forms other than words. In our approach, we went a step further. Obviously, we still accept that an argument can be conveyed verbally, but we do not limit ourselves to such arguments. For that reason we identify arguments with actions undertaken by the arguers. Such an action may change the world (the environment) around an argument or bring about a change of beliefs of one arguer or all of them. A change in the world usually (but not necessarily) entails a change in beliefs. But there may be cases, in which the world itself remains unchanged, while the beliefs do change. In order to illustrate that with an example, let us assume that thesis T means that John has the right key to open the safe. Given that, let us discuss the initial situation once more $(1, 3\,|2, 4, 5|\,3)$, a situation in which John considers three visions $(1, 3\,|2, 4, 5|\,1)$, $(1, 3\,|2, 4, 5|\,3)$ and $(1, 3\,|2, 4, 5|\,5)$. Since only in one of the visions the thesis is true, John believes with a degree 1/3 that he has the right key. Let us assume now that Jake can perform three actions (give three arguments) a_1, a_2, a_3. The argument a_1 is the verbal statement: "I've heard that the safe can be unlocked with an even-numbered key." If John believes Jake's words, he will change the considered visions into the following: $(1, 3\,|2, 4, 5|\,2)$, $(1, 3\,|2, 4, 5|\,4)$ and, consequently, he will believe with the degree 0/2 that the thesis T is true (the thesis holds in none of the visions in consideration). Notice that the reality did not change and $(1, 3\,|2, 4, 5|\,3)$ is still true. The argument a_2 enriches the first argument, as Jake offers John an exchange: "I'll give you the key number 4, if you give me the key number 3, so that you'll have keys 1 and 4, and I've heard thatthe safe can be unlocked with an even-numbered key." Assuming that accepting this argument means exchanging the keys, then the actual state changes into $(1, 3\,|2, 4, 5|\,3)$. John's visions of reality change as well and they now are: $(1, 3\,|2, 4, 5|\,2)$, $(1, 3\,|2, 4, 5|\,4)$. Therefore, John believes with a degree 1/2 that the thesis T holds (in one of the visions in consideration John has

the key opening the safe). The last argument, a_3, is an action performed by Jake that involves showing John that the key number 3 opens the safe. Such an argument leads to John's accepting only vision of the world, a vision which coincides with the actual state of affairs, that is, $(1, 3\,|2, 4, 5|\,3)$. Notice that the action a_1 is a typical verbal action, which can cause a change of beliefs. The action a_2 combines a verbal argument with a nonverbal activity. Performing that action may lead both to an exchange of keys and, what follows, a change in beliefs. The argument a_3 is conveyed only in a nonverbal way. Giving that the arguments lead to a change in John's beliefs. He now believes with a degree 1/1 that he is in possession of the right key (see Fig. 4). We have demonstrated that our approach allows for the evaluating of the effectiveness of arguments conveyed through verbal and nonverbal means or both at the same time. It offers a possibility to infer effectiveness of persuasions within well-developed models, in which the result of persuasion is influenced not only by verbal arguments, but also various other intentional activities.

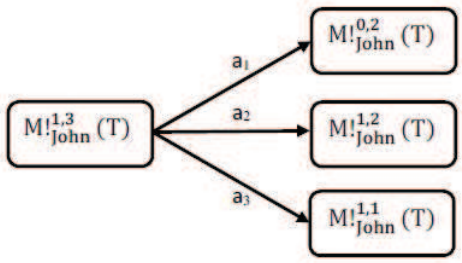

Fig. 4. The result of using arguments a_1, a_2, a_3

In the AG_n logic, changes resulting from performed actions are denoted by the existential operator $\Diamond$ which we read as: 'possible'. For example, we intuitively read the formula $\Diamond(a_1{:}\text{Kuba})M!^{0,2}_{John}(T)$ as follows: When giving the argument a_1, Jake can make John believe with a degree 0/2 that T is a valid thesis. Similarly, the formula $\Diamond(a_3{:}\text{Kuba})M!^{1,1}_{John}(T)$ expresses that by performing an action a_3,Jake can influence John's beliefs and make this become certain that the thesis T is true.

3.2. FORMAL SYNTAX AND SEMANTICS OF THE AG_n LOGIC'S LANGUAGE

In this chapter, we shall present the complete syntax of the language of AG_n logic, as well as its interpretation in the model of multi-agent systems.

Assume that Agt={l,...,n} is a set of names of agents (arguers), V_0 is a set of propositional variables and Π_0 is a set of program variables (elementary actions). Further, let ; denote the operator of program sequential composition, which allows us to devise programs schemes defined as a finite sequence of elementary actions a_1; ... ; a_k. Intuitively, the program a_1; a_2, where a_1, $a_2 \in \Pi_0$ means "Perform a_1 and then perform a_2." The set of all program schemes is denoted by the symbol Π.

A set of well-formed expressions of the language of AG_n logic is described by the following BNF *Backus-Naur form:*

$$\alpha ::= p \mid \neg\alpha \mid \alpha \vee \alpha \mid M_i^d\alpha \mid \Diamond(i{:}P)\alpha,$$

where $p \in V_0$ is a propositional variable, $i \in$ Agt is an agent's name, $P \in \Pi$ is a program (a sequence of arguments) and $d \in N$is a natural number.

Other boolean connectives are defined in a traditional manner. We also use the following abbreviations:

$B_i^d\ \alpha$ for $\neg\ M_i^d\ (\neg\alpha)$,

$M_i^d\ \alpha$, where $M_i^0\alpha \leftrightarrow \neg\ M_i^0\alpha$, $M_i^d\alpha \leftrightarrow M_i^{d-1}\alpha \wedge \neg\ M_i^d\alpha$, if $d > 0$,

$M!_i^{d_1 d_2}\ \alpha$ for $M!_i^{d_2}\alpha \wedge M!_i^{d_2}\ (\alpha \vee \neg\alpha)$.

Definition. Let Agt be a set of agents' names. By a semantic model we mean a Kripke structure M = (S, RB, I, v) where:

S is a non-empty set of states,

RB is a doxastic function, which assigns to every agent a binary relation defined in S, RB: Agt $\leftrightarrow\ 2^{S\times S}$,

I is an interpretation of program variables $I : \Pi_0 \rightarrow$ (Agt $\rightarrow\ 2^{S\times S}$),

v is a valuation of propositional variables, $v : S \rightarrow \{0,1\}^{V_0}$.

Function I can be easily extended to interpret any program scheme.

Let I_Π: $\Pi \rightarrow$ (Agt $\rightarrow\ 2^{S\times S}$) be a function defined by mutual induction on the structure of the program $P \in \Pi$ in the following way: $I_\Pi(a)(i) = I(a)(i)$ for $a \in \Pi_0$ and $i \in$ Agt, $I_\Pi(P_1;P_2)(i) = I_\Pi(P_1)(i)\ ^o\ I_\Pi(P_2)(i) = (s,s') \in S\times S$: $(\exists s'' \in S)((s,s'') \in I_\Pi(P_1)(i)$ and $(s'',s') \in I_\Pi(P_2)(i))$ for $P_1, P_2 \in \Pi$ and $i \in$ Agt.

The semantics of AG_n formulas is defined in Kripke's structure M.

Definition. For a particular structure M = (S, RB, I, v) and a particular state s ∈ S the boolean value of formula α is denoted M,$s \models \alpha$ and defined inductively as follows:

M,s ⊨ p	iff	v(s)(p)=1 for p ∈ V_0,
M,s ⊨ ¬α	iff	it is false, that M,s ⊨ α,
M,s ⊨ α ∨ β	iff	M,s ⊨ α or M,s ⊨ β,
M,s ⊨ $M_i^d\alpha$	iff	$\lvert\{s' \in S : (s,s') \in RB(i)$ and M,s' ⊨ α$\}\rvert > d$, d ∈ N,
M,s ⊨ ◊(i:P)α	iff	$(\exists s' \in S)((s,s') \in I_\Pi(P)(i)$ and M,s' ⊨ α).

We say that formula α is satisfied in model M and at state s, if M,s $\models$ α.

We offer a detailed description of AG_n semantics and a complete axiomatization of this logic in our other works (Budzyńska, Kacprzak, Rembelski 2008a; Budzyńska, Kacprzak 2008).

3.3. APPLICATIONS OF THE AGn LOGIC

The afore proposed formalism is a perfect tool for inferring the persuasive function of communication. It also allows us to differentiate between a verbal and a nonverbal medium. In this chapter we will describe its role in modeling, studying, analyzing and testing the meaning of nonverbal arguments in the process of persuasion.

3.3.1. MODELING ELEMENTS OF COALSCENCE

The AG_n logic is a perfect tool for inferring coalescent argumentation. It allows us to embrace all characteristic features of the process of convincing. In coalescent argumentation a great emphasis is put on including arguments which refer not only to logic, but also to emotions, feelings, intuition and the entire position held by both arguers. AG_n allows us to model all those aspects.

We shall begin with emotions. In the model of AG_n logic, performing an action, or giving an argument, results in going from one system's state (call it s_1) to another (call it s_2). And sometimes we assume that an argument does not change anything, so $s_1 = s_2$. A state can be characterized in various ways. Especially, if we assume that it is the emotional state of one or both arguers. Then, performing an argument which involves smiling and making

a kind face by the proponent, leads to a change from a state describing sadness to one describing joy and contentment. A similar effect can be brought about by such a nonverbal action as a tender hug, touch or kiss. Although that action has no impact on the beliefs of the person who is being convinced, it significantly changes his feelings and it is these feelings that influence both beliefs and behaviors. A state of a system can determine such emotions as fear, worry or insecurity, but it can also define intuitions. Looking around the house that we intend to buy may result in going from an euphoric state caused by having found an amazing bargain to a state of anxiety triggered by an intuitive sense that there must be a catch somewhere, if somebody is willing to sell such an impressive house for such a low price. The discomfort can also stem from an imprecise fear instilled in us by the house we were visiting. Even though such an argument can hardly be called convincing, it will probably change considerably our attitude towards this seemingly attractive offer. Similarly, we can model someone's entire position, as well as its transformation, which happens in the process of communication. An important element of coalescent argumentation is the situation in which communication occurs. If the same process takes place in different circumstances, it can have different results. Moreover, a change of environment can significantly influence the success of an argumentation. Let us recall the example in which Jake tries to convince John that key number 3 opens the safe. Assume that Jake performs a series of verbal actions, i.e. "I've heard that the safe can be unlocked with the third key," "I've seen Peter open the safe with key number 3," "I'm sure that the safe can be opened with the third key" etc. Such words would probably have a poor effect. But there is one argument with which John cannot argue. It is precisely the action performed by Jake of taking key number 3 and opening the safe with it. In the AG_n model wewould describe that situation as follows. At state s_1 John believes with a degree 1/3 that key number 3 opens the safe. After having performed the action involving the opening of the safe, we go to state s_2, in which John believes in the advanced thesis with a degree 1/1. Notice that the nonverbal argument did not refer directly to John's beliefs. It only brought about a change of situation: in state s_1 the safe is locked, in state $s_2$the safe is open and John sees that it has been opened with the third key. A revision of beliefs was a result of the environment's modification. Jake did not say a word, instead, he nonverbally introduced a change to the environment; you could not dream of a better result. Apparently, environmental arguments (situational arguments) have a considerable impact on succeeding in argumentation, and the extent of thoses

changes can be formally modeled with the use of Kripke's possible-world semantics.

3.3.2. ANALYZING RELATIONS BETWEEN THE GOAL AND THE RESULT OF AN ARGUMENT

In our previous works, we used the AG_n logic to verify properties of argumentative systems, especially multi-agent ones. For that purpose, we would build a model for the already existing system, a model consistent with the one we described in paragraph 3.2. Then, we would use formulas of the AG_n logic to describe the properties of our interest and to test their validity. This can be done in two ways. One is a syntactic proof which makes use of the complete axiomatic system for AG_n (Budzyńska, Kacprzak 2008). The other is based on a semantic model of verification and allows us to automatically study the satisfiability of formulas, which the AG_n logic can do with a tool called Perseus (Budzyńska, Kacprzak, Rembelski 2008b). The questions we posed for the studied systems mainly concerned such issues as: "Is a given argumentation effective?", "What result would a particular argument bring?", "Is there any argument that would be more successful?" Therefore, we focused on succeeding in argumentation, or more precisely, we wanted to answer the question whether success can be achieved and to what degree. We analyzed systems in terms of which arguments are successful, but we left out why they achieve the desired effect. Thus, it was enough to limit our interpretation of an action to determining the state in which it can be performed and the state it attainted once the action is performed. Now, assume that, just like in the extended proposal by Marek Tokarz from paragraph 2.2., a persuasive action is characterized by three elements (k, α, δ) that determine message k, conveyed through action, medium δ and goal α. Formally, we are now able to define the set of elementary actions as follows:

$$\Pi_0=\{(\mathrm{k}, \alpha, \delta) : \mathrm{k} \in \mathrm{K}, \alpha \in \mathrm{F}, \delta \in \Delta\},$$

where k is a non-empty set of messages, F a set of formulas of the AG_n logic, $\Delta = \{\mathrm{ver}, \mathrm{nver}\}$ is a set of possible media (verbal and nonverbal). Notice that depending on the needs and applications of a designed model, the set Δ can be freely expanded. For example: if we want to examine visual arguments, the possibility of sending messages by means of images ought to be added to that set and denoted by the symbol vis. An even more detailed distinction can be added, if we use e.g. Nęcki's classification

discussed in paragraph 1.3. The set Δ would thus be extended by such means of conveying messages as facial expression, gestures, appearance etc. Thanks to such extensions, we will also be able to infer the relations between perfomed arguments and examine why one argument is effective, while another is not.

We assume that the goal of an action is descibed in the AG_nlanguage as bringing about the desired belief or behavior of the opponent. For example, Mary may be aiming to convince John that adding curry to a shrimp dish will improve the taste of the meal. Formally, the goal α is $M!^{3,3}_{John}$ (a_dish_with_curry_in-it-is_better), that is, John considers three visions of reality and in each one the meal with curry is better. Mary may also want to make John add curry, without caring if he is convinced that it is right to do so. Formally, $\Diamond$(adding_curry : John) *true* – perhaps John will perform the action of "adding_curry." We say that the goal of an action is attainted, if after that action the system is in a state in which the formula describing that goal is satisfied. For example, consider the argument a = (k, α, δ) used by Mary. The goal α will be realized if, after having performed that persuasive action, Mary achieves a situation s, in which s $\models$ α. Here lies the crucial difference between the AG_n logic and the theory by Tokarz. In Tokarz's approach, the goal of a persuasive action is a specific situation; we say that such a situation was a success if, after it is completed, the attained situation is desirable or better than the previous. In the AG_n logic we assume that a goal is a language formula and that an action is successful if its result satisfies that formula. Thus, any situation is successful in which a property defined by formula α is true. Such an approach allows us to concentrate on what is most vital to the proponent and to leave out less important elements. For example, if Mary aims to make John add curry to the dish, it may matter to her whether he does it with a happy face or with visible resignation and resentment. Both situations are desired from Mary's point of view, because in both cases it is true that John adds curry. Any other situation is also successful in which John serves shrimps with curry, no matter the circumstances of that occurence. In Tokarz's approach, one should either describe a successful situation in detail, including all its elements, or present other situations which would be more desirable.

If we treat an action as a triple (k, α, δ), we can accurately identify differences between the effectiveness of the same message depending on how it was conveyed. Assuming that Mary's goal is to have the dish spiced with curry, the message she wants to send concerns adding curry to the shrimps. She may send that message verbally: "I've eaten shrimps many

times. They taste better with curry. Could you add some of that spice?" or, as we desribed earlier, she can convey it nonverbally, performing a number of actions, such as bustling about the kitchen in search of curry in order to show how important it is for her to have the spice added. The verbal argument may have a poor result, if any — John will ignore Mary's request, still convinced that curry would spoil the taste of the dish. While the nonverbal argument may produce the desired outcome: John, impressed by Mary's efforts, will take up her suggestion. Formally, the difference lies in the degree of John's belief that it is good to add curry, which depends on the medium (see Fig. 5). Likewise, we may analyze how different messages influence attaining the same goal. Describing arguments by identifying their message, their medium and their goal would make it much easier to establish what contributes the most to the success of an argumentation.

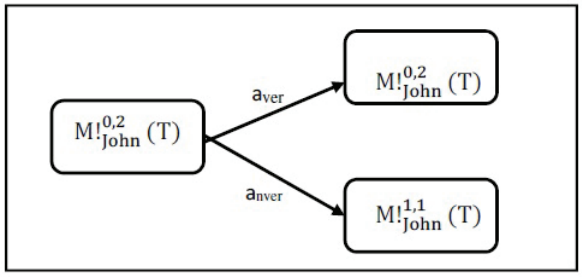

Fig. 5. A comparison of performing a verbal and nonverbal action containing the same message

3.3.3. EXPLORING THE AUXILIARY FUNCTION OF ARGUMENTS

In paragraph 2.2 about Marek Tokarz's model and its extension, we mentioned that some messages sent during persuasion perform merely an auxiliary function. Notice that this is the role of numerous types of nonverbal messages, e.g. facial expression, touch, presence. A smile, a hug or a mini skirt rarely are autonomous means of persuasion in their own right. They are rather used to create favorable conditions for the realization of the proper persuasive actions such as asking somebody out on a date, asking for a loan etc.

Let us restate the example discussed in paragraph 2.2, so that it takes into account nonverbal communication and is adapted to the AG_nlogic. Let a_1 *be an action which consists in John making a proposal: "Would you like to go to dinner together?"*, while a_2 is an action consisting in smiling. State

$s_1$shall be the initial situation of the persuasion in which the receiver of the communication (Mary) is in a bad mood, s_2 — a situation in which Mary is in a good mood, s_3 — Mary rejecting the offer and s_4 — Mary accepting the offer. Now consider the two persuasions: $P_1 = (a_1)$ and $P_2 = (a_2; a_1)$. In our model the result of performing action a in state s' is determined by the function of an interpretation I_n. According to the definition from paragraph 3.2, we say that the state is a result of having performed the persuasion P at the state s by agent i, if (s,s') $\in$ $\mathbf{I}_\Pi(P)(i)$. Notice that here, unlike in the approach described by Tokarz, the result of a persuasive action in the situation s depends not only on the message we want to send, but also on how it is performed, on who sends the message, as well as on its goal. Assume that the result of action a_1, a_2 in the abovementioned persuasions is as follows:

Persuasion 1:

$(s_1,s_3) \in \mathbf{I}_\Pi(a_1)$(John) — John performing the action a_1 in the state s_1 leads us to the state s_3,

Persuasion 2:

$(s_1,s_2) \in I_\Pi(a_2)$(John) — John performing the action a_2 in the state s_1 leads us to the state s_2, $(s_2,s_4) \in I_\Pi(a_1)$(John) — John performing the action a_1 in the state s_2 leads us to the state s_4,

so $(s_1,s_4) \in I_\Pi(P_2)$(John) — John the persuasion $P_2 = (a_2;a_1)$ in the state s_1 leads us to the state s_4 (see Fig. 6).

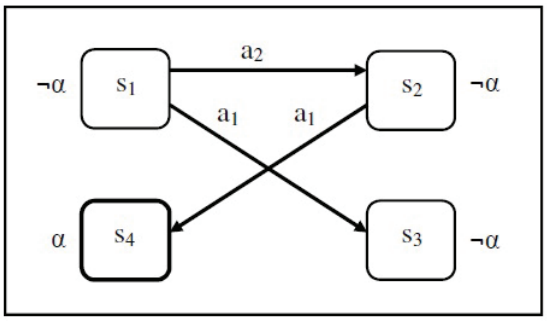

Fig. 6. The interpretation of actions a_1 and a_2

Now assume that the formula α ("Mary accepts John's offer of dinner") is the goal of
persuasion and that the only state which fulfils α is state s_4. Formally, $s_1 \models \neg\alpha$, $s_2 \models \neg\alpha$,
$s_3 \models \neg\alpha$, $s_4 \models \alpha$. holds. We can see that giving merely the argument a_1 will not produce the desired result. But when it is preceded by the argument

a_2, the situation changes radically. Thus, we shall say that the action a_2 was used by the agent i in the state s as auxiliary to the action a_1, where there exists no such state s' that (s,s') $\in$ $I_\Pi(a_1)$(i) and s' $\models$ α, and there exists such a state s" that (s, s") $\in$ I_Π (a_2,a_1)(i) and s" $\models$ α.

CONCLUSION

At the beginning of this article we raised two questions: can nonverbal signs be reduced to their verbal equivalents and how can we formally model nonverbal communication. In the literature on the subject, one may often come across the opinion that those two types of messages can be reduced to one another, because from the formal point of view information is always the same message, no matter if it was conveyed verbally or nonverbally (no matter if I say "yes" or nod my head). Hence, both messages should be denoted by the same symbol. Secondly, it is claimed that a formal model with nonverbal arguments would only be interesting if anyone was able to enumerate nonverbal arguments which cannot be reduced to verbal ones. The problem is that in fact there are no such arguments (if we understand 'reducibility' as the possibility to replace the activity, e.g. nodding, with speaking the words, e.g. "yes").

We offered a solution to that controversy. We demonstrated that it does make sense to distinguish nonverbal and verbal messages, when a model describes communication in terms of its one specific function. Namely, a model whose functions or applications include describing the effectiveness of communication. Obviously, a model of communication can fulfil other functions: it may serve e.g. to verify correctness of the arguments contained in a message. In such a case, distinguishing between the verbal and the nonverbal is unnnecessary, because what is important here, are the relations between pieces of information and not the way they are conveyed. In informal logic bringing visual arguments down to their verbal equivalents is completely justifiable (which does not mean that one cannot have some reservations over other specific solutions offered in that model), because the aim of that model is to analyze visual arguments in terms of their correctness and not the effectiveness of the message. A vodka advertisemnt assessed in terms of correctness may score poorly, but highly in terms of effectiveness. In social practice these two criteria often have little in common. That is why an advertising agency which based its marketing stategies on informal logic, would probably go belly up pretty fast.

Formal systems, such as propositional or predicate logic, which are concerned only with the aspects of communication related to its correctness,

may ignore the nonverbal character of some messages. For example, the fact that one piece of information is structured 'A $\rightarrow$ B', the other is A, no matter how these were distributed, allows us to establish that the conculusion B has been inferred correctly, because the produced reasoning falls under the *modus ponens* form of a deductive argument. A different research situation is generated by questions which concern differences in the effectiveness of messages depending on the means of its transmission. In this paper, we presented the example of a logic which formalizes a communication model fulfilling that task and in which it is possible to express the nonverbal character of messages. It is the multi-modal logic of graded beliefs and actions AG_n. in that logic arguments are represented as actions, hence they are not predetermined to be verbal by nature. Only a further specification allows us to establish whether we are dealing with a verbal or a nonverbal action. Referring to Marek Tokarz's ideas, we demonstrated how to distinguish different types of arguments and how to tie up their effectiveness with the means of conveying the message. Assume that some criminals are considering two ways of extracting the desired information from the hostage. In each case they have the same goal in mind (α — to gain information about where the money is hidden) and they send the same message (k — a threat), but one argument consists in speaking the words "I'll punch you" in a menacing voice (ver), while the other is actually beating the hostage (nver). In our model, the arguments are not considered identical, even though they contain the same message, thanks to allowing for the parameter ver-nver. In other words, these arguments will be denoted by two different symbols, but they will be sharing some properties (k and α). This allows us to establish in the model that the two arguments produce different results. It give us the possibility to express the difference in the effectiveness of both arguments, e.g. uttering a threat may not achieve the intended goal (the hostage will remain silent), while bringing the threat into action may lead to the criminals' success and to retrieving the desired information.

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THE PRAGMA-DIALECTICAL MODEL AND ABDUCTIVE REASONING

Originally published as "Model pragma-dialektyczny a rozumienie abdukcyjne," Studia Semiotyczne 27 (2010), 217–236. Translated by Agnieszka Ostaszewska.

1. INTRODUCTION

The questions concerning rationality and the ethics of verbal occurrences are at the centre of the deliberations of social communication. The antagonistic and cooperative functions of social discourses are connected with the notion of a conflict and the capability of solving it. Argumentative discourse as one of the types of social discourse is discussed within the framework of pragmatic, dialectic and rhetorical models. This paper is an attempt at critical assessment of the pragma-dialectical model of argumentation proposed by Frans H. Eemeren and Rob Grootendorst. I defend the standpoint that the application of the pragma-dialectical model to the analysis of argumentation reliability in a naturally occurring discussion requires an expansion of the concepts introduced in the pragma-dialectical theory.

The starting point is the assumption of an error of the pragma-dialectical conviction that infringement of one of the rules of critical discussion developed by Frans H. Eemeren and Rob Grootendorst, and at the same time the expression of an argument not leading to resolution of the dispute between the discussion participants, is a proper criterion of an argument's fallaciousness assessment.

Engaging into the abovementioned issue has been dictated by two factors. The first one was the fact that the theoretical complex of critical discussion proposed by Frans H. Eemeren and Rob Grootendorst (1984, cf. also Eemeren and Houtlosser 2002b, 2002c) seems to integrate pragmatic, dialectic and rhetorical functions of argumentation, yet they are still treated selectively.

The second factor pertains to the omission of reproductive features of naturally occurring disputes in the pragma-dialectical model.[1] Although the heuristic tool enabling the analysis of the validity of the naturally occurring discussions, which contain an externalisation of a dispute, does not have to be based on a detailed description of natural communicational cooperation, yet every fallacy considered in the pragma-dialectical model cannot be perceived as an informal fallacy. Thus, in this paper we have adopted the suggestion of Walton (1995) and Jacobs and others (1991) that the variety of features of the naturally occurring discussions should be a part of the model designed for their evaluation.

The objective of this paper is two-fold: it is aimed at verification of the pragma-dialectical criteria of assessment of reliability/fallaciousness of an argument and development of criteria of assessment of reliability/fallaciousness of an argument. The purpose of the paper is however not to change the basic character of the pragma-dialectical model, but to introduce additional criteria increasing the efficiency of the assessment of arguments.

In view of the initial assumption of the work concerning the incapability of evaluation of argumentation reliability without having first determined the so-called "dispute space,"[2] the antagonizing function plays here a superior role. It is obvious that protagonists of a given standpoint may imagine the existence of an antagonist. The point of interest of these deliberations is however a situation in which both participants have opposing positions and in which they express arguments in favour of their positions or in which one of the participants, not expressing his own arguments, questions the arguments of the other party. Based on the result of quality research concerning argumentation reliability in naturally occurring discussions (Dębowska 2008), I support the standpoint of Eemeren and Grootendorst (1984, 1992, 2004) that the pragma-dialectical model is the proper tool for determination the "dispute space" by means of the specification of: common propositional content[3] of the argumentation, the standpoints of the participants of the dispute, the type of the dispute, the stages of the dispute, as well as complex relations between the pro-arguments resulting from the introduction of counterarguments.

[1]The notion of "a naturally occurring dispute" is used within the meaning proposed by Walton (1995).

[2]The notion of "disagreement space" is used here within the meaning proposed by Eemeren and others (1993).

[3]The notion of common propositional content was introduced by Eemeren and Grootendorst (1984). It refers to the notion of macro-proposition introduced by van Dijk (1997), i.e. to the basic propositional content of the discourse.

The above quality research (Dębowska 2008) has also confirmed the following features of the pragma-dialectical model and have indicated the directions of its development:

(1) the concept of "a fallacy" in pragma-dialectics is too closely connected with the traditional definitions of formal and informal fallacies;[4]

(2) the only extension of the standard approach to argumentation reliability is the assertion that each breach of the pragma-dialectical rule affects also the balance between the dialectical global goal of dispute resolution and the rhetorical global goal of carrying out the most efficient attack, and therefore it in itself constitutes an obstacle for resolution of the existing dispute;[5]

(3) assessment of argument reliability in the pragma-dialectical model should also be based on the abductive reasoning,[6] and therefore should concentrate on determination of the pragmatic relevance of an argument, the analysis of the inference processes and their relations with various possible global and local goals of the interlocutors.

The analysis of the above points shall be preceded in this work by a theoretical description of the concept of a fallacy. Two perceptions of the concept shall be discussed in paragraph 2: a standard and pragma-dialectical approach to the reliability of an argument. We shall also present the pragma-dialectical model of critical discussion. Paragraph 3 shall pertain to evaluation of the pragma-dialectical model from the semiotic perspective; I shall explain why the pragma-dialectical perception of the reliability of the argument should be semiotically adequate. In paragraph 4, on the other hand, I will concentrate on the meaning of abduction in the semiotically adequate model frame, and I shall demonstrate why the combination of the

[4]In pragma-dialectics a breach of one of the rules of critical discussion is treated as a fallacy.

[5]The pragma-dialectical model does not consider other goals apart from the dialectical goal of dispute resolution and the rhetorical goal of carrying out the most effective attack.

[6]Abduction is one of the three methods of reasoning distinguished in modern linguistics (Hobbs 2006). The two remaining ones are induction and deduction. Hobbs (2006: 727) claims that "In deduction, from P and P $\rightarrow$ Q, we conclude Q. In induction, from P and Q, or more likely a number of instances of P and Q together with other considerations, we conclude P $\rightarrow$ Q. From an observable Q and a general principle P $\rightarrow$ Q, we conclude that P must be the underlying reason that Q is true." Abductive reasoning refers therefore to the process of development of the most probable explanations for the set of available information. Pragmatically developed utterances, local and contextual implicatures, are according to Hobbs (2006), the products of abductive reasoning. Cf. also paragraph 4.

pragma-dialectical model frame with Hobb's "Interpretation as Abduction" system increases the effectiveness of the assessment of the argumentation reliability. In paragraph 5 I will focus on the significance of local and global goals in the semiotically adequate model frame. In paragraph 6 I will present a proposition of extension of the pragma-dialectical model, based on the interdisciplinary theory of communication, which includes the complementary approaches from the fields of rhetoric, dialectics and pragmatics; interdisciplinary theory of communication will therefore be perceived from a superior semiotic perspective (cf. Wąsik 2003: 15, 17).

2. A STANDARD AND PRAGMA-DIALECTICAL PERCEPTION OF ARGUMENTATION RELIABILITY

Standard definition of fallaciousness, referring to the apparent correctness of the argument has been recently, as observed by Eemeren (2001: 35), ousted by the pragma-dialectical definition, which describes a fallacy as a deficit move in the argumentative discourse. A fallacy is therefore placed in a complex speech act.

It is worth noticing the fact that the concept of a fallacy was already described by Aristotle in 4^{th} century BC. Both sophismata, as well as deductively incorrect demonstrative syllogisms were treated by Aristotle as fallacies. He defines sophisms as arguments which seem to "reason from opinion" and which appear to be generally accepted but are not (1955: 17ff). What Aristotle (1955) calls a sophism is an argument presented to someone with the intention of misleading them. Two types of fallacies are distinguished: language-dependent fallacies (*in dictione*) and language-independent fallacies (*extra-dictionem*).

For example, equivocation, amphiboly, fallacies of conjunction and division, errors of accent and figurative speaking errors are treated by Aristotle as language-dependant sophisms. On the other hand, arguments in which expressions are incorrectly classified in connection with the place and manner of use, *fallacia accidentalis, ignoratio elenchi, fallacia sequendum quid et simpliciter, fallacia consequentis, petition principii,* the error of false cause, the error of many questions in one — are language-independent (Aristotle 1955, 17,25).

Aristotelian notion of incorrect demonstrative syllogism was, according to Hamblin (1970 [1993]),adopted by Cassiodorus in the 6^{th} century and replaced by the notion of "formal fallacy". In the 20^{th} century the concept of a formal fallacy was recognized as a collective term for the following categories: equivocation, critical errors of conjunction and division, incorrect

use of modus ponens, incorrect use of modus tollens, erroneous change of the function of the operator (cf. Walton, 1995: 69-90).

The concept of the informal fallacy, rooted also in the Aristotelian tradition, is associated above all with the name of John Locke. The concept of informal fallacy seems to be more varied than the concept of formal fallacy. The reason for this variation may be considered two-fold. Firstly, we cannot speak of a specific number of informal fallacies. Secondly, as indicated by Eemeren and others (1996), the mere term "informal fallacy" is not systematically used by all scientists engaged in the argumentation theory.

As suggested by the preceding paragraph, a substantial contribution in the development of the concept of an informal fallacy was made by John Locke in the 17^{th} century. He made a list of the so-called *adfallacies,* i.e. methods of deceiving the opponent. However, in the 20^{th} century one resigned from the term "techniques of deceiving the opponent" and started to define the fallacies as unreliable arguments consciously or unconsciously presented by the opponent (Eemeren *et al.* 1996).

The concept of formal and informal fallacies was in the '80s of the 20^{th} century adapted by the Amsterdam pragma-dialectical school. Rob Grootendorst and Frans H. van Eemeren, the principle representatives of the Amsterdam school, proposed an ideal model of critical discussion with an externalisation of the dispute. The pragma-dialectical model distinguishes four stages of discussion: the confrontation stage/externalisation of the dispute, opening stage, argumentation stage and concluding stage.

Eemeren and Grootendorst (1984: 75ff; 1992: 34ff) claim that discovering certain pragmatic and dialectic features in naturally occurring discussions is possible, if the person analysing the discussion adheres to the guidelines proposed in the critical discussion model. Moreover, they emphasize that the goal of each critical discussion should be the dispute resolution (Eemeren, Grootendorst 1992). Therefore, the pragma-dialectical model focuses both on heuristic, as well as critical functions. The perception of the model as a series of guidelines emphasizes its heuristic function. Evaluation of the argumentative moves in the context of their contribution towards the resolution of the dispute concerns the critical function of the model (cf. Eemeren, Grootendorst 2004: 58f). It needs to be emphasized, however, that the gravity point of the model is not only Toulmin's concept of critical reasoning, but also "the Socratic ideal of subjecting everything one believes in under a dialectical scrutiny" (Eemeren, Grootendorst 2004: 57).

Below please find the ideal model of critical discussion proposed by

Eemeren and Grootendorst.

Confrontation stage 1.1 1.2	Confrontation / externalisation of a dispute (stage 1) Language user 1 advances a positive or negative point of view in respect of expressed opinion O Language user 2 casts doubts on this view
Opening Stage 2.1 2.2 2.3 2.4 2.5 2.6	The decision to conduct an argumentative discussion (stage 2) Language user 2 challenges language user 1 to defend his point of view with respect of O Language user 1 accepts the challenge from language user 2 Language user 1 and language user 2 decide on an attempt to resolve the dispute by means of discussion Language user 1 and language user 2 decide who is to take the role of protagonist and who the role of antagonist in the discussion Language user 1 and language user 2 agree the rules of the discussion to be followed Language user 1 and language user 2 agree when they will regard the discussion as concluded
Argumentation stage 3.1 3.2 3.4 3.5	The advancing of argumentation and reaction to it (stage 3) The protagonist advances an argumentation in defence of his view The antagonist reacts to the protagonist's argumentation by casting doubt on the constellations of statements that constitute the argumentation or on the justificatory or refutatory potential of those constellations The antagonist reacts to the protagonist's argumentation by casting doubt on the constellations of statements that constitute the argumentation or on the justificatory or refutatory potential of those constellations (etc.)
Concluding stage (a) (b) (c)	Determining how the discussion ends (stage 4) The dispute is resolved in the protagonist's favour The dispute is resolved in the antagonists favour The dispute is unresolved but the discussion is terminated (perhaps, *pro tem*)

(Eemeren, Grootendorst 1984: 88)

The model is characterised by special rules, breach of these rules is referred to by standard definitions of formal and informal fallacies:

Rule 1. Parties must not prevent each other from advancing or casting doubt on standpoints.

Rule 2. Whoever advances a standpoint is obliged to defend it if asked to do so.

Rule 3. An attack on a standpoint must relate to the standpoint that has really been advanced by the protagonist.

Rule 4. A standpoint may be defended only by advancing argumentation relating to that standpoint.

Rule 5. A person can be held to the premises he leaves implicit.

Rule 6. A standpoint must be regarded as conclusively defended if the defence takes place by means of the common starting points.

Rule 7. A standpoint must be regarded as conclusively defended if the defence takes place by means of arguments in which a commonly accepted scheme of argumentation is correctly applied.

Rule 8. The arguments used in a discursive text must be valid or capable of being validated by the explicitization of one or more unexpressed premises.

Rule 9. A failed defence must result in the protagonist withdrawing his standpoint and a successful defence must result in the antagonist withdrawing his doubt about the standpoint.

Rule 10. Formulations must be neither puzzlingly vague nor confusingly ambiguous and must be interpreted as accurately as possible.

(Eemeren, Grootendorst 1992: 208f)

Violation of rule 8. pertains to formal fallacies. Violation of rule 10. pertains only to the formal fallacy of equivocation. Violation of all the remaining rules pertains to informal fallacies. Moreover, in the pragma-dialectical theory, violation of rules 1.-9. is connected with particular stages of critical discussion. Violations of rule 1. occur at the stage of confrontation /externalisation of the dispute, violations of rule 2. occur at the opening stage, violations of rules 3.-8. occur at the stage of argumentation and violations of rule 9. occur at the stage of dispute resolution (Eemeren, Grootendorst 1992: 208f).

3. SEMIOTICALLY ADEQUATE MODEL FRAME

A semiotically adequate model frame for analysis of legitimacy of the relevance of the naturally occurring discussions should definitely not be

based on the basic concepts of particular semiotic approaches. In view of the fact that the objective of this work is to develop criteria based on the interdisciplinary theory of communication, including the complementary notions from the field of dialectics, rhetoric, and cognitive pragmatics — the point of reference here shall be those semiotic terms and categories, which belong to the systems describing international communication with regards to interpretation. The model frame understood in the above way shall be based on the approaches represented by such semiotitians as: W. Morris, Ch. Peirce, J. Pelc, R. Barthes, J. Greimas (cf. also Wąsik 2003, Hodge, Kress 1988).

In view of the above it seems obvious that the pragma-dialectical model frame is not based on the semiotic properties of interpersonal communication. This frame does not focus on various patterns of interaction, but is centred rather on the standard treatment of fallacies (Eemeren *et al.* 1996: 283ff; Eemeren, Grootendorst 2004: 158ff). Despite the fact that the function of the ideal pragma-dialectical model is not a reproductive description of the features of speech acts, yet, omitting the inference processes, graduality and the multi-sided character of the decisions (treated as processes and products of abductive reasoning) results in a decrease of the semiotic value of the model. Thus, increase of the semiotic efficiency of the pragma-dialectical model requires that we take into account the relativity of communicational behaviours (cf. Hodge, Kress 1988).

4. THE MEANING OF ABDUCTION IN THE SEMIOTICALLY ADEQUATE MODEL FRAME

Normative pragmatics is treated by Eemeren and Grootendorst (Eemeren *et al.* 1993) as the basis of the pragma-dialectical model. Therefore, the model takes into account: the felicity conditions necessary for the expression of speech acts with the argumentative illocutive force formulated on the basis of Searle's speech acts theory (1969, 1979), Grice's version of the cooperation principle[7] (1975), and Jackson's and Jacobs' logical assumptions (1983). The model assumes that speech acts should be expressed in accordance with the assumptions and expectations of the other party; the basis here is Grice's cooperation principle, an account not taken of possible violations of conversational maxims.[8]

[7]Grice's cooperative principle (1975): "Make your contribution as informative as required (for the current purposes of the exchange)."

[8]I am referring to Grice's (1975) conversational maxims, included into the coopera-

Representatives of the pragma-dialectical approach are aware that discussion participants are not often perfectly rational in their assumptions and expectations, yet despite this fact they do not allow the possible blurring of the conceptual categories. For example, adopting Jackson's and Jacobs' logical assumptions, i.e. "the assumptions of mutual awareness and mutual dependency" and "the assumptions of common activity" function only as an elaboration of Grice's cooperative principle as part of the "interaction direction." "The assumption of common activity" refers to Goffman's idea concerning the "working consensus" (1959: 10), which is associated with making a common decision concerning the "direction of the interaction." In accordance with the assumption of "common activity," the interlocutors together determine the direction of the interaction, assuming the roles of the protagonists and of the antagonist. "The assumption of mutual awareness and mutual dependency" is demonstrated in the interlocutors' cooperation, who systematically strive for a common goal, i.e. the unification of opinions. As emphasized by Jackson and Jacobs (1983), logical assumptions are connected with Grice's (1975) conversational maxims, whereby the basis is considered to be composed of the following values: honesty, efficiency, relevance and clarity.

The normative structure of the pragma-dialectical model does not therefore include into the criteria of assessment of the validity of the arguments the products of abductive reasoning: pragmatically developed utterances and local and context-conditioned implicatures.[9] "Pragmatic enrichment" is connected above all with "saturation" and "free enrichment." Saturation consists of filling a slot in the logical form of an utterance. According to Carston (2002: 186), if a slot is not filled in, then we do not get full propositional form of an utterance.[10] Unlike the notion of saturation, the notion of free enrichment does not pertain to the cognitive process conditioned by the linguistic component of the utterance (Recanati). In light of the relevance

tion principle, i.e. the maxims of quantity, quality, relation and manner. These maxims have been developed in order to examine unnecessary, dishonest, unmotivated and incomprehensible speech acts.

[9]The notion of "conversational implicature" is connected above all with finding the hidden meaning of a given statement by infringement of one or more of Grice's conversational maxims, i.e. the maxims of quality, quantity, manner and relation.

[10]Carston (2002: 186) provides the following example of a grammatical ellipse "Jane wants apple pie and Bill [?] chocolate mousse", requires filling in the process of utterance saturation. She also presents the following example of the following utterance: "He is too young [for what]", in which the pragmatic conclusion saturates the slot "[for what?]".

theory, prepositional contents are the product of the following processes (1) creation of an implicature, (2) free enrichment and (3) saturation, and are treated as being cognitively strong. In other words, these processes reinforce the contents of the utterance.[11]

It is rather undisputable that the subjective evaluation of meanings characteristic for abductive reasoning constitutes a reason for explicit resignation from the adoption of the above concepts in the pragma-dialectical model. However, as social semiotitians Hodge and Kress (1988) emphasize, making a naturally occurring discussion dependant on the configuration of the possible social, cultural or even situational meanings encourages adoption of a subjective point of view as the basis for objectivity in the research of natural discourse. It would therefore be advisable to take into account cognitive pragmatics, and not to focus solely on normative pragmatics.

Although the pragma-dialectical model constitutes, undoubtedly, an attempt at developing an interdisciplinary model of communication, it is to a considerable extent based on the coding/decoding model of communication.[12] Pragma-dialectitians have adopted as their basis the characteristic features of the coding/decoding models, such as single-directedness and invariability of meanings. Although they focus on complex relations between arguments, they still treat the effects of these relations as stable, i.e. considered only on the level of contribution effectiveness aimed at dispute resolution. On the other hand, cognitive pragmatism emphasizes the multi-directedness of effects, an account is taken of the relativity of qualification of the complex speech acts expressed by the participants of the dispute (cf. Jacobs *et al.* 1991: 58). As stressed by Walton (1995) and Jackson (2007), the complexity of naturally occurring discussions is manifested in the sequencing of the complex speech acts and the dynamics of the development of meanings (cf. also Jacobs and Jackson 1983: 286, Walton 1995: 22). These features are characteristic for the inference communication model.

Taking the above into account, we do not however question the fact that the concepts distinguished in pragma-dialectics are adequate tools for determination of the space of the dispute. They indicate the conditions necessary for externalisation of the dispute, i.e. the specification of the kind

[11]For example: a visible cognitive reinforcement effect on the utterance "She's got a mind" in the process of free enrichment would be "She's got an excellently functioning mind."

[12]Exemplary models of coding/decoding communication models have been developed by: Lasswell (1948), Shannon, Weaver (1949), Gerbner (1956), Jakobson (1960) and Berlo (1960).

of the dispute, determination of the standpoints of the dispute participants, as well as complex relations between the pro-arguments resulting from the inference of counterarguments. However, it needs to be noted that these notions are used to designate such phenomena/products which are a result of abductive reasoning. Therefore, by contemplating these type of issues, we need to bear in mind the fact that determination of the dispute space should be connected with reasoning through implicature, both local as well as contextual. Then it is possible to analyse the reliability of the arguments, i.e. juxtapose the fallacies with real and virtual points of view of the dispute participants, the stages of the dispute and the type of the dispute.

It needs to be emphasized, however, that abduction as the indispensible cognitive backbone of the pragma-dialectic theory cannot consist in clearly simplified forms of reasoning, being the basis of the artificial intelligence models (Reed, Grasso 2007: lff: Reed *et al.* 2007: 87ff). Although these models are based on abduction, they do not take into consideration strong and weak implicatures, which appear in the process of meaning creation in naturally occurring discussions. This impacts on the notional and methodological rigour of the pragma-dialectical model reinforced by abductive inference, which is different from the rigour characteristic for artificial intelligence models. It is obvious here that we are not undermining the hypothesis that artificial intelligence models are focused on the analysis of various effects. Multi-agent reasoning assumes, however, possible ways of achieving the previously planned effects, by varying degrees of the probability of occurrence. In naturally occurring discussions the goals, even if previously planned, may change over the course of the discussion (cf. Jacobs *et al.* 1991: 58). Therefore, as emphasized by Jacobs and others (1991), the analysis of natural discourse should allow the existence of local and global goals, as well as the possible alterations thereof. Thus, we need to find such a system of abductive inferences investigation, which would extend the pragma-dialectical model and at the same time would take into account the degree and character of occurring interpretations in connection with the achievement of goals, which are not subject to direct inspection. Such a system, in view of its capacity, seems to be the model framework called "Interpretation as Abduction", developed by Jerry Hobbs (1993, 2006).

The "Interpretation as Abduction" (IA) model framework makes it possible to construct cohesion links in interpretation, assuming as the starting point the Gricean (Grice 1957, 1975, 1989) and neo-Gricean (Sperber, Wilson 1986, Bach 1994, 1999, Blackmore 1998, Carston 2002, Recanati 1993, 2006) interpretational distinctions and relevance theory (Sperber, Wilson 1986).

Hobbs (2006: 735) maintains that correct interpretation of an utterance requires that the conversation is perceived as "coherent segment of discourse conveying some situation." This way, he points out, the correlation of the processes of thinking is based on abductive interference in the process of recognition of the relations characteristic for the discourse, e.g. the preparatory relations. Recognition of coherent relations, as Hobbs emphasizes, requires that one takes into account both the informational, as well as the intentional contents of the discourse. The informational contents of the discourse is the product of the pragmatic reinforcement of the preposition, i.e. the emergence of the explicature, for example by means of saturation or free enrichment. On the other hand, the intentional contents of the discourse is the product of conversational implicature and presupposition.

5. LOCAL AND GLOBAL GOALS IN THE SEMIOTICALLY ADEQUATE MODEL FRAME

In comparison with the pragma-dialectical model, Hobbs's system (Hobbs *et al.* 1993, Hobbs 2006) provides for the existence of other goals than the resolution of a dispute. One pays attention to local and global goals of the participants, which emphasizes the dynamics of the character of mental operations. Jacobs and others (1991: 58) define local purposes as virtual plans and requirements emerging in a locally relevant way and indicate that global purposes are determined prior to the commencement of the discussion. Taking into account the local and global goals of the dialogue, Hobbs (2006) refers directly to Walton's persuasion dialogue (Walton 1995, cf. Walton 2004) and Sperber's and Wilson's relevance theory (1986).

Walton's persuasion dialogue adopts the pragma-dialectic critical discussion as its starting point. At this point it needs to be noted, however, that Walton's persuasion dialogue (as well as the examination dialogue being a part of the persuasion dialogue) does not function as a construct enabling the analysis of the standpoints of the dispute participants, the type of the dispute and the stages of the dispute — as is the case with the pragma-dialectical model. Moreover, according to Walton's persuasion dialogue, resolution of a dispute is not always the global goal of the disputants. Especially, when we are dealing with "a non-mixed discussion" (cf. Eemeren, Grootendorst 1984: 5), in which only one participant presents an argumentation and the other one is undermining it. Walton indicated that "a non-mixed discussion" provides only that the points of view of the participants are mutually exclusive.

Walton's persuasion dialogue suggests the existence of a multi-directional nature of the relations between local and global possibilities. For example, carrying out a most effective attack may, but does not have to, take into account the resolution of the dispute (Walton 1995, cf. also Walton, Godden 2005: 273ff). It also needs to be added that in the Walton's dialogue there has been a clear distinction marked between the common and individual goals of the participants. It therefore develops the pragma-dialectical model from two perspectives: diversity and individuality of goals.

The examination dialogue, being a part of the persuasion dialogue, assumes the existence of two goals: the goal of "extracting information" and the "goal of testing the reliability of the argumentation" (Walton 2006: 772). In the ideal clarification dialogue model one also takes into account the change of the argumentative aspect to the clarification aspect in the contributions of both dispute participants.

As the reference to the relevance theory (Sperber, Wilson 1986) is concerned in Hobb's system (2006), it is visible in the fact that it takes into account the ostensive behaviour of the dispute participants, i.e. the predictability of communication behaviours. Ostensive behaviours in naturally occurring discussions are perceivable for other dispute participants thanks to the maximisation of the multiplication effect. The multiplication effect pertains to the building of dynamic relations between the arguments expressed at a given time and the arguments expressed at an earlier stage. Sperber and Wilson (1986: 48) indicate the fact that the increase of relevance of new assumptions depends on the increase of the number of links between arguments. It is therefore obvious that in discussions in which externalisation of a dispute occurs, the linking of old and new assumptions explains the contents of a given point of view. The productivity of clarification of a point of view should be understood here as causing positive cognitive effects increasing the knowledge of the participants of the dispute, and the knowledge already possessed by the analysing person. In other words, at this point verification of the available assumption takes place.

6. A PROPOSAL FOR THE EXTENSION OF THE PRAGMA-DIALECTICAL MODEL

In this paragraph I shall discuss a proposal for the extension of the pragma-dialectical model, for the examination of reliability of the argumentation based on the interpretation process. The new model is based on the critical discussion structure, i.e. incorporates into the pragma-dialectical model those notions and categories, which make it possible to determine the

common contents of the discussion, the standpoints of the dispute participants, the type of the dispute, the stages of the dispute, as well as the complex relations between the pro-arguments resulting from the introduction of the counterarguments. As has been confirmed by quality research (Dębowska, 2008), analysis of the interpretational processes in the argumentative discourse is not possible without the externalisation of the above aspects. An additional set of criteria necessary for the assessment of reliability of an argument is characterised by fuzzy hierarchical structure, assuming the need for verification of the interpretation over the duration of the discourse, and suggests the only possible order of the analysis of the reliability argument.

The point of gravity of this set is the pragmatic relevance of an argument, determined by the specification of the optimum of the pragmatic argument, the topos of the dynamic argument and the so-called pragmatic warrant. The notion of the topic of the dynamic argument functions both in dialectics, as well as in rhetoric. On the other hand, the notion of the pragmatic warrant is connected with the notion of "critical reasoning", described by Toulmin (1958 [2003]).

Set of criteria/guidelines

(1) It is assumed that there is a relation between the point of view of the proponent or the opponent and the argument presented in defence of this point of view. No relation at the level of logical minimum[13] requires that the degree of the pragmatic relevance of an argument is determined. Determination of the degree of pragmatic relevance of an argument is possible by means of specification of the pragmatic optimum, the argument's dynamic topos and the pragmatic warrant.

(2) Absence of pragmatic relevance at the level of point of view-argument, results in the specification of pragmatic relevance at the level of coordination, subordination or multiple relations between the arguments.

(3) At every stage of the determination of pragmatic relevance of the argument one needs to take into account possible inference processes taking place in a naturally occurring discussion as well as the effects thereof (e.g. the implicature). Let us assume that the "Interpretation as Abduction" model frame constitutes an adequate model for examination of the interpretation processes (cf. paragraph 4).

[13]The notion of logical minimum ("if p then q, where p is an 'argument' and q is a 'point of view"') and pragmatic optimum was introduced by Eemeren and Grootendorst (1992: 61-65). They assume that on this basis it is possible to verify the *ignoratio elenchi* argument, they do not allow, however, for a second assessment of the remaining fallacies.

(4) The pragmatic relevance of an argument with respect to a point of view should be considered with respect to the local and global goals of the disputants.

(5) One needs to determine the relation between the rhetorical and dialectical goals (possible relations: balance between the rhetorical and dialectical goals, predominance of the rhetorical goals overt the dialectical goals and *vice versa*).

Reliability of an argument is therefore considered not only with respect to the pragma-dialectical rules. The above criteria/guidelines focus on the notion of pragmatic relevance and may also be treated as an extension of rule 5 of the pragma-dialectical model. Rule 5 assumes that there exist implicit prerequisites, yet in view of its prescriptive character, it does not propose any method of examination thereof. The notion of "pragmatic relevance" on the other hand places implicitness in the foreground, emphasizing that it is connected with the processes and effects of abductive interference connected with the goals of the persons presenting their arguments. It needs to be noted that pragmatic relevance pertains above all to the relations between the point of view and the prepositional contents of the argument. According to Jacobs and Jackson (1992: 173), the prepositional content of a pragmatically relevant argument justifies the point of view and refers to the common prepositional content of the discussion or the common prepositional content of the sub-discussion (cf. Walton 1995). Jacobs and Jackson emphasize therefore that pragmatically relevant arguments cannot be treated as fallacies. Such a standpoint is also supported by Walton (1995: 255), who added that pragmatically relevant arguments are not an obstacle for achievement of the goal(s) of the disputants. Walton (1995) indicates however that not all pragmatically irrelevant arguments should be defined as fallacies. A pragmatically irrelevant argument may simply turn out to be a weak prerequisite. Therefore, the above set allows for the graduality of pragmatic relevance.

Aiming at the creation of an interdisciplinary model for argumentation examination on the basis of the pragma-dialectical model, I have used the notions from the borderline of three disciplines dealing with the dialogue form of argumentation: pragmatics, rhetoric and dialectics. Each of these notions, i.e. "the pragmatic optimum", "the dynamic topos of the argument" and the "pragmatic warrant of an argument" concerns the determination of the pragmatic relevance of the argument. Despite the fact that they stem from various traditions examining the argument structure, each of them functions as an abductive interference, i.e. an implicit attempt at explaining

the point of view.

As we have already mentioned, the notions of the "logical minimum" and "the pragmatic optimum" were introduced into the research of the dialectic form of the argument by Eemeren and Grootendorst (1992). The logical minimum assumes the form of a modus ponens argument "If p then q, where p is an 'argument' and q is a 'point of view,"' i.e. it pertains to the explicit form of the prerequisite. "The pragmatic optimum" is based on the closest context of a given speech act, i.e. allows the externalisation of an implicit prerequisite. As opposed to Eemeren and Grootendorst, we believe that application thereof as inference rules allows for a second verification not only of the *ignoratio elenchi* argument, but also of each potential fallacy.

The concept of "topos" adopted in the above set exceeds the definitions adopted by Aristotle and Perelman and Lucie Olbrachts-Tyteca. The Aristotelian notion of "special topos" is limited to three types of rhetoric, i.e. intended rhetoric, defensive rhetoric and argument refuting rhetoric (cf. Aristotle 1959: 33, 169, 171). On the other hand the Aristotelian motion of the topos based on a definition, property, type or case is limited to the Aristotelian dialectical discussion or to specific types of rhetoric (cf. Aristotle 1966: 281, 283, 285, 19). Similarly as in Aristotle's works the notion of topos in the works or Perelman and Olbrachts-Tyteca does not function as a general inference rule. Perelman and Lucie Olbrachts-Tyteca (1969: 85) discuss only those arguments which may be analysed within the topos of quality, topos of quantity, topos of order and topos of essence.

A new set of criteria adapts the concept of a scalar topos proposed by Anscombre and Ducrot (1989: 82f, Ducrot 1996). Such a concept of the topos refers to the gradable inference rules allowing the combination of topical fields in a given context. Potentially, each argument in the spoken discourse may be referred to using the gradable inference rule (Ducrot 1996). Carel (1995, p. 169) indicates four basic forms of scalar topos: "+ P, + Q", "- P, -Q", "- P, + Q", "+P, - Q", where "P" is an argument and "Q" is a point of view. Bruxelles and others (1995: 105, 106) indicate one possible topoi of uttering "He is rich, he will invite you," namely, "the more you have, the more you will do," based on two topical fields "Possession" and the "Ability to act".

7. CONCLUSION

The starting point for this article consisted of three basic assumptions, supported by the theoretical considerations and quality research carried out by Dębowska (2008):

(1) the pragma-dialectical model in the form proposed by Eemeren and Grootendorst cannot function as a tool adequate for the analysis of the reliability of argumentation in naturally occurring discussions;

(2) observance of the rules of critical discussion and the realisation of the dialectic goal of a critical discussion — resolution of a dispute — cannot be the only criterion of the assessment of argumentation reliability;

(3) argumentation should be treated not as a sequence of axiomatically conditioned assertions but a sequence of complex actions.

Bearing in mind the above, we have proposed criteria for evaluation of the reliability of the naturally occurring discussions. Determination of the pragmatic relevance of an argument, referring to the three rules of abductive inference, i.e. to the "pragmatic optimum," "topos of dynamic argument" and "the argument's pragmatic warrant," is the most important criterion of the assessment of the reliability of an argument. The criteria/guidelines presented in the preceding paragraph come directly and indirectly from Hobbs's model. Sketching the relation between the "Interpretation as Abduction" model frame and the persuasion dialogue model it has been demonstrated that the constant emerging of local goals may refer to the so-called embeddings of various types of dialogue models (e.g. the clarification dialogue) in the structure of the persuasion dialogue.

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Anna Pietryga

LEIBNIZ'S *LINGUA CHARACTERISTICA* AND ITS CONTEMPORARY COUNTERPARTS

Originally published as "Leibniza <<lingua characteristica>> i jej współczesne odpowiedniki," Studia Semiotyczne 27 (2010), 293–305. Translated by Lesław Kawalec.

There is no need to introduce Gottfried Wilhelm Leibniz, a great philosopher, theologian, diplomat, creator (independently of Isaac Newton) of the infinitesimal calculus and founder of the Academy of Sciences in Berlin. He also planned the development of the so-called *Lingua characteristica* (the plan shared by other 17^{th} century scholars). Literally taken, the name of the language means a *language of letters*, a *graphic language*, also called a *characteristica universalis*. It was meant to be a way of expressing meanings, as modeled after methods used in arithmetic and geometry (Leibniz also mentions logicians) and having unusual properties.

1. Like mathematical methods, such as written multiplication, *lingua characteristica* is supposed to enable an assessment of the reasoning correctness on the basis of the notation alone, which would prevent disputes between followers of opposing ideas and thus eliminate such disputes at the outset. Agreement would be reached by means of performing calculations in public, as encouraged by the Latin motto: *calculemus* (Murawski 1994: 93, 97).

2. *Lingua characteristica* will shut the mouths of ignoramuses as in the new language it will be possible to write about and discuss those topics only that one understands; otherwise the mistake will be noticeable for everyone, the author included (Murawski 1994: 95). (The text fails to mention authors of utopian designs, but these have not yet been expressed in a magical language).

3. The language would be extremely easy to learn, offering symbols for human thoughts as the so-called *lingua mentalis*. It will also serve communication between nations, which would accept it as a very useful device. One can guess that there is just ONE *characteristica universalis*; otherwise the dispute between followers of the various options seems inevitable.[1]

Thanks to this wonderful language, anything cognizable would be cognized or, to be more precise, executable or calculable *ex datis* — on the basis of the data one has. If the method, applied by mathematicians did not suffice to discover everything one would have expected, it did at least prevent them from error — "if they did not say everything they should have, then they also did not say anything they should not have" (Murawski 1994: 94, 92).

From the standpoint of Leibniz's monadology, each monad (simple substances) contains all its future history (Murawski 1991: 47-48, 51-52), as some kind of DNA. In parallel to substances, a notion pertinent to it, too, has to contain in its contents all the predicatives that can be truthfully predicated of that substance. The path to truth, according to Leibniz, is an analysis of notions, which occurs through the application of mathematical operations (from the domain of combinatorics) on simple notions (Batóg 1991: 109, Murawski 1994: 91). The great mathematician was in favor of numbering notions (Audi 1996: 429), as numbers reflect their essences.[2] The analysis of language which he carried out usually does not go beyond the analysis of names, omitting e.g. predicatives with a bigger number of arguments or functional symbols, such as the signs + and =.[3]

The totality of notions is a network that starts with simple notions and then includes more and more complex ones, with the ordering relationship for the system being that the relationship of some notions is contained in others

[1] See Audi 1996: 427-429. The great thinker's "ecumenical" desires about the unity of Christians ought to be mentioned, as well as his contacts with Baruch Spinoza. Cf. Audi 1996: 759, Murawski 1994: 91, 97, Marciszewki 1988: 92.

[2] "Essentiae rerum sunt sicut numeri." See the paper by Witold Marciszewski, discussing the same (1999), "Być robotem — sposób na nieśmiertelność" (http://www.calculemus.org/lect/si/b.html) [being a robot is a way to achieve immortality].

[3] "It needs to be borne in mind that Leibniz was strongly influenced by Aristotle and the scholastics, and usually limited himself to deliberating on those notions only that were expressible by names and forgot to mention the notions (familiar to him, incidentally) that corresponded to functional symbols, predicates with two or tree arguments, etc." (Batóg 1991: 109).

(like the Aristotelian categories, where from the highest classes — categories — we move down to the narrowest, along the pattern: kind (that which is superior)/species (that which is subordinate/ species difference (that which differentiates one species within the kind from another species)). KIND and SPECIES are names of relationships, and any being — the extremities of hierarchies included — is at the same time a KIND for a subordinate SPECIES and a SPECIES for a higher KIND.

Leibniz went on to abandon the idea that an analysis of notions can be conducted to the level of original notions in an absolute sense, but he continued to believe that the level of the simplest notions man uses can be attained. It was the application of an appropriate system of signs (Burkhardt 1980: 219-220, 197) that was supposed to be of assistance in conducting relevant analyses, or even their indispensable condition.

The contemporary counterparts of Leibniz's idea that seek to attain similar OBJECTIVES concerning communication and consensus between people (other than Ludwik Zamenhoff's Esperanto) include Anna Wierzbicka's *Lingua Mentalis*, under construction for years now, as well as the *Ehmay Ghee Chah* universal foreign language by Elmer Hankes. As Zenon Klemensiewicz wrote in 1963, there had already been several hundred such attempts before (Klemensiewicz 1963: 9).

On the other hand, one needs to mention formalism, which was prevalent in the 1920s logic, and which used METHODS that were similar to those that Leibniz proposed in the construction of *lingua characteristica*.

1. LINGUISTIC DESIGNS

Esperanto is probably the best known contemporary attempt of the kind, and possibly the most consistently realised. Started by the Warsaw ophthalmologist, Dr Ludwik Łazarz Zamenhoff (1859-1917), it must have been intended as "giving hope" since the very word "Esperanto"szyk> means in that language 'a hopeful.' The first textbooks of the new language, published in Russian and Polish, were signed by the author's nickname, who would call himself "Dr Esperanto."[4]

Białystok, where he was born, was in those days a multilingual town (as the whole of Poland was[5]), and a Jewish town in particular, just as Zamenhoff's family were Jewish. Languages divided people, which fortunately

[4]See http://esperanto.pl.

[5]The illusion of Poland as a country speaking homogeneous Polish is shattered by the interesting and well-researched booklet by Marian Kucała (2002).

was not always a problem. Władysław Bartoszewski offers some interesting recollection on this subject in his book-length interview, given to Michał Komar. As a child, he learned to understand Yiddish and following his return from the park asked his mom why he was a 'stupid goy,' as he heard a Jewish mother forbid her child to play with him using this particular phrase. Fortunately, little Włodzio's mother did not seem to care very much (Bartoszewski, Komar 2006: 9).

That language borders are not always treated lightly by children and adults is known to us from the painful history of the 20^{th} century (if not from the contemporary experience). The deadly danger of not being able to pronounce the word *shibboleth* is known to us from the early parts of the Old Testament.[6]

The historical and geographical coincidences might probably be credited for Zamenhoff's success (he was a son of a foreign language teacher) in creating a language that would be user friendly and allow the overcoming of existing barriers without creating new ones. Alas, despite grammatical simplicity, Esperanto does treat people unequally because of its heavy reliance on Romance grammars (Latin, Italian, French, Portugese), and not everyone — not even before World War II — could use those.

Postwar designs include the *Lingua Mentalis*. Within its framework, Anna Wierzbicka indicated the co-called 'semantic primitives,' to which any expression of the natural language can be reduced. Initially there were 13 of those: *I, you, someone, something, world, this, want, not want, think of, say, imagine, be part of, become*.[7] This number grew in her subsequent publications, reaching about 30 elements in 1991 and 60 in 2002. These so-called universals are supposed to facilitate the expression of all meanings that someone who uses any language wishes to express. The examples presented in print usually concern two languages: English or Polish but, in the opinion of Wierzbicka, English can be replaced with any natural language. Elsewhere she states that some more complex schemes "are more associated with a specific language, such as *I want to do this*."[8]

Specific examples of the application of the method presented are not

[6]The Book of Judges 12:6. This is to thank Janusz Wojnar for his assistance in positioning this O.T. passage. C*f.* the paper by Jerzy Bartmiński (2000) concerning national identity:

http://www.wtk.poznan,.pl/Archiwum/20001019/Bartminski.html

[7]Wierzbicka 1980: 10; my punctuation — AP. Initially these words were printed in columns.

[8]See Wierzbicka 1988: 9, 10 and 1991: 7, 8. *Ibidem* see the differing lists of 'supplementary terms.'

always in full agreement with the declarations concerning the vocabulary used, since alongside the so-called semantic primitives, they also include notions that are "relatively very simple and extensively recurrent in the world's languages as separate lexical units." The examples of analyses concern at least three levels of semantic encoding: lexical items, grammatical and illocutionary means.

Because the lexical analyses are very extensive, let us present one example only. What is a cup? This is just a fragment of the answer:

CUPS
A KIND OF THING THAT PEOPLE MAKE
IMAGINING THINGS OF THIS KIND PEOPLE WOULD SAY
THESE THINGS ABOUT THEM:
PURPOSE
These are made for people to use repeatedly for drinking hot liquids from, such as tea or coffee,
one person from one thing of this kind
Being able to put them down on something else
MATERIAL [...]
APPEARANCE [...]
WHAT PEOPLE MIGHT SAY ABOUT THEM [...]

As can be seen, the analysis uses complex sentences. With not a word of comment a (relatively) correct word order of some specific language is used and, in the case of Polish, suffixes are correctly selected. In the analyses of English examples, there tend to be correct forms of irregular verbs, and complex sentences make extensive use of gerunds (one drinks from cups *when sitting at a table*) whereas cup plates are made *for putting them* [i.e. cups] *on*. Articles and prepositions are applied with no comment, although anyone trying to apply those on one's own knows how treacherous this is.

The analysis of grammatical structures yields much shorter examples. This is the first of those:

Hilary made Robin type the letters; ['the' was not mentioned among the universals even though the list includes the phrase 'the same'].

Hilary wanted this: Robin will type the letters
Hilary did something because of that
Robin typed the letters because of that
not because Robin wanted it
Robin didn't want it (Wierzbicka 1988: 241)

In 1974 James McCawley (1974: 30) presented a syntactic analysis of a sentence that included the predicate 'persuade,' which was in itself

analyzed in a way typical for generative semantics. The analysis of the inner syntax of the lexeme 'persuade' contained — in appropriate entries — the verbs 'cause,' 'start' and 'intend.' Such elements are missing from the analysis by Wierzbicka, published 14 years later, even though both papers set out to do the same thing: explicate the meaning of a sentence.

Closer to the tradition of generative semanticians are the illocutionary analyses presented by Wierzbicka. Here is one of these:

I suggest that you do this (x)
I say: I think it may be good if you do this (x)
I say this because I want you to think about it
I think: I do not know if you will want to do it (Wierzbicka 1991: 202)

Simultaneously with one of the works by Wierzbicka from 1992, a textbook of an artificial language came out, authored by Elmer Joseph Hankes. Its name is *Ehmay Ghee Chah*, that is, a polite foreign language. It had been conceptualized as simple and undiversified. It is supposed to operate as a *lingua franca* and be subservient to man's collaboration with the computer. The author proposed a brand new alphabet, punctuation and operational commands, concerning e.g. foreign graphical signs.

A letter of Hankes's alphabet is formed by attaching 1-3 horizontal bars to a vertical line — on its left for consonants and on the right for vowels. Between those, dots are added, which is to secure 56 possible combinations, 20 of these for vowels and 20 for consonants. The remaining ones are a reserve for writing expressions in foreign languages, i.e. foreign-language quotations (in which Hankes's alphabet resembles Japanese writing, where katakana is used for foreign words and rendering emphasis).

The sounds of *Ehmay Ghee Chah* are supposed to be pronounced separately, and so there occurs no sonorization or devoicing within a word or between two words, as it is known in Polish (*krzywda, ławka, prośba and wóz siana/wóz drutu*). In general, the pronunciation of the language is to be free from any irregularity, which will facilitate man's collaboration with a machine. All words are unambiguous. There is practically no category of case. There is a need of strict international control of the language's further development to secure fidelity in the imitation of pronunciation patterns (the textbook was distributed with a cassette). On the other hand, local communities should enrich *Ehmay Ghee Chah* with elements of their ethnic languages, such as personal and place names.

According to the author, the language he is promoting levels the playing field for everyone as it has "no evident origin." Alas, as is the case with Esperanto, the origin of the language proposed by Hankes IS evident.

In complex nominal expressions the last element is dominant, as is the case in English, where the true noun is the last one of a series, such as in 'alarm clock,' with the preceding one functioning as a modifier. Longer series illustrating the phenomenon are also possible, such as 'spring wheat grain yield.'

Concerning Hankes's language verbs, their conjugation includes present, past and future forms in perfect and continuous aspects. There is no verb-noun concord. A translation sample from English to *Ehmay Ghee Chah* suggests the following solutions related to word order: subject-predicate, possessive pronoun-noun, predicate-adverbial of place. Vocabulary is defined in English and although changes in that respect are allowable, one can expect that the coexistence of definitions in English and other language(s) can lead to unwanted ambiguities.

A further analysis of syntactic and semantic assumptions provides more evidence to prove that Hankes's language is not as deprived of a conspicuous origin as the author would have it. In writing, he proposes an alphabet rather than a syllabary (as for syllabic languages) or logograms (such as in Chinese). Half of the signs are meant for vowels and the other half for consonants, whereas in some languages the number of consonantal phonemes is dozens of times higher than the number of phonemes representing vowels; it also happens that a given language only features consonants in writing.[9] The very signs of Hankes's alphabet resemble the signs of the Ogamic language, once used by Celts in what today is Great Britain and Ireland. Individual words in the language by Hankes are separated with spaces rather than colons,[10] with the notation going from left to right. Decimal numbering and "Arabic" numerals are used. Italics are avoided; letters should be hand-printed so that collaboration with a computer would be easier. The name of the language is notable, too: *Ehmay Ghee Chah* means a polite foreign language. Impoliteness should be eliminated, and so should tendencies to merge sounds. But then *Ehmay Ghee Chah* is in fact *Eh muh ay ghee chah.*

1. FORMALISM IN LOGIC

Interest in "the forms used by logicians," as Leibniz put it, was reflected in one of the orientations in the 20^{th} century philosophy of mathematics,

[9]On the proportion of the numbers of vocalic and consonantal phonemes in various languages see Majewicz 1989: 182. Apart from Hebrew, other consonantal systems of writing include Phoenician and Ugaritic. *Cf.* Cohen 1956: 49; Comrie 1998: 162, 174.

[10]On the Ethiopian colons see Cohen 1956: 50. Comrie 1998: 176.

known as formalism. Leibniz contributed greatly to its development, and to the development of logic at large; what is particularly emphasized are his assertions about: the identity of indiscernibles, and the possibility of mutual replacement of their names while keeping the truthfulness of the sentence (Audi 1996: 429, Marciszewski 1988: 92). In criticizing linguistic designs of a universal language, we speak of details. In the case of formalism, we touch upon a fundamental question.

Formalism was started by the German mathematician David Hilbert in the 1920s. The so-called Hilbert's program proposed the formalization of mathematics in the first place (and thus the transformation of axioms, proofs and theorems into 'concrete visible objects' (Murawski 1991: 12), which one will be able to examine like objects) and, secondly, a demonstration of non-contradiction of mathematics. In Hilberts opinion, properly selected axioms will afford a possibility of solving every mathematical problem that can be formulated. "There is no *ignorabimus* in mathematics" (Murawski 1991: 12) means 'there is no WE WILL NOT KNOW.' This is how Leinbniz's dream was to come true: say all that is true without saying what is unnecessary (Murawski 1994: 92).

Unluckily for formalists, in 1931 Kurt Gödel published a paper where he proved that the arithmetic of natural numbers (and also all systems that are richer) is incomplete, meaning that we cannot determine whether some of its propositions are its theorems or not. As regards non-contradiction of a formalized theory containing the arithmetic of natural numbers, it cannot be done using the inventory of this theory only. Alfred Tarski reached similar conclusions at the time: unable to provide a formal definition of sentence for a natural language, we can neither formulate a definition of a true sentence in such a language; we also cannot give a semantic definition of the phrase 'true sentence.' Murawski (1998) writes on the mutual (in)dependencies between the two scholars. He presents the following conclusion: although Gödel was first to apply the method formulated by both of them, it was Tarski who first called the result (attained independently from Gödel) the formal undefinability of truth. Gödel in his texts, even avoided the very word 'truth,' for fear of negative reactions in his milieu.

A similar issue can be seen in languages described by the grammars concerning (fragments of) natural language. I mean the categorial grammar, started as early as in the 1930s by Kazimierz Ajdukiewicz and those created in the postwar period by Noam Chomsky and Richard Montague (Buszkowski 1989; Pietryga 2006: 376-377). It would be interesting to trace the history of Tarski and Gödel with regard to languages delimited by generative-

transformational and categorial grammars.

The very first sentence of Ajdukiewicz's famous text of 1935 "Die syntaktische Konnexität" makes reference to the 'discovery of antinomy' and ways of its resolution, which made the issues of linguistic syntax "the most important problems of logic." The text does not imply, however, that the liar's paradox is at issue but, rather, that it is the discovery, in 1901, by Bertrand Russell of the antinomy of classes (Audi 1996: 728-729).[11] This so-called 'Russell's paradox' was resolved thanks to the adoption of the theory of types, designed by Russell himself; in its simplified version it was recognized by most logicians only as late as in the 1930's. It gave rise to the discoveries by Tarski and Gödel (Marciszewski 1987: 113). Most logicians were, as can be imagined, too engrossed in the transformations under way at that time to notice these simple but ingenious thoughts.

The syntactic calculus proposed by Ajdukiewicz in further parts of the paper (Ajdukiewicz 1935) is founded upon the Husserlian conception of semantic categories (which particular words belong to) and on the functor-argument relationship between words. In many cases, a syntactic calculus so conceived enables a verification of whether one is dealing with a syntactically cohesive expression. Upon a thorough analysis of the issue, Ajdukiewicz finally notices that categorial grammar was lacking in the so-called operators (such as the general and detailed quantifiers), which in the case of some languages are indispensable for making an analysis of the type in question (and therefore, in his opinion it would be useful to "smuggle" those into the grammar, as Ajdukiewicz wrote in the last paragraph of his 1935 paper). The in-depth remarks on the issue are concluded by Ajdukiewicz with a concession of his helplessness in any further development of the method proposed.

Also the results of postwar natural language studies, which were mentioned before, ignore the existence of the Tarski-Gödel result. The work by Chomsky seeks to model human linguistic ability: grammar should formally generate correct sentences, at the same time exposing their structure. The so-called phrase structure rules indicate their permissible structure but fail to comprehensively address the issue, also due to the constantly changing terminology. The respective transformations are to secure correct supplementation of grammar details (sequence of tenses or inflection with phonology) and make possible joint derivation of like sentences (with one

[11] The antinomy is contained in this question: is a set, a member of itself even if it constitutes a set containing sets that are not members of themselves, see Marciszewski 1987: 113.

scheme applied to the affirmative and negative variants of declarative sentences). Generative-Transformational Grammar constantly evolved, forever improved by its creators to meet subsequent requirements and amend errors. In Chomsky's grammar there is no question of the truthfulness of the sentences being constructed. Kazimierz Polański must be right in saying that the transformational rules applied in this grammar were allegedly "an adaptation of the informal procedures of traditional grammar to the formalized transformational description" (Polański 1999: 217). Obviously, school grammar does not pose philosophical questions about the definition of truthfulness of the target language sentences.

What can be puzzling, though, is that Tarski's questions are not asked by Richard Montague, his doctoral student (Zygmunt 1995: XVII), who repeatedly stresses the significance of the T-scheme for his work. Although Tarski staunchly asserted the view of the essential differences between natural and formal languages, giving clear rationale for his convictions, Montague makes the opposite belief his flagship idea.[12] Supporting it with skillful formalization, he strives to present English as a formal language. Like Tarski, Montague focuses on declarative sentences, which constitute a traditional area of interest in logic, as the main carriers of logical values. Montague notes that although he still (!) cannot formalize the whole planned fragment of English, it is known where one is to head.[13] Tarski's accomplishments clearly show where the limits are found for such illusions (Tarski 1936a, Tarski 1936b, Tarski 1944, Tarski 1969; Pietryga 2006).

The limits are established by:

1. the lack of a structural definition of a natural language sentence (among formalized grammars, Chomsky's grammar is an exception; Chomsky is, incidentally, a pet 'negative hero' in Montague's texts; Montague 1970/1979: 188, 210; Pietryga 2006);

2. a list of words actually or potentially belonging to a given language that would be useful for the possible formulation of such a definition. Irrespective of the existence of such a list, what is notable is the presence/absence in its lexicon of such words as 'previous,' 'each' and

[12]Montague (1970-1979: 188) wrote that he rejected the idea that there should be a major theoretical difference between formal and natural languages.

[13]See *ibidem*. Unlike philologists, Montague was not interested in reactions by native speakers of a language to the sentences he was describing, as he treated the description as part of mathematics, for which such reactions are irrelevant. See Thomason 1979: 2.

— most importantly — 'true.' For all these words, it would be beneficial if rules for their correct use were given in the same language as the one where they belong. For a convincing emulation of natural language, its formal notation should also enable the naming of its own expressions.

If those requirements were to be met, the formal language under construction would indeed be very similar to natural language because it would permit the formulation of the paradox of a liar, with which the users of world's languages have been able to live for thousands of years. And this is where a major practical difference lies between the users of ethnic languages as such on one hand and logicians on the other.[14]

In one of the works I cited (Leibniz gave none of these a title) Leibniz expresses a belief that the implementation of his design was not only possible but outright easy, and that with the collaboration of intelligent people it would take no more than several years, which he could prove with geometrical certainty (Murawski 1994: 94). Remember that Gottfried Wilhelm Leibniz died in 1716. The fact that 200 years later it was proved on formal grounds that the formal method he had proposed had limitations was also to his own merit, though unintentionally. In the days when he worked, impossibility of finding the answer to Goedel-Tarski IGNORABIMUS was not yet actually proved among other theorems (Murawski 1991: 10).

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Aleksandra Horecka

THE CONCEPT OF ICONIC SIGN IN THE WORKS OF SELECTED REPRESENTATIVES OF THE LVOW-WARSAW SCHOOL: KAZIMIERZ TWARDOWSKI, TADEUSZ WITWICKI, STANISŁAW OSSOWSKI, MIECZYSŁAW WALLIS AND LEOPOLD BLAUSTEIN

Originally published as "Pojęcie znaku ikonicznego w dziełach wybranych przedstawicieli szkoły lwowsko-warszawskiej: Kazimierza Twardowskiego, Tadeusza Witwickiego, Stanisława Ossowskiego, Mieczysława Wallisa i Leopolda Blausteina," Studia Semiotyczne 27 (2010), 307–352. Translated by Lesław Kawalec.

The terms "iconic sign" and "image" are found in a number of works by the representatives of the Lvov-Warsaw School. Its founder, Kazimierz Twardowski, quite early on speaks about image, and although he is not explicit in formulating a theory of image, he does supply the tools for the analysis of its structure — he distinguishes between the content of the representation and its object. The first theory of image in the Lvov-Warsaw School was presented in Stanisław Ossowski's *Analiza pojęcia znaku* [*The analysis of the concept of sign*] of 1926. Tadeusz Witwicki makes references to the writings of Twardowski and Ossowski in his investigation of the relation between the image and the reproduced object of representation (in *O reprezentacji, czyli stosunku obrazu do przedmiotu odtworzonego* of 1935 [*On representation, or relation between an image and a reproduced object*]). Leopold Blaustein, inspired by Twardowski and Husserl among others, was aware of Witwicki's ideas on the nature of image, creates his own concept of iconic object (*Przedstawienia imaginatywne. Studium z pogranicza psychologii i estetyki*, 1930 [*Imaginary presentations. A study from borderline of psychology and aesthetics*], and *O naoczności jako właściwości niektórych przedstawień* [*On*

eyewitnessing as a property of some presentations], 1931). In 1933, Ossowski published the book *U podstaw estetyki* [*The basis of aesthetics*], where he presents the theory of image, differing from his earlier theory. It is to this work that Mieczysław Wallis refers in tract *O rozumieniu pierwiastków przedstawiających w dziełach sztuki* [*On understanding presenting elements in works of art*].Wallis develops his conception of iconic sign throughout his lifetime, thus creating the most complex theory of iconic sign from the Lvov-Warsaw School.

The purpose of this paper is the presentation of the concept (definition and theory) of iconic sign by the following representatives of the Lvov-Warsaw School: Kazimierz Twardowski, Tadeusz Witwicki, Stanisław Ossowski, Mieczysław Wallis and Leopold Blaustein. In a number of cases, I reconstruct the concepts which are not explicitly described by these scholars. I also undertake the description of the relations between the terms used by individual philosophers in terms of their denotations.

ICONIC SIGN IN THE CONCEPTION OF KAZIMIERZ TWARDOSKI

Kazimierz Twardowski does not explicitly use the term "iconic sign," but on a number of occasions he discusses objects that other scholars of the same school might term "iconic signs." The founder of the school does not provide an explicit definition of iconic sign. On the basis of this concept as well as some others he formulates, though, one can venture to draft a definition.

Twardowski defines sign by making a reference to the relation of expressing, and he defines the relation of expressing by making a reference to the relation of expressing-itself-in. In Twardowski's opinion, some psychical creation x of person O is expressed in person O's psychophysical creation y where two conditions are fulfilled: (1) the psychical creation x is a partial cause of the formation of the psychophysical creation y; (2) the psychical creation x does not fall under the senses, while the psychophysical creation y does (Twardowski 1965a: 230). A psychophysical creation y expresses some psychical creation x, where x is expressed in y and where the psychophysical creation y is a partial cause of the formation of the psychical creation z in another person, likened to x (Twardowski 1965a: 231). The author believes that "psychophysical creations that express some psychic creations are called the SIGNS of these psychical creations, and the very psychical creations are their MEANINGS" (Twardowski 1965a: 232). The definitions of expressing-itself-in, expressing and sign which Twardowski gives, can be

reconstructed as follows.

(Def.expressing-itself-in.Twardowski) $\forall x \forall y \forall O$ [x expresses itself in $y \equiv$ (x is a person O's psychic creation $\wedge \neg$ x is perceivable by senses $\wedge$ y is person O's psychophysical creation $\wedge$ y is perceivable by senses $\wedge$ x is a partial cause of the formation of y)].

(Def.expressing.Twardowski) $\forall x \forall y$ [y expresses $x \equiv$ x expresses itself in $y \wedge$ $\exists z \exists O_2$ (z is O_2's psychic creation $\wedge$ y partially accounts for the formation of $z \wedge z$ is similar to x)].

(Def.sign.1.Twardowski) $\forall x \forall y \forall O$ (y is a sign of $x \equiv$ y expresses x).

The latter definition upon expansion takes the following form:

(Def.sign.2.Twardowski) $\forall x \forall y \forall O$ {y is a sign of $x \equiv$ [x is person O's psychical creation $\wedge \neg$ x is sensorily perceptible $\wedge$ y is O's psychophysical creation $\wedge$ y is sensorily perceptible $\wedge$ x is a partial cause of the formation of $y \wedge$ $\exists z \exists O_2$ (z is a psychical creation of $O_2 \wedge$ y is a partial cause of the formation of $z \wedge z$ is similar to x)]}.

A question arises whether one can distinguish between a set of iconic signs just on the basis of the above psychological conception of sign. Can a sensorily perceptible psychophysical creation that has a form be considered as an iconic sign of a non-perceptible psychical creation that has no form? This seems to be possible with some additional assumptions that are in line with Twardowski's philosophical conception. For an object y to be an iconic sign of x, on top of accepting a premise that y is a sign of x, we must also assume that: (1) the psychical creations x and z are representations, that is, phenomenal representations, and that (2) between the psychical creation x and the psychophysical creation y there obtains a certain relation R. In particular, it can be assumed that the relation R is about the representation of x and the perceptual representation of y are similar (in terms of content if we introduce the notion of the content of a representation). If all the above assumptions hold true, we will be able to say that some psychophysical creation y is an iconic sign of a psychic creation x, such as the pastel *Helenka* by Stanisław Wyspiański is an iconic sign of the representation of Helenka — the artist's daughter — which Wyspiański had in mind. In Twardowski's psychological concept of sign it cannot be said, though, that the drawing

Helenka is the iconic sign of the living person, Helenka — Wyspiański's child. Notably, Twardowski believes that although colloquially the words "representation" and "image" have "the right of citizenship almost only within the domain of eyesight" (Twardowski 1965c: 130), these words can be applied to all the other senses.

In the treatise *O czynnościach i wytworach* [*On actions and products*], Twardowski asserts that alongside true, real creations, there are artificial ones, which he calls artefacts, such as an actor's pose which is supposed to express wrath, but which does not really express it as the actor only acts it out rather than feeling it. The pose of the actor, that is, a certain psychophysical creation, does not arise thanks to a real feeling, but it usually does thanks to a representation of a feeling — a presented feeling.

Twardowski repeatedly speaks on image. The concept of image appears in his treatise of 1894 *O treści i przedmiocie przedstawień* [*On the content and object of presentations*], where an analysis of such acts, eg. presenting phenomena to oneself, is investigated. Twardowski makes a fundamental distinction between the content, the act and the object of presentation there. He transfers the results of the discussion of the psychical activity of presenting onto the relation of presentation, which connects the image with what we can call a designation (Twardowski doesn't use the term the "designation of image"). To begin with, let us consider the distinction Twardowski makes between the act, content and object of presentation as per a specific person — John, who is looking at a friend of his, Peter. John and Peter are two members of the relation of presenting to oneself (left and right). The action of John presenting Peter to himself is an act. Peter — as the right-hand-side member of the act — is the object of presentation, something which in Twardowski's terms "EXISTS OUT-OF-ITSELF and onto which our presenting phenomena to ourselves [...] is directed," something real (Twardowski 1965b: 4). In John — the left-hand-side member of the relation of presentation – a more or less approximate "image" of something real occurs (in our example of Peter), which is the content of presenting to oneself (Twardowski 1965b: 4). In the tract *O treści i przedmiocie przedstawień*, we find this: "Both when the object is presented and when it is judged, on top of the act and its object, there is something more, which is at the same time the sign of the object — its psychical "image" as long as this object is presented, and there is its existence, as long as it is judged" (Twardowski 1965b: 8).

Twardowski is convinced that the relation of presenting to oneself that obtains between the object of this relation (here: Peter) and the subject

of the presentation (John) by means of the contents of presentation (the inner, immanent "image" of Peter) is parallel to the relation of presenting something by way of an image (this is why "it had become customary to call presentation a form of mental reflection" Twardowski 1965b: 12). If the relation of presenting and the relation of presenting to oneself follow the same pattern, then their members are identical, too. And just as you can speak of the act, content and the object of presentation in the case of presenting to oneself, so we can speak of the act, content and object of presentation in the case of presenting. But although presenting to oneself is a relation that takes place within inner experience, the relation of presenting something by means of an image is one in the domain of external experience: "like the verb "paint" the verb "present to oneself" initially corresponds to a double object — an object that is presented and the content which is presented. The content is an image and the object — a landscape" (Twardowski 1965b: 12).

In the treatise *O treści i przedmiocie przedstawień* Twardowski writes:

> It is colloquially said that a painter paints a picture but they also say that he is painting a landscape. The same action by the painter is directed at two different objects, THE RESULT BEING ONE AND THE SAME (my emphasis, A.H.). When the painter has painted the picture, possibly a landscape, he has before him both a picture and a landscape. The picture is a painted one, rather than carved or drawn — a true painted picture. The landscape is a painted one as well, but it is no true landscape — it has been "painted." The painted picture and the painted landscape ARE IN FACT ONLY ONE THING (my emphasis, A.H.); the picture represents a landscape, so it is a painted landscape; the painted landscape is the image of the landscape (Twardowski 1965b: 11).

Twardowski's discussion on the relation of presenting things to oneself by means of an image which he presents in the tract, leads one to the following conclusions: a picture can present things such as a landscape. A landscape is the object of presentation of this picture as well as an actually existing self-standing object. The picture here is a painted landscape. A painted landscape, which is an image of the landscape, is the content of presentation. It can be thought that in the above statement Twardowski puts the equation mark between the content of presentation and a physical object (a true painted picture, which is the same part of the reality as an actually existing true landscape) — a canvass surface transformed by the painter by way of placing on it particles of paint in various colours.

Apparently the word "image" is not unambiguous (to differentiate

between various notions, subscript will be used). When we say that the National Museum in Cracow features a number of paintings by Jacek Malczewski, the word "image" then refers to material objects — canvasses with particles of paint, framed ($image_1$). "image" is also understood as an act of imaging or its result (the left-hand member of the two-member relation of imaging) ($image_2$). The word "$image_1$" is absolute but "$image_2$" is a relative term. I am far from equating the contents of presentation with a physical object. I would say that a painted landscape (in the sense that modifies the word "painted") is an $image_2$ of the real landscape and the contents of $image_1$. I think that the creation of two actions Twardowski writes about (painting a picture and painting a landscape) are two different objects: in the case of the first one — $image_1$; in the case of the other one – $image_2$.

Images and sculptures are discussed in a tract by Twardowski, coming from 1912, *O czynnościach i wytworach*. In this tract, Twardowski distinguishes between actions (objects designated by verbs such as "to jump" and "to shout") and their products (Twardowski 1965a: 220) (such as object designated by the respective nouns such as "a jump" or "a shout"). He distinguishes between two kinds of the products of actions — persistent and non-persistent[1]. Non-persistent products of actions last no longer than the actions themselves whereas persistent products take longer than the action itself (Twardowski 1965a: 228). Persistent products, in Twardowski's opinion, are made possible thanks to the action "passing" onto material, that is, on something that has existed before and is in no part (does not belong to) the action (Twardowski 1965a: 228).

In the tract *O czynnościach i wytworach* we read: "Strictly speaking [. . .], the product of an action is only a new arrangement, a transformation of the material [. . .]. But since the arrangement, displacement, form, etc., exists only in some material, to put it in vague terms, we call some whole [. . .] a drawing, painting or sculpture" (Twardowski 1965a: 229). We can thus say that in Twardowski's conception the expression "a persistent product of an action" is ambiguous. In the strict sense of the word, we call a new system, a transformation of the material a "persistent product of an action" whereas a "persistent product" in vague terms is used about a thing. The action itself that results in a persistent product is about transformation of material and

[1]Twardowski makes a reservation that there is no strict boundary between persistent and non-persistent products because „the persistence of persistent products can vary," which should be understood in this way that the duration of an object after the completion of the action can be very different — from a moment to lasting for ages (Twardowski 1965a: 228).

a change in the arrangement of the material. In the case of the action of painting, the persistent product in its strictest sense is some displacement of paint on the canvas, and the persistent product in its vaguest sense — a certain displacement of particles of paint on the canvas, that is, a painting. In the case of the action of sculpting, the persistent product in the strictest sense is a form imposed on a chunk of clay or marble, and in vague terms — a chunk of some form: a sculpture. In the case of the activity of drawing, a persistent product in the strictest sense is the arrangement of lead particles or charcoal on paper, but in vague terms – graphite particles arranged in a certain manner — a drawing.

A question arises: what kind of products can these objects be on the grounds of Twardowski's conception, which by representatives of the School including Wallis or Ossowski are considered iconic signs. I believe these objects might be either persistent or non-persistent. The examples of objects regarded as iconic signs classified as non-persistent include such processes as a Norwegian folk dance representing the catching and processing of fish or Ireneusz Krosny's pantomime showing the high school leaving exam. The example of objects considered to be iconic signs and classified as persistent are such things as a drawing by Wyspiański that shows his daughter Helenka or Michelangelo's sculpture that presents David. A painting or sculpture are, however, persistent objects only in a vague sense. Apparently, along with Twardowski's ideas, no object that the representatives of the Warsaw-Lvov school consider as an iconic sign is ever a persistent product in the strictest sense. If some object, considered an iconic sign, is a persistent product, it is a persistent product in a vague sense — a thing.

ICONIC SIGN IN TADEUSZ WITWICKI'S CONCEPTION

Tadeusz Witwicki does not use the term "iconic sign;" rather, like Ossowski, he uses the term "image." Although Witwicki does not analyze the very notion of image, he investigates the relation between the content and the object of presentation as well as the relation that holds between an image and a reproduced object. He devotes two of his studies to it: *O stosunku treści do przedmiotu przedstawienia* [*On relation of a content towards an object of the presentation*], coming from 1931, and *O reprezentacji, czyli stosunku obrazu do przedmiotu odtworzonego*, from 1935.

Witwicki upholds Twardowski's proposition on the analogy between these two relations — between the content and the object of presentation and the relation between things such as a painting and the object it represents:

> The relation between the contents [...] to the object of presentation is very similar to the one that obtains between a painting, photo or a sculpture and the objects they represent. It is only that this "make-believe" nature and the sharp distinction between the representing and represented objects shows much more clearly in images than it can be in the case of the contents and object of presentation because an image and a presented object can be seen many times and both these objects are seen at the same time (Witwicki 1931: 6).

In both of his works, Witwicki answers the question why we see other objects in some material objects, such as a person we know in a photo. In an earlier work *O stosunku treści do przemiotu przedstawienia*, Witwicki answers the question by making a reference to the concept of view: "The view becomes the content of presentation thanks to it being ascribed a series of actual or make-believe features that are eligible for the object of this presentation and in this way we recognize it as an object" (Witwicki 1931: 7), and further "a view is discerned as the object in question in a make-believe fashion" (Witwicki 1931: 7). Witwicki notes that when we perceive an object, such as a table, what we are given directly is its view, and this view is recognized in actuality but unduly as a table. So it is too in the case of images – we recognize a view as a face of a friend, but we are not serious about it – this is make-believe. In a work published several years later, *O reprezentacji czyli stosunku obrazu do przedmiotu odtworzonego*, Witwicki resumes the discussion of how it happens that we see other objects in things such as painted pictures. He asserts that between an image and a reproduced object there occurs a relation of psychological representation. This relation is "strictly tied with some psychical experience — it is dependent and based on it" (Witwicki 1935: 12).

Witwicki believes that the feelings of psychological representation are kinds of conscious illusions, that is, ones where we no longer believe in that which — though visibly untrue — is still vividly self-imposing" (Witwicki 1935: 19). The main constituent part of a representational experience is a thought, rid of a conviction, that a set of spots is identical with a person. The subject of such an experience only makes a presumption, that is, a judgment – only represented — that there is such an identicality: "When closely watching an image, deep inside we almost always believe that what we see and imagine is object A rather than B. It would thus follow that we truly see and imagine object A only and that we are only deluded in seeing object B" (Witwicki 1935: 78).

Let us now have a closer look at Witwicki's psychological represen-

tation theory. Representation is about us taking "one object to be another with emotion rather than seriousness" (Witwicki 1935: 9) when "in one object we see what we believe to be another, a numerically different object" (Witwicki 1935: 19), whereas in a photo we see a real person. Psychological representation is obtained when "person O thinks that the x that perceives is in fact y." Representation is a three-member relation, with x being a representing object and y — a represented one. This relation can be rendered in this way "x represents y for O." Regarding the conception of psychological representation, which Witwicki devised, a question arises about what is the first member of this relation and what is the other one.

Because the terminological grid used by the protagonists of the Lvov-Warsaw School is not a homogeneous one, I suggest that the following objects be identified in reference to an iconic sign (image): first, a physical object, such as a theatrical performance, canvases covered in particles of paint, a chunk of marble of a certain shape — "the representer;" second, that which we see "in" a theatrical performance, a painted picture, a sculpture, and which will be called "the representative agent;" third, the designation of theatrical performance, painted picture and sculpture respectively, for which we will use the term "the represented."

One can believe that in Witwicki's conception, the representer is the first member of the relation of psychological representation, the other being the represented. Why? First, Witwicki believes that image is a material object, such as an arrangement of colourful spots on a two-dimensional surface. Second, he refers to the 1926 paper *Analiza pojęcia znaku* by Ossowski, where author believes the members of the relation of representation (holding between an image and its designation) to be the representer and the represented, and overlooks the representative agent. Third, Witwicki bases his ideas on "a generally stated fact that, in a good photo, sculpture or painting, reproduced objects can be seen directly and one of these are taken to be the others" (Witwicki 1935: 3), an arrangement of colourful spots is identified with an object it represents, and this arrangement is thought of as if it were a man, tree and the like (Witwicki 1935: 14). A question remains though of how the relation of psychological representation can be rendered by using the concepts of the representer, the representative agent and the represented. Witwicki's statements are vague and allow for two possibilities: (1) somebody spuriously identifies that which they see in the representer with the represented or (2) somebody identifies the representer with the represented in a make-believe fashion. Interpretation (1) seems to be supported by Witwicki's statements included in *O stosunku treści*

do przedmiotu przedstawienia concerning view, whereas interpretation (2) is reinforced by his remarks from *O reprezentacji, czyli o stosunku obrazu do przedmiotu odtworzonego*, where the author identifies things as a set of strokes and colourful spots with the representer and writes that the set of strokes and colour spots is identified with a person being represented (the represented).

Witwicki raises the problem of the similarity between the representer and the represented. He believes that in order that representation be psychically experienced, this similarity "cannot be of just any kind — it must be visible, and it is best if it occurs on account of the characteristic features of the object" (Witwicki 1935: 26) with "the representing object not necessarily similar at first sight to the represented object as long as it highlights the traits the subject means at a given moment" (Witwicki 1935: 26). Witwicki does not stop at stating that the representer and the represented are similar, but he strives to explain how it occurs that e.g. in the case of a painted picture some arrangement of colour dots and strokes, for a certain subject, looks like a three-dimensional object, such as a tree. Witwicki believes that some features of the representer correspond to some features of the represented, but are not always the same traits (e.g. the same colour). Some trait of the representer are suggestive ones, corresponding to features that describe the represented on account of which the representer is interested in the represented object — the essential traits. "It happens that some suggestive traits of the representing object are not [...] the same as the corresponding essential traits of the represented object, but they are very similar to them, so it is very easy to be confused and take some for the others" (Witwicki 1935: 28). On top of the essential traits, the represented also has non-essential traits, which hardly, if at all, find counterparts in the representer (Witwicki 1935: 27-28). Suggestive traits suggest, to the subject of the psychical and representative experience, a thought that the representing object (such as the arrangement of spots on a two-dimensional surface) is a represented object (such as a person) (Witwicki 1935: 27). Witwicki notes that "under the influence of suggestive traits we often pretend to attribute to the representing object traits which we know the object does not have really, and which therefore can be called fake" (Witwicki 1935: 28): on the basis of an arrangement of some light and dark colours, we ascribe to the representer a convex quality although in fact it is flat. We can say (although Witwicki does not do that) that some make-believe properties of the representer (an alleged convex quality) correspond to some essential traits of the represented (real convex quality) and in so doing we attribute

an alleged convexness of the representer to the represented. From Witwicki's words, however, it follows that the suggestive traits are properties that hold true for the representer, while fake traits are make-believe traits of the representer; in a psychical-representative experience, we attribute fake and suggestive traits to the represented rather than to the representer. Note, that which is the subject of Witwicki's reflection is not objective similarity but subjective similarity, similarity for the subject.

On top of psychological representation, based on a psychological-representational experience, Witwicki also studies logical representation based on a logical-representational experience. If, however, in the case of psychological representation, the subject spuriously thinks that object A (representing) is object B (represented), in the event of logical representation the subject does not equate A with B but thinks that B is something like A; in even more precise terms, realizing the similarity between A and B, the properties of B are inferred from the properties of A. In Witwicki's opinion, logical representation, deprived of visuality, occurs between all sorts of models and the objects they represent, such as between the model of the Solar System and the Solar System itself. To Witwicki, models are objects of a completely different type than images and cannot be counted as images. Wallis does not share this view; for him models are iconic signs. What is characteristic for Witwicki's concept is the strict connection between the type of semiotic object and the type of psychic experience in which this object is described and expressed. The logical classification of the experiences of representation closely corresponds to the division of semiotic objects. In connection with the above, a conclusion arises that in the case of images Witwicki argues for similarity in terms of appearance rather than any similarity: it is impossible for someone to take one object for another in a situation where there is no similarity of appearance between objects.

ICONIC SIGN BY STANISŁAW OSSOWSKI

Stanisław Ossowski does not use the term "iconic sign" but he operates with the word "image." In his writings there are three different definitions of image. In the first two — the first one having been presented in *Analiza pojęcia znaku*, 1926, and the second one coming in chapter VII of the book of 1933 *U podstaw estetyki* ("Dwie rzeczywistości w sztuce" ("Two realities in art") — Ossowski makes a reference to the two-member relation of presentation. If the first definition of image by Ossowski there is an idea of similarity, in the second one it is a peculiar kind of similarity — the similarity of appearance. In the third definition of image, included in chapter

VIII *U podstaw estetyki* ("Zagadnienie realizmu" ["Problem of realism"]), the concept of a three-member relation of presentation is used. In order to distinguish between the three notions of image, subscript will be used to differentiate between the terms.

The definition of image$_1$ coming from the tract *Analiza pojęcia znaku*, could be reconstructed as follows: an image is a material object which is semantically subordinated to a designation and which is bound to the designation by the relation of presentation (Ossowski 1967: 35-36).

(Def.image$_1$.Ossowski) $\forall x \forall y \forall O$ [x is an image$_1$of y for $O \equiv$ (x is material $\wedge$ x presents y for O)].

The relation of presentation that associates image$_1$ with the designation is, in Ossowski's idea, a collation of the symmetrical relation of similarity, consisting in the consistency of the elements of image$_1$ and the representative agent object and some asymmetrical relation which is, as we can imagine, a subject having an intention of assigning one object to another. Whereas the symmetrical relation of similarity is objective, the asymmetrical relation that Ossowski writes about is subjective as it belongs to some subject. Therefore the relation of representation, which is a collation of objective and subjective relation, is a subjective one: thus the *definiendum* in the definition (Def.image$_1$.Ossowski) is "x is an image$_1$ of y for O" and not: "x is an image$_1$of y."

Ossowski cares very much about emphasizing the difference between the relation of presentation and the relation between a model and a copy. The latter is not a presentation relation as it is a collation of a symmetrical relation of similarity and a genetic asymmetrical relation, which consists in a copy being made in line with a model (Ossowski 1967: 37). Hence a newly-released car, which was made after a model of a car manufactured previously, is not an image of the model. Ossowski does not discuss a situation where we would be dealing with a copy of an image. On the one hand, as we may suppose, on the grounds of Ossowski's conception, a copy of Wyspiański's drawing that presents Helenka is not a painting of the image of Helenka, but it is an image of Helenka, as is the model. On the other hand, apparently, if someone made a copy of Wyspiański's drawing with an intention that the copy should present this painting, then the copy would be an image of Wyspiański's drawing.

The designation of image$_1$ is, in Ossowski's opinion, a presented object but — as Kazimierz Twardowski demonstrates — the term "presented object"

is ambiguous. The term "presented object" can thus signify the content of presentation and the object of presentation, that is, a really existing object, possibly some intentional object. Ossowski does not write in what sense of the word he uses the phrase "presented object." The examples Ossowski gives include a map as an image of terrain, a photo of a mountain place called Morskie Oko as an image of Morskie Oko as well as a rhythm tapped on the table as an image of a melody. The above examples make one think that the designations of at least some images_1 are really existing objects. It is problematic, though, what is the designation of an image in the case of an illustration showing a brownie or any other object that does not really exist. Ossowski does not discuss this.

The definition (Def.image_1.Ossowski) speaks of a similarity between the image and the presented object. In *Analiza pojęcia znaku*, Ossowski writes that he means a similarity in some sense but, quite remarkably, he does not write that he means the similarity of appearance: "This simple similarity is about the correspondence of the contents: an image and a presented object are brought down into such sets of elements that a mutually unambiguous correspondence can apply between both of these sets. In some cases, there is similarity between the elements of both sets and in others the correspondence is solely about an identical spatial or temporal arrangement [...]" (Ossowski 1967: 36). Note that with such an idea of similarity between image_1 and the presented object, which is not limited to the similarity of appearance, the scope of the term image_1 is extremely broad. One can look to see an identical structure of the various objects and recognize a certain work of music to be the image_1 of an architectural object (if the creator wants to render the rhythm of the colonnade spacing with the rhythm of a piece of music) or a note where quotation marks have been used to mark who was speaking as the image_1 of the conversation the people were having. Moreover, we can even consider the sentence "Alice has a cat" as the image_1 of a situation where Alice has a cat, arguing that we are dealing with a correspondence of two structures — semantic (two names and the functor – predicate) and ontological (two things and the relation that brings them together).

In chapter VII of *U podstaw estetyki*, Ossowski presents a different concept of another idea of image — here it will be referred to as image_2. Image_2 is thus defined by Ossowski: "An object is an image if someone takes a semantic attitude towards it, where this other object onto which the observer's thought is redirected is determined by the similarity of appearances" (Ossowski 1966: 81).

This definition can possibly be expressed this way:

(Def.image$_2$.Ossowski) $\forall x \forall y \forall O$ [x is an image$_2$ of y for $O \equiv$ (O interprets x semantically $\wedge$ O transfers thought onto y $\wedge$ y is similar in terms of appearance to x)].

The definition quoted after Ossowski may be speaking about a semantic attitude, but on account of the ambiguity of the term, I suggest speaking of a semantic interpretation.

In the chapter where the last quote comes from there is no mention of an image being something material, which causes a great deal of interpretative difficulty. It is a problem to determine between which objects found therein obtain the relation of the similarity of appearance. Take the very realistic portrait of Józio Feldman by Wyspiański: is it about the similarity of the appearance of the set of particles of pastels and the appearance of the living boy or the similarity between the appearance of the particles of paint and the appearance of the boy "in" the portrait or, perhaps, the similarity between the appearance of the boy "in" the painting and the real living boy? Some light is shed on the issue by Ossowski's remarks on semantic interpretation. Ossowski asserts that "we interpret objects in semantic terms if we assume towards it such an attitude where the object being perceived is not an object of our presentation but where it represents some other object or situation that we represent through the object being interpreted but without thinking of it" (Ossowski 1966: 19). According to Ossowski, we semantically interpret the signs of speech when we understand what they signify; we semantically interpret spots on canvas when we see the 1410 Battle of Tannenberg in it; we semantically interpret a chunk of marble when we see the personage of Adam Mickiewicz in it (Ossowski 1966: 19). In Ossowski's opinion then, it looks as if someone is experiencing sensory data caused by some specific colour spots on Jan Matejko's painting *The Battle of Tannenberg*, they are interpreting the data semantically when these spots represent the Battle of Tannenberg and the interpreter is presenting the battle to themselves, but the battle is "in" the image — it is not the real battle fought in 1410. So, most probably, when Ossowski writes about the similarity of appearance, he means the similarity of the appearances of the colour dots on the canvas and the object that is "in" the image.

In *U podstaw estetyki* he writes: "A reproductive object is an image if the determination of the object being reproduced is about an objective relation of similarity. [...] It is solely about the similarity of appearance (in

images of music — about some phonic similarity), though, rather than any other similarity" (Ossowski 1966: 80). The passage quoted mentions the reproductive and reproduced objects, and it is the notion of reproducing rather than presentation, as was the case in *Analiza pojęcia znaku*, which is the notion Ossowski uses to define image_3. Unlike representation, reproduction is a three- rather than two-member relation. The first member of the relation is an image, understood as the set of spots on canvass or a description seen as a set of inscriptions; the second member is the represented object, the third one being the designation, which can either be a fragment of reality or a fictitious object. Notably, the words "reproduction" and "presentation" are used by Ossowski in the same meaning.

The three-membered quality of reproduction appears in Ossowski's writings as a result of the analysis of the phrase "that which is reproduced." The author notes that the phrase "that which is reproduced" and its synonyms – "reproduced object" and "presented object" — are ambiguous: "Speaking of "that which is reproduced," we either mean the content of presentations imposed by a description or painting, a real or fictitious fragment of reality to which those presentations are supposed to refer" (Ossowski 1966: 104). It is worth reminding ourselves that the ambiguity of the phrase "presented object" was previously demonstrated by Twardowski in the tract *O treści i przemiocie przedstawień* [On the content and object of presentation] from 1894 (Twardowski 1965b: 13), that is, 39 years before the publication of Ossowski's *U podstaw estetyki*. Ossowski discusses the distinction in the following example: that which is reproduced in the painting *Rejtan* by Matejko is either the scene presented in the picture or the scene that actually took place in the town of Grodno in 1772. Therefore the author suggests that "in order to avoid misunderstanding, we shall establish the following terminological conventions: that which is the object of our presentations — when we are semantically interpreting the reproducing object — will be called the presented object. And only this. The other object, whose representative the presented object is supposed to be, will be the designation of a painting or a description" (Ossowski 1966: 105). Note again that in the terminological grid that was proposed alongside the discussion of Witwicki's ideas, what Ossowski calls "presented object" was called the representative agent and what he calls the designation of the image — the represented.

The conception of three-member reproduction (and thus of presentation, too), which Ossowski promoted, seemingly diverts from casual intuition. We say that "something reproduces something else" and the word "reproduces" is treated as a sentence-making functor from two name arguments.

But regardless of whether rendition be treated as a relation of two or three members, questions arise about what can be substituted for the variables x, y in the formula "x reproduces y" or for the variables x, y, z in the formula "x reproduces y by means of z." Apparently, one can assume one of the two assumptions:

1. in the relation: x reproduces (presents) object y be means of object z: x is the representer, y — the represented, z — the representative agent.

2. in the relation: object x reproduces (presents) object y by means of object z: x is the representative agent, y – the represented and z — the representer.

In the following charts I give examples of the possible members of the relations: x reproduces (presents) y by means of z with the first and the other assumption separately (I discuss three Polish paintings: the *Portrait of Helenka* by Stanisław Wyspiański, the *Battle of Tannenberg* by Jan Matejko and *Satan* by Stanisław Ignacy Witkiewicz (Witkacy)):

x	*y*	*z*
Set of spots or particles of paint on canvass (the representer)	Designation (the represented)	A scene (the representative agent)
(a) Wyspiański's *Portrait of Helanka*	(a) a living girl – Helenka	(a) a girl „in" the painting
(b) Matejko's *Battle of Tannenberg*	(b) a real battle near Grunwald/Tannenberg in 1410 (b') a representation of the real battle of Tannenberg that Matejko had in mind.	(b) the scene of the battle of Tannenberg "in" the painting
(c) Witkacy's *Satan*	(c) a fictitious object – Satan (c') the representation of Satan in Witkacy's mind (c") a "true" Satan	(c) Satan "in" the painting

Fig. 1. Examples of the possible members of the relation: x reproduces (presents) y by means of z, assuming that x is the representer, y — the represented, z — the representative agent.

x	*y*	*z*
A scene (the representative agent)	Designation (the represented)	Set of spots or particles of paint on canvass (the representer)
(a) a girl „in" the painting	(a) a living girl – Helenka	(a) Wyspiański's *Portrait of Helanka*
(b) the scene of the battle of Tannenberg "in" the painting	(b) a real battle near Grunwald/Tannenberg in 1410 (b') a representation of the real battle of Tannenberg that Matejko had in mind.	(b) Matejko's *Battle of Tannenberg*
(c) Satan "in" the painting	(c) a fictitious object – Satan (c') the representation of Satan in Witkacy's mind (c") a "true" Satan	(c) Witkacy's *Satan*

Fig. 2. Examples of the possible members of the relation: x reproduces (presents) y by means of z, assuming that z is the representer, y — the represented, x — the representative agent

Apparently, Ossowski would accept the first assumption while rejecting the other, that is, he would recognize that the canvas with particles of paint reproduces (presents) a living girl, Helenka, by means of a girl "in" the painting, etc. In Ossowski's opinion a canvas covered with paint (the representer) is the first member of the relation of reproduction. As regards the *Battle of Tannenberg* by Matejko, Ossowski would say that its designation is the real battle, even if Matejko painted a group of models. Concerning *Satan* by Witkacy, he would most probably recognize that the painting's designation is a fictitious object — Satan — rather than the presentation of Satan Witkacy had in his mind when painting the picture. The following words by Ossowski would suggest that option: "The designation of an image [...] cannot be some fragment of reality: it can also be a fictitious object which we treat as if it were part of reality that once existed somewhere" (Ossowski 1966: 106). It is intriguing that Ossowski writes of images presenting fictitious objects that "if the only basis for imagining such a designation (i.e. a fictitious object; A. H.) is a represented object, that is, if the designation is in no way shown, the distinction between a designation and a represented object is a mere matter of words." In this case, in Ossowski's opinion, there is no way of comparing the designation and the presented object. However, it seems that even in this situation we are still dealing with two different objects. Ossowski writes that in the case of painted pictures, all three members of the relation of reproduction appear very clear cut and it is hard to confuse (in my terminology) the represented with the representative agent because the representative agent is posited directly in the picture, whereas the represented (designation) is elsewhere. As regards 3-D images (Ossowski most probably means sculptures, theatrical performances, etc.),

the differences between the represented and the representative agent become blurred, which, however, does not mean that we are dealing with two rather than three members of the relation of reproduction (Ossowski 1966: 106).

The reproductive object (i.e. the representer, the first member of the relation of reproduction) is, in Ossowski's opinion, a painting or a description. Note that the notion of reproduction in Ossowski's conception does not suffice to define an image since the reproductive objects, on top of images, are verbally reproductive objects, that is, descriptions. Therefore, in the determination of image, the author refers to the similarity of appearance.

A question arises: between which objects — members of the relation of reproduction — there obtains the relationship of similarity of appearance: is it between the representer and the represented or between the representative agent and the represented? Ossowski gives the following examples: "The image of crushing waves at sea can be hung without the fear of flooding the room," "if we say that Chełmoński greatly reproduced partridges on the snow or four galloping horses, it is because a set of sensory impressions we experience when we look at his pictures, seems similar to the set of psychical experiences we would otherwise experience if we looked at a real-time partridge or four horses live" (Ossowski 1966: 80, 81). The first example does not explain much as the word "image" is a rather ambiguous one: the image of the rough waves is the represented; the picture, which we can put into a closet, is the representer. The other example would support the idea that the similarity of appearances, in Ossowski's opinion, obtains between the representative agent and the represented.

We might ask in which sense of the word Ossowski uses the term "appearance." The author devoted a paragraph in the first edition of *U podstaw estetyki* to this term (in the 1966 edition this paragraph was skipped). It reads that the word "appearance" is ambiguous, but Ossowski does not make it clear what meanings it has. We can guess, however, that Ossowski means appearance as a set of visual elements and appearance as a set of sensory data that is interpreted in object terms. Ossowski writes: "In his *Psychologia* [*Psychology*], prof. Witwicki speaks of a "view" and "appearance" of objects, but this terminology has serious shortcomings: the term "view" too strongly upholds a wrong suggestion as though the whole distinction only concerned visual perceptions" (Ossowski 1933: 9-10).

Władysław Witwicki indeed distinguishes between a view and an appearance. In his opinion, "view" is the same as "perceptual presentation," whereas "appearance" is "something more than a view:" it is "a view, that is, perceptual presentation of an object, "tinged," marked by the presentations

of other objects and situations as well as thoughts" (Witwicki 1962: 211). The appearance of an apple is made up of the view of an apple but also the presentation of its taste, the presentation of the crunch that accompanies its halving and the like. Witwicki believes that an apple that has just been picked and an apple made of wax or china have differing appearances but someone may have the same views of these two objects (Witwicki 1962: 210).

Ossowski does not accept the distinction made by Władysław Witwicki. He wants to speak of a perfect wax imitation of an apple having the same appearance as an apple that has just been picked from a tree, so he wants to speak of a similarity of appearances rather than views. In Ossowski's opinion one can speak of appearances of perceptible things not only by the sense of sight but also the senses of touch and hearing. Hence his decision to use "descriptive expressions" rather than "appearances" to avoid misunderstandings (Ossowski 1966: 10). In the book *U podstaw estetyki*, Ossowski uses these particular phrases in this role: "directly perceptible physical traits" (Ossowski 1966: 18), "a set of acoustic and optical elements" (Ossowski 1966: 18), "a set of visual elements" (Ossowski 1966: 22),"sensory form of the object" (Ossowski 1966: 22, 69), "an arrangement of visual or auditory elements" (Ossowski 1966: 22-23), "a set of sensory elements" (Ossowski 1966: 29) and "arrangement of sensory qualities" (Ossowski 1966: 69). All these terms indicate that the appearance of an object, in Ossowski's opinion, is a set of sensory qualities, traits that are sensorily perceptible that determine objects. The understanding of "appearance" is close to the casual sense of the word here, such as this which is recorded in the *Dictionary of the Polish Language*: it reads that "appearance" is the same as "an external form of something, a set of traits that makes up someone's face value" (Szymczak 1978: 779).

It appears that the notion of appearance which is used by Ossowski is not the same as the same notion as used by Witwicki and apparently has nothing in common with his idea of view. A view or appearance are for Witwicki psychical phenomena: the basis of their construction are not qualities that determine objects but they are sensory impressions. This is why Witwicki's terminology is unacceptable to Ossowski. Witwicki investigates psychical phenomena, psychical experiences, sets of impressions, presentations and, being a psychologist, he is not concerned with whether there are some objects other than cognitive subjects.[2] Ossowski stands on

[2]See Witwicki 1962: 226: "Psychology is not interested in whether people, things, qualities really exist, whether this structure of our impressional systems corresponds to something real or whether it is just our own system of describing the reality. A

the grounds of philosophical realism: he assumes that there are indeed some objects whose appearances we do not experience.

According to Ossowski, the similarity between appearances in the case of a presented object (the representative agent) and the designation (the represented) is achieved by "some analogy of the arrangement of the elements of image and the elements of the projection of the reproduced reality on a plane" (projection does not have to have a perspective), "the analogy of colour relations or at least the relation of the elements of light between the elements in the two systems," as well as "the similarity of the colours of the elements of image and the corresponding elements of the presented object" (Ossowski 1966: 83). Likeness in painting thus encompasses the similarity of the respective qualities (such as colour), the similarity of the characteristics of these qualities (the intensity of paint) as well as the similarity of system — such as spatial arrangement (spatial relations: something is behind/next to something else).

Therefore, the following difficulty arises: can we speak of a similarity between the image of Satan from Witkacy's *Satan* painting and the "true" Devil or between the presented brownie *Koszałek Opałek* and the "true" benevolent dwarf? Can we project a Devil — or any other fictitious object — onto a plane? The difficulty is apparently insurmountable if we assume that the represented of the picture Satan is a "true" Satan. It ought to be accepted that the represented is the image of Satan which Witkacy had in mind. The problem also surfaces in the case of Matejko's *Battle of Tannenberg.* Can it be said that the artist was really projecting the real battle at Tannenberg? We know that what he was really doing was copying a group of models he had placed in front of him. If we admit that the represented can be someone's representation (such as the representation of Satan in Witkacy's mind), then the relation of similarity will need to be searched for between the content of the artist's representation and the representative agent. Obviously, the recipient has access to the represented thus conceived only thanks to the representative agent, so the similarity of appearances between the two objects can only be judged by the its creator.

Apparently, Ossowski is not really fully consistent when he writes (to quote him again) "If we say that Chełmoński greatly reproduced partridges in the snow or four galloping horses, it is because the set of sensory impressions we experience when looking at his paintings seems similar to the set of impressions we would experience by looking at real partridges or at four

psychologist just needs to state that the impressions that we experience is not chaos, that they make a whole."

galloping horses" (Ossowski 1966: 81). Ossowski here probably speaks of the similarity of appearances, but the "appearance" is something other than "qualities inherent in external objects;" it is "sets of sensory experiences." The charge of inconsistency could be rescinded, though as the contents of presentations are largely determined by an "external" object, and so if "external" objects are similar, then the corresponding contents of the representations will be similar, as well. If some quality arrangements of the representative agent correspond to the quality arrangements of the represented, then some perceptions of the qualities (quality arrangements) of the representative agent will correspond to some quality perceptions (quality arrangements) of the represented.

In Ossowski's writings, appearance is not constrained to the qualities of the qualities perceived visually or a set of visual impressions. Hence his concept of image includes some works of sculpture too: "In sculpture we deal with a similarity between not just one appearance but a whole range of appearances: the work and the object reproduced can be compared from a number of points in space" (Ossowski 1966: 84). Here the author suggests that appearance is not a set of all qualities that inhere in the object but it is a selection of qualities — a set of qualities that are sensorily perceptible by a certain subject from some viewpoint. Thus appearance is relativized to the place where the observer is positioned. As there are an infinite number of points where an object can be watched from, there are unlimited appearances. Ossowski seems to believe that in the case of painting, we speak the similarity of just one appearance to another. This is backed by a conviction that, in the art of painting, there is one suitable point from which the observer perceives the representative agent. In reality, though, one can approximate a painting and get further away from it: then the point of observation changes and so does the appearance of the work of art. So, a painting would thus have a number of appearances.

ICONIC SIGN IN THE CONCEPTION BY MIECZYSŁAW WALLIS

Wallis's semiotic terminology is not uniform. In his writings from 1934, he uses a phrase "a directly presenting sign;" in his writings from 1937 it was called "image-likeness" and, finally, as of 1939 he used the term "iconic sign." In Wallis's writings a definition of "iconic sign" can be found. According to the first one from *O rozumieniu pierwiastków przedstawiających w dziełach sztuki*, coming from 1934, whether an object is an iconic sign depends on the intention of the creator of the object rather than the recipient. Along with the other definition, found in the essays *O pewnych trudnościach*

związanych z pojęciem znaku [*On some difficulties concerning concept of sign*], from 1967, and *O znakach ikonicznych* [*On iconic signs*], from 1969, whether an object is an iconic sign is dependent on the observer as well as the maker.

In the tract *O rozumieniu pierwiastków przedstawiających w dziełach sztuki*, Wallis undertakes an attempt to define a directly presenting object. The rendition of the definition is somewhat difficult. On the one hand, Wallis speaks of presenting objects (presenting directly, indirectly, symbolically), that is — as we might presume — objects that present, but on the other hand he believes that presentation is a psychophysical activity of a certain subject and there is no point in saying that object x presents object y. In order to avoid contradiction, we might just as well recognize that the presenting object (i.e. an object that presents) is the third member of the relation of presenting: T presents y by means of x.

Let us reconstruct Wallis's definition of presenting. Twardowski treats the relation of presenting something to oneself as a three-member relation, with the relation of something presenting something being a two-member. Ossowski believes that the relation of something presenting something is a three-member one. Like Twardowski, Wallis, tries to clearly distinguish between presenting things to oneself and things presenting things, but he does it in a different manner than Twardowski. He believes that the term "present" means some psychophysical activity, with the term "present to oneself" being about a psychical activity. More specifically "Presentation is about the creator T creating a sensorily perceptible, physical object a with the intention that the object a causing in the subject O a presentation — an intuitive presentation or a notion — of object A that is different from object a, thanks to there being a relation of representation between object a and object A" (Wallis 1968a: 88). Further: "Instead of saying "creator T presents object A by means of object a," we often say that "object a presents object A" [...]. However, it is a shortcut, a metaphor, which becomes nonsensical if taken literally: a physical object a cannot "present" that is do some psychophysical activity" (Wallis 1968a: 89). According to Twardowski a sentence such as "Object x presents object y" is a meaningful sentence while in Wallis's opinion it is nonsensical because he understands "presentation" as a "psychophysical activity." I suggest the following rendition of the definition of the presentation relation:

(Def.W.rendition.Wallis) $\forall T \forall x \forall\ y$ [T presents x by means of $y \equiv\ \exists O$ (T creates $y\ \wedge\ y$ is sensorily perceivable $\wedge\ y$ is a physical object $\wedge\ T$ wants y

to evoke in O the presentation of $x \ \wedge x \neq y \ \wedge y$ represents x)].

In the above definition the concept of representation needs explaining. To Wallis, representation is about "some sensorily perceptible object replacing some other object, whether sensorily perceptible for me or not, in some terms" (Wallis 1968a: 85) and so it consists in replacing some object for somebody with another object: someone, having perceived an object, thinks of another object — they present it to themselves. Wallis does not define representation in conventional terms but, first, he gives *genus proximum* of representation — this representation is a relation, a *sui generis* replacement. Second, he characterizes the formal qualities of the relation: representation is, arguably, a three-member relation (x substitutes y for O), it is a relation between objects rather than a psychical or psychophysical activity (thanks to the existence of the relation of substitution a number of psychical and psychophysical activities are possible). Representation is an asymmetrical and counter-reflexive relation. Third, it imposes the conditions on the members of the relation: the first member is one that is sensorily perceptible, the second one — a perceivable or non-perceivable object — with the third being the subject.

Wallis distinguishes between three kinds of representation: direct, indirect and symbolic. This is how he describes direct representation: "A sensorily perceivable object a represents a sensorily perceivable object A thanks to there being a similarity of appearances between objects a and A" (Wallis 1968a: 85). Kinds of representation correspond to different kinds of presentation: direct, indirect and symbolic.

Wallis gives examples of representation: a drawing of a horse and the word "horse" represent a horse for someone; the image of a lion in a painting — pride, and the national flag of Poland — Poland. Wallis's writings on representation bring up one difficulty. Note that in the section on iconic sign in Ossowski's works a distinction into the representer, the represented and the representative agent was introduced. In the case of Wallis's conception one cannot be sure about the objects the relation of representation holds: the representer and the represented or between the representative agent (the interpreted representer) and the represented. The definition of representation Wallis provides implies that the members of the representation include the representer and the represented, but Wallis gives the representer (such as the word "horse") as an example of the members on one occasion but, on others, the representative agent (a lion on a medieval painting; a drawing of a horse).

Eventually, the first definition of iconic sign in Wallis's conception

(seen as an object that presents directly) can be reconstructed as made up of two sentences in the following manner:

(Def.iconic.sign.Wallis.1)

1. Iconic sign is the third member of the relation of direct presentation: T directly presents x by means of y:

   $\forall y$ [y is an iconic sign $\equiv$ $\exists T \exists x$(T directly presents x by means of y)].

2. Person T directly presents x by means of y, where T creates a sensorily perceptible, physical object y so that it will evoke in observer O a presentation of object x being other than object y, thanks to there being a relation of representation between object x and object y that is based on the similarity of appearance:

   $\forall T \forall x \forall y$

   [T directly presents x by means of $y \equiv$ $\exists O$ (T creates y $\wedge$ y is sensorily perceivable $\wedge$ y is a physical object $\wedge$ T wants y to evoke in O the presentation of x $\wedge$ $x \neq y$ $\wedge$ y represents x $\wedge$ x is similar to y in terms of appearance)].

In short, we can say that object y directly presenting another object x (that is, object y being an iconic sign of x) is a physical, sensorily perceivable object, created by person T in order to evoke in person O a presentation of x thanks to there being the similarity of appearance between x and y.

Wallis's definition of iconic sign speaks of the similarity of appearance between an iconic sign (the representer) and its designation (the represented). However, he does not devote much attention to it. He merely states that "the similarity is about the similarity between the arrangement of elements – lines, colour spots, chunks, tones — and sometimes also about the similarity of the elements themselves (such as the similarity of eye colour in a painted portrait)" (Wallis 1968a: 44), and he declares that he uses the word "appearance" in the sense which Witwicki imparts on the word "view." Therefore, "appearance" in Wallis's conception means as much as "perceptual presentation of an object."

It is intriguing what Wallis means when he writes that an object x is similar to some other object y in terms of appearance. Traditionally, it is believed that the similarity between two objects in terms of a certain trait P is about the trait P being inherent in both. We will say that one person's eyes are similar in terms of colour if there is some colour that is inherent in

the eyes of both the one person and the other. Such an understanding of similarity assumes the existence of the so-called general properties, inherent in more than one object. With such an interpretation of likeness, where we say that one object is like another in terms of appearance we mean that there is some appearance that is identical in one and the other object, so there is a perceptual presentation that is identical for both. Is it about such a similarity, though, when we talk about the similarity of objects in terms of appearance? Apparently the condition of perceptual presentations being identical is "too strong" and cannot be fulfilled as presentations are numerically different.

When we speak of a similarity between two objects in terms of appearance, we mean the similarity of appearance — perceptual presentations – rather than identical appearances, being perceptual presentations that these objects provide the observer with. When we say that two objects look identical, it is not about identical intuitive presentations that we have when we perceive the objects as these are always numerically different, but it is about the contents of these presentations being identical. The contents of presentations are not just qualities but presented qualities, and there apparently should be a distinction between general and individual qualities. Therefore, the similarity of appearances between the representer and the represented in the conception by Wallis is in actuality the similarity between the presentation of the representer and the presentation of the represented, and hence, arguably, between the representative agent and the presentation of the represented. Similarity between physical objects is brought down to the similarity between the presentations of these objects.

Like for Ossowski, for Wallis, too, appearance is not limited to the qualities that can be perceived visually (Wallis 1983b: 22; Wallis 1983c: 31) or to a set of visual impressions. Hence in Wallis's conception the notion of a directly presenting object (iconic sign) includes some works of sculpture, music, theatre and film, as well as the component parts of these: actors' bodies and apparel, their mimics and movement, gestures imitating actions, and also decorations, dance, mimetic play, onomatopoeic words and expressions.

Note that in Wallis's conception all iconic signs (all signs at all) are objects generated by some conscious being, and hence the reflection of the isle of Gilma, on Lake Dobskie, in the waters of the lake cannot be considered the iconic sign of the island.

In the tract *O rozumieniu pierwiastków przedstawiających w dziełach sztuki*, Wallis gives a taxonomy of signs. A question arises where iconic signs

belong in this taxonomy. In the tract mentioned, Wallis divides signs into presenting and non-presenting: he considers a "presenting sign" to be "a physical object *ZP*, created by the creator T with an intention to create in the recipient O some specific thought concerning an object other than *ZP*" (Wallis 1968b: 82), while a "non-presenting sign" — "a physical object *ZN*, created by creator T with an intention other than creating in recipient O some specific thought concerning an object other than *ZN*, but with an intention that the object, together with other objects, should create, within some convention, a new physical object *ZP* creating in recipient O some specific thought concerning an object other than *ZP*" (Wallis 1968b: 83). As we can see, the definition of a non-presenting sign is based on the notion of a presenting sign. In this definition it is assumed that a presenting sign can be a compound one, made up, among other things, of non-presenting signs.

The above definitions can be expressed in the following manner:

(Def.presenting sign.Wallis) $\forall x[x$ is a presenting sign $\equiv\ \exists T \exists O \exists y\ (T$ creates $x\ \wedge x$ is a physical object $\wedge\ T$ wants to evoke in O thought $m\ \wedge$ thought m concerns $y \wedge y \neq x)]$.

(Def.non-presenting sign.Wallis) $\forall x[x$ is a non-presenting sign $\equiv\ \exists T \exists O \exists y \exists z\ (T$ creates $x\ \wedge x$ is a physical object $\wedge\ y$ is a presenting sign$)]$.

Wallis counts directly presenting signs (i.e. iconic signs) among presenting signs. A question arises, however, whether non-presenting signs can be part of iconic signs. Wallis does not answer this question even though he discusses the issue of the relations between presenting and non-presenting signs in an example of indirectly presenting signs.[3]

In the articles *O pewnych trudnościach zwiazanych z pojęciem znaku*, from 1967, and *O znakach ikonicznych*, from 1969, Wallis presents a modified version of the definition coming from *O rozumieniu pierwiastków przedstawiających w dziełach sztuki* and builds a whole theory of iconic signs, formulating additional propositions. The other definition of iconic sign can be reconstructed as follows: an iconic sign is an anthropogenic object, sensorily perceivable, which — thanks to the similarity of appearance — can cause

[3]Wallis claims that non-presentative signs are all prepositions, conjunctions, letters and, possibly, some parts of words, that is, sequences of letters. A dot above an "i" is not a sign because there is no convention concerning it, but the letter "i" is a sign which, upon a convention, serves the purpose of the construction of new signs in conjunction with other signs.

a presentation of an object other than itself in a recipient who assumes an appropriate attitude (Wallis 1983b: 21). Whereas in the first definition of iconic sign Wallis emphasizes the intention of the creator of the sign, and it is the intention of the creator that in fact decides whether an object is an iconic sign, in Wallis's other definition of iconic sign the emphasis is placed on a possibility that an object arouses some thoughts in the recipient. One could say — which Wallis does not do — that according to the other definition, an iconic sign has a potential, available property which manifests in favourable circumstances and that one can distinguish between potential iconic signs (that is, those which can arouse intuitive presentations of other objects but are not causing any at the moment) and actual iconic signs (such that can cause intuitive presentations of other objects and are causing ones at the moment). In order that a potential iconic sign should turn actual, some conditions need to hold about the subject and the object. The object needs to be similar to one whose presentation it is to evoke, while the observer needs to be able to assume an appropriate semantic attitude and they need to actually assume it; apparently, they also need to possess some not necessarily verbalized knowledge regarding the interpretation rules of the object.

In Wallis's works from the 1960s, Wallis devotes more attention to the other member of representation, characteristic of iconic signs. He claims that in the case of iconic signs, the other member of the relation of representation is a sensorily perceivable object (Wallis 1983c: 37) and originally it is always a unitary object even though in secondary terms it can be any representative of a class of objects (Wallis 1983c: 37). The iconic sign of a horse primarily represents a single horse of a certain breed, colour and size, but thanks to some consensus or custom, it can represent any representative of some class of horses, of race, colour, etc. By analogy to linguistic expressions, we could speak of a supposition of an iconic sign, but Wallis does not use the term "supposition" about iconic signs. Just as the word "horse" may be used in various normal suppositions, such as a personal supposition where it designates one specific horse (such as in a statement "the horse ate from Mike's hand"), in a universal supposition where it designates any representative of a class of horses (such as in the utterance "a horse is an artiodactyl animal"), the iconic sign of a horse can occur in various suppositions: personal, when it represents one specific horse, and universal, when it designates any representative of a class of horses.

In *O znakach ikonicznych*, Wallis often sees an analogy between iconic and linguistic signs, and he uses terminology used to describe language ex-

pressions for the description of iconic signs as well. He analyses such things as ambiguity in the domain of iconic signs (Wallis 1983c: 41-42). In defining an ambiguous iconic sign, he refers to the observer's interpretation. He deems an iconic sign ambiguous when — in a situation when somebody assumes a semantic attitude to it — it can be interpreted as either P_1or P_2, other than P_1. A definition of an ambiguous iconic sign can be reconstructed as follows:

(Def.1.ambiguous.iconic.sign.Wallis) $\forall x \forall O$ [(x is an iconic sign $\wedge$ O assumes a semantic attitude towards x) $\Rightarrow$ [x is ambiguous $\equiv$ $\exists t_1 \exists t_2 \exists P_1 \exists P_2$ ($t_1 \neq t_2 \wedge P_1 \neq P_2 \wedge O$ in t_1 interprets x as $P_1 \wedge O$ in t_2 interprets x as P_2)]].

Apparently, the phrase "O in t_1 interprets x as P_1" may well be replaced by "x is an iconic sign of P_1 for O in t_1."

We thus get the following definition:

(Def.2.ambiguous.iconic.sign.Wallis) $\forall x \forall O$[(x is an iconic sign $\wedge$ O assumes a semantic attitude towards x) $\Rightarrow$ [x is ambiguous $\equiv$ $\exists t_1 \exists t_2 \exists P_1 \exists P_2$ ($t_1 \neq t_2$ $\wedge$ $P_1 \neq P_2 \wedge x$ is an iconic sign of P_1 for O in $t_1 \wedge x$ is an iconic sign of P_2 for O in t_2)]].

Wallis believes that iconic signs can be rich in detail or scarce in detail. The signs that are scarce in detail are called by him "outline," with those rich in detail — "*pleromata*." Outline can be exemplified by a roadside sign of a swerve; *pleromata* can be a photo of someone or a naturalistic painting. Wallis believes that between outline and *pleromata* there is "an infinite diversity of intermediate stages – ordinary iconic signs" (Wallis 1983c: 39).

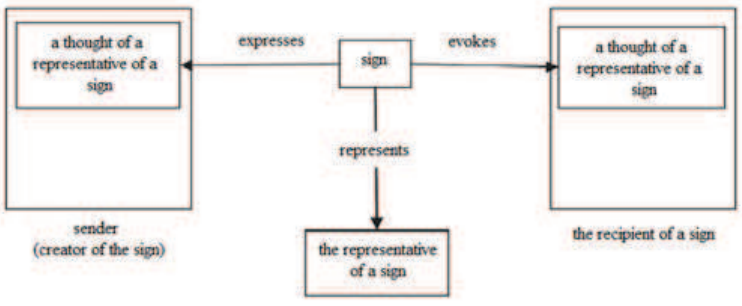

Fig. 3. The functions of a sign, according to Wallis

In the tract *O znakach ikonicznych* there are three functions of an iconic sign clearly mentioned, which are performed by any representational sign: "A representational sign performs a three-fold function: (1) represents an object (representational function), (2) expresses the sign's creator's thought about the object (expressive function), (3) evokes in the recipient of the sign a thought of their object (evocative function)" (Wallis 1983c: 33). Arguably, Wallis means the functions performed by an actual sign (an actual iconic sign, in particular) rather than a potential one. Note that the concept of expressing is narrower for Wallis than it is for Twardowski. One can say that expressing in Twardowski's concept encompasses Wallis's conception of expressing alongside with evocation, that is, together with the expressive and evocative function as envisaged by Wallis. For the general structure, along with the function of iconic sign in Wallis, see Fig. 3.

Both in *O rozumieniu pierwiastków przedstawiających w dziełach sztuki* as well as in *O znakach ikonicznych*, Wallis juxtaposes iconic signs (directly representing objects) with conventional signs (indirectly representing signs). A question arises whether there are mixed signs that were both iconic signs (representing another object thanks to the similarity of appearances) and conventional ones, that is, representing thanks to their conventional attribution to other objects. This is a question of a separability of sign division members in Wallis's conception. Wallis does not answer the above directly, but one can infer on the basis of his works that he would probably have said no when asked: no sign can at the same time represent directly (be an iconic sign) and indirectly — by convention — and thus be a conventional sign. Wallis does allow for the existence of direct-indirect mixed representation, but he comes up with a map as an example of an object that represents in this manner; it is made up of two kinds of signs — some signs represent some objects thanks to the similarity of appearance (such as lines that directly represent rivers, bays and seas) with others representing indirectly, by convention (such as dots standing for cities). Mixed representation, then, is not about one object representing another object both directly and indirectly, but the object being made up of parts of which some are only directly representing while others are only indirectly representing. Alas, concerning onomatopoeic words and phrases, some only represent in a direct manner, while others only in indirect ways: "bang," "boom," "bow wow" and the like are uninflected, simple iconic signs, whereas such ones as "cuckoo" are inflected, conventional signs that have been formed from iconic signs (such as the coo-cooing sound produced by cuckoos) (Wallis 1983c: 36). Wallis notes that expressions made up of several words can be iconic, too;

so can be whole passages of literature.

Should it be admitted, then, that in some special case a literary passage represents both thanks to the similarity of appearance and upon a convention? Wallis does not speak on this, but, seemingly, he would have been inclined to recognize that such a passage has two part-aspects, of which one (the layer of inscription) represents upon a convention, with the other (the layer of sound) upon a similarity of appearances. A passage from a literary work of art as a whole would thus represent/substitute in a mixed manner: directly and indirectly. Other examples Wallis supplies as objects that represent in a mixed fashion include a text with depictions and a medieval painting with inscriptions.

In the tract *O znakach ikonicznych* we find a passage where the author states that "upon a convention or consensus, iconic signs — outline in particular — can function in some contexts as conventional signs. They then constitute shortcut substitutes of some expressions or sentences. So, "a simplified drawing of a bed in a railway timetable stands for the phrase "sleeping car." [...] An image of a small tower in the hand of a female character in a medieval painting replaces the sentence őThis person is Saint Barbaraŕ" (Wallis 1983c: 39-40). So, it appears that Wallis accepts a possibility of an iconic sign performing the function of a conventional sign. A simplified drawing of a bed represents a bed upon the similarity of appearances, while by convention it symbolizes a sleeping car. So, we have a situation where one and the same object represents two different objects in two ways. Still, it does not appear that in Wallis's conception one and the same object can both directly and indirectly represent one and the same object. Note that on the basis of the statements in Wallis's paper *Uwagi o symbolach* [*Remarks on symbols*], published eight years after the essay *O znakach ikonicznych*, one can reach a conclusion that a simplified drawing of a bed does represent a bed upon a similarity of appearance, but it does not represent a sleeping car by convention: a sleeping car is symbolized by a physical object — the bed itself. In this case an iconic sign, i.e. a simplified drawing of a bed, represents, in just one manner — directly – another object — a bed.

Wallis believes that, on one hand, iconic signs, like all signs, can undergo the process of desemantization. This happens when an iconic sign loses its iconic character and becomes an asemantic sign (one can speak of desemantization-deiconization). On the other hand, an asemantic object may undergo the process of semantization-iconization, that is, turn into a sign — an iconic sign. In *O znakach ikonicznych* we read that "This process

(desemantization, A.H.) is often encountered in ornamental art. Images of people, animals and birds on vases from metal or on rugs become ever more simplified and are in the end transformed into purely geometrical ornaments" (Wallis 1983c: 40). It is uncertain what the processes mentioned by Wallis are about. One of the possible interpretations has it that the desemantization of iconic signs concerns many objects that are systematized along a principle (say, each next object is poorer in detail from the preceding one) rather than one specific physical object. So even though the first and the second object in a three-element sequence are iconic signs (were made so they would cause a representation of an object and can cause it), the last object in the series is not an iconic sign (it was not created to evoke imaginings about another object and cannot form representations of another object). With another interpretation we will say that desemantization concerns one specific object, rather than a series of systematized ones; in the first phase of its existence it is a potential iconic sign: it can cause a representation of another object but, with time, as a result of a change in conditions, say, of the subject, this potential property cannot be actualized any longer (something that is initially a schematic image of a house, with time, does not cause any representation in any subject).

On the basis of the studies of the terms used by the representatives of this School, carried out here, it can be said that the terms Wallis used — "directly representing object," "'sign-likeness," "iconic sign" are interchangeable with Ossowski's term "image," as used in *U podstaw estetyki*, and are at the same time independent from Witwicki's understanding of "image:" in Wallis's opinion, models are iconic signs, but to Witwicki, they are not images; a reflection of somebody's face in water is an image in Witwicki's conception, but is not an iconic sign as understood by Wallis; Wyspiański's drawing *Helenka* is considered an image by Witwicki and as an iconic sign by Wallis.

Wallis's writings abound in the word "image," too. Wallis uses the word "image" in three ways. The first one is that "image" is the same as "a kind of iconic sign" — this notion of "image" conforms to a casual use. In the second meaning, "image" (we will speak of image_2) is "something in between an iconic sign and a symbol" (Wallis 1983f: 77). In the third meaning, an image (image_3) is a typical iconic sign of a kind.

The notion of image_2, that is, something intermediate between an iconic sign and a symbol, appears in Wallis's article of 1961 *Świat sztuk i świat znaków* [*The world of arts and the world of signs*]. The author does not make specific the notion of image_2 and this makes it hard to understand

exactly what he means. He only gives examples of objects that are images: in many ages, temples and churches "were more than the arrangements of chunks that organized space and were used for some practical purposes [...] but they were also őiconic signsť, őlikenessť, őimagesť, [...] ősymbolsť, and the like, of objects other than themselves — of the universe, of heaven, perceived as the dwellings of gods or God, of God himself, of the congregation of the faithful, etc." Some tips on how to understand image_2 can be found in Wallis's later enunciations on symbols and their relation with iconic signs. If, still in a paper from 1934 *O rozumieniu pierwiastków przedstawiających w dziełach sztuki* Wallis does not explicitly make it clear whether symbols are signs of sorts or not, in his later works (Wallis 1977: 36) he clearly notes that a symbol need not be a sign, and in the work *Uwagi o symbolach*, coming from 1977, he decisively excludes all symbols from the domain of signs (Wallis 1977: 93). Apparently, the notion of image_2, which appears in the work from 1961 is identical with the notion of symbolic sign, elaborated on in 1977: "A symbol can be represented by an iconic sign or a conventional sign. Such an iconic sign, representing a symbol, is called a symbolic sign. A dog, carved from stone at the foot of the statue of one's wife. The sculpture — an iconic sign — shows a dog and the dog symbolizes fidelity" (Wallis 1977: 94). Apparently, then, image_2 is an iconic sign which represents a symbol, and hence is an iconic sign, which directly represents another object, which, in turn, symbolizes something, such as the projection of a temple on a circular plane is the iconic sign of a circle, but at the same time the circle is a symbol of Heaven or a community (the circle of believers).

The third notion of image comes from the tract *Dzieje sztuki jako dzieje struktur semantycznych* [*The history of art as a history of semantic structures*] from 1968. Image_3 is a "typical iconic sign or a set of iconic signs, recurring in various ages and artistic circles that is highly marked by emotions" (Wallis 1983f: 54-55), such as the likeness of a mother with a child or a horseman killing a monster or a beast.

ICONIC SIGN IN THE CONCEPTION BY LEOPOLD BLAUSTEIN

Leopold Blaustein does not use the term "iconic sign" because he limits the set of signs to the set of language creations. He does investigate some objects — reproductive objects — which would have been considered iconic signs by a number of scholars coming from the Lvov-Warsaw School. Notably, although Blaustein does not consider reproductive objects to be iconic signs, he does say that "to a degree, the relation between a reproductive and imaginary or reproduced object is like one that holds between a schema

and an outlined object, a symbol and a symbolized object and between the sign and the designated. Due to their genetic likeness, these relation can be called the relation of representations" (Blaustein 2005e: 75). Remarkably, on account of the similarity of the relation holding between the objects Blaustein mentions, a number of representatives of the School count reproductive objects, symbols and outline, as well as signs-expressions as part of a set of signs in a broad sense of the word. Let us term Blaustein's reproductive objects, outline, symbols and signs as "semiotic objects." We will say that Blaustein uses the term "sign" in a narrow sense: he only calls signs semiotic objects of a kind.

Blaustein believes that in the case of objects such as a painting or sculpture we are dealing with three objects: a reproductive object, a reproduced object and an imaginary object. A reproductive object is a spatial and temporal physical object, an element of the real world, such as an actor, a canvas covered by colour, a screen along with the phantoms that cover it, a figure from marble, etc. (Blaustein 2005c: 11). The reproductive object corresponds to what I called the representer. The reproduced object is what other representatives of the Lvov-Warsaw School call the "designator" or "denoter" of an iconic sign, and I have used the term "the representative agent" for it. A reproduced object can be an element of the real world but does not have to be. An imaginary object is what we see "in" the picture or sculpture or on stage. An imaginary object is not an element of the real world of time and space and cannot be one, but its component parts can enter *quasi*-spatial relations ("in" the picture, a tree can be in front of the house, while a cloud can hover above it), *quasi*-temporal and even *quasi*-cause-and-effect relationships. Imaginary objects, Blaustein writes, are not ideas — they are *quasi*-real.[4] In the case of Stanisław Wyspiański's drawing *Helenka*, the reproductive object is paper covered by particles of pastels, the reproduced object is a living girl, Wyspiański's daughter — Helenka — and the imaginary object is the face of a child that we see "in" the portrait. Blaustein believes that the reproductive, imaginary and reproduced objects

[4]See Blaustein 2005d: 54. Notably, the ideas on imaginary objects presented here by Blaustein converge with the ideas by Roman Ingarden on intentional objects. However, the treatise by Blaustein *Przedstawienia imaginatywne. Studium z pogranicza psychologii i estetyki* (1930) (1930) was published a year before Ingarden's *Das literarische Kunstwerk* (1931). Blaustein overtly draws upon Ingarden's *Das literarische Kunstwerk* and *O poznawaniu dzieła literackiego* (1937) [*The cognition of literary work of art*] only in the tract *O ujmowaniu przedmiotów estetycznych* (1938). It is possible, though, that in 1930, Blaustein knew early ideas by Ingarden on the nature of intentional objects and he may have borrowed from these.

are members of a natural representation relation.

In reference to Blaustein's conception, a question arises about the nature of the imaginary object. In the tract *O ujmowaniu przedmiotów estetycznych* [*On depiction of aesthetic objects*], where Blaustein openly draws upon Ingarden's ideas, expressed in *Das litrarische Kunstwerk*: "When I watch 10 photos of a person I know, there are 10 reproductive objects, and with the help of these I can express 10 imaginary objects, but only one reproduced object" (Blaustein 2005f: 10). In the work *Przedstawienia imaginatywne. Studium z pogranicza psychologii i estetyki*, we read: "We distinguish between a phantom and its appearance because one and the same phantom, such as the shadow of a tree, can be seen by a number of people" (Blaustein 2005f: 61). Blaustein recalls the distinction between four layers of a literary work of art made by Ingarden: (1) the layer of word-sound, (2) the semantic layer made up of sentential significations, (3) the layer of presented objects, and (4) the layer of outlined appearances where objects presented in the work become manifest (Blaustein 2005c: 13). He also mentions concretization of a piece of literature, which Ingarden talks about. A question comes up whether the imaginary object which Blaustein writes about is a counterpart of any of the elements described by Ingarden (any of the layers or concretizations he distinguishes) or not. Note that the terms "representer," "represented" and "representative agent" that have been used here to describe the structure of an iconic sign (such as a painted picture) are insufficient. It is necessary to distinguish between a potential representative agent (representative agent$_{potential}$) — a counterpart of the third and fourth layer of the work, or the third and fourth taken together — and an actual representative agent (representative agent$_{actual}$) — as the counterpart of Ingarden's concretization. On the one hand, arguably, in writing that thanks to 10 photos he can express 10 imaginary objects, Blaustein means the imaginary object as the third layer of the piece (the layer of presented objects) and at the same time representative agent$_{potential}$. This assertion seems supported by the fact that Ingarden wrote about the depiction of a work of art rather than the depiction of concretization (we can say that concretizations are some products of the act of the depiction of a work of art). On the other hand, in Blaustein's opinion, there are as many appearances of the reproductive object as there are presenting contents, with each presenting content being tied to some perceptual presentation. Blaustein thinks that "appearance unambiguously marks an imaginary or reproduced object for me [...]. The intentional object of imaginary presentation is thus unambiguously marked for me by its appearance and is unique" (Blaustein

2005d: 65). Note that the above quotes do not speak of an imaginary object being marked by means of appearance but of marking an imaginary object for somebody. If, however, we have to do with relativization to the recipient, a presumption arises that, for Blaustein, an imaginary object is not that much a counterpart of some potential layer of the work of art, but an equivalent of Ingarden's concretization of a work of art. And possibly the object of this concretization (representative object$_{actual}$). Importantly, on the grounds of Blaustein's conception, it is possible that the representative agent corresponds to Ingarden's fourth layer — the layer of appearances. Then, the imaginary object would not be identical with the representative agent but would be a counterpart of what is presented; then two kinds of the represented would be distinguished: real and imaginary.

By asserting that each reproductive object is tied to exactly one imaginary object, Blaustein does not determine whether he means the representative agent$_{potential}$ or the representative agent$_{actual}$. Another problem is whether indeed each reproductive object is tied to exactly one imaginary object. As Wallis notes, some reproductive objects are ambiguous, that is, can be interpreted in more than one way. In Blaustein's terminology, we would say that given one appearance, such as the appearance of a set of strokes, we can intend to mean either object, such as when we perceive Fig. 4:

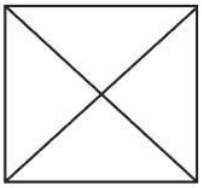

Fig. 4. A pyramid

We can intend to mean either a pyramid that is pointing at us or one with its base directed at us, and so the appearance in this case does not unambiguously mark the imaginary object for us. It is a fact, though, that at a given moment we can intend to mean only one object, and therefore an assertion still holds that is weaker than Blaustein: the appearance unambiguously determines the imaginary object (or the reproduced one) at a given moment (that is, a given moment can evoke precisely one concretization, and possibly express the object of exactly one concretization).

A key term that is used by Blaustein to describe objects such as a painting or sculpture is the notion of presenting contents. The presenting

contents of the presentation of an object presents the object of this presentation. When we are looking at a board we have a perceptual presentation of the board. The presenting content of the board presents a real board. This content makes up the appearance (view) of a real board. Therefore the appearance of an object presents this object. It would appear that one appearance, that is, the presenting content of the presentation of an object, always presents exactly one object. In fact, that is not so. Blaustein believes that in the case of reproductive objects one presenting content presents two objects: one physical object (such as paper covered by particles of pastels) and an imaginary content (such as the face of Wyspiański's daughter Helenka "in" the picture). Which object is actually presented by the presenting content depends on the intention of the subject. Blaustein describes it this way:

> The same presenting content fulfills [...] a dual role: the appearance of a screen and the appearances of the landscapes, homes, people and animals that appear on the screen, with these landscapes, homes, people and animals being further objects of the presenting content, and the screen, covered by phantoms, being its closest proper object. That the presenting content plays the part of the appearance of these further objects, too, is evidenced by the viewer — gazing without psychological reflection at the people and things that appear on the screen — sees these people and things directly and does not think about their being not identical with the sets of colour spots that he actually sees. The duality of the presenting content and the imaginary object will be easily realized by the viewer, though, once his attention to the imaginary world is transformed into the attention to the world of the reproductive objects (Blaustein 2005b: 26-27).

Blaustein's conception causes some doubt. A question arises concerning the range of the name "reproductive object." Reproductive objects analysed by Blaustein are above all human artefacts. One object that is not, and which is considered as reproductive by Blaustein, is the surface of a mirror that reflects someone's face. Blaustein would probably consider that the reproductive object is also the surface of a lake reflecting the forest that grows around it. When we look at the surface of water we see the forest "in" it. The forest as reflected in water is an image of the forest. However, man also has an ability to personify that is to see human or animal silhouettes in clouds or rocks, say, rocky mushrooms — mushroom-shaped rocks that can be found in the Góry Stołowe mountains, or a crass formation in the Ojców National Park near Pieskowa Skała that looks like a mace, called Hercules' Bludgeon. As we look at these rocks we see "in" them some imaginary objects

and intend to some imaginary objects. However, can we call these rocks reproductive objects? Can we acknowledge that here is a relation of natural representation between these rocks, mushrooms or a mace? The answer to both questions seems to be negative. Apparently, then, we can intend to see imaginary objects also when perceiving such objects which do not represent these imaginary objects.

Indeed, Blaustein distinguishes between several kinds of — as I put it — semiotic objects, such as reproducive objects and outlines. Outlines are exemplified by Blaustein in a map of terrain, a globe that represents the world, a drawing that represents the inside of a home with a section. No outline, and thus none of the objects mentioned above, is in Blaustein's conception a reproductive object. A question arises then what the basis for the distinction between outlines and reproductive objects is. Note that for some representatives of the Lvov-Waraw School, such as Wallis, a map is a kind of mixed object – iconic-conventional — and some architectural drawings that represent buildings are iconic signs. At closer scrutiny when comparing the sets of Blaustein's reproductive objects and Wallis's set of iconic signs, one can conclude that these sets cross. Wallis considers a map of terrain as an iconic sign but Blaustein thinks that such a map is not a reproductive object but an outline. Regarding a mirror, reflecting someone's silhouette is, according to Blaustein, a reproductive object, but it is not an iconic sign according to Wallis. The drawing by Wyspiański, *Helenka*, is an iconic sign in Wallis's conception and a reproductive object in Blaustein's terms.

The key concept used by Blaustein to distinguish between objects and both outlines and symbols is the notion of phenomenon. According to Blaustein all imaginary presentations are phenomenal, but schematic and symbolic ones are not phenomenal because the presenting content of outlines and symbols does not play a part in the appearance of their intentional objects (Blaustein 2005b: 30) so, in the case of outlines "we see the spherical quality of the globe, some parts of Poland being higher or lower on the plasticine map, but the appearance of a specific [..] globe or a plasticine map does not claim to be [...] the planet or Poland" (Blaustein 2005b: 30); in the case of a map "the presenting content does play a role of appearance but it is the appearance of an outline (map) rather than an object outlined by a map" (Blaustein 2005b: 30).

Blaustein's tract *O naoczności jako właściwości niektórych przedstawień* reads: "Presentation is phenomenal if a complex of the sensory contents that accompany it presents the intentional object of the presentation, and

thus performs in the capacity of its appearance. The conditions for the presenting content having the quality of appearance include its adequacy vis-a-vis the object, independence of the whole made up of those contents of the presenting content that correspond to something in the object and the congruence of the properties — whether fulfilled or unfulfilled in appearance — that are attributed to the object of presentation" (Blaustein 2005b: 35). In the passage above, Blaustein provides the necessary condition for a presentation to be phenomenal:

(1) The presenting content of the presentation of a representing object must fulfill the role of the appearance of the represented (intentional) object.

The condition proves to be equivalent with the conjunction of three other conditions (in reference to each of the conditions an example of an object is given that does not fulfill this condition, along with an explanation of why it does not comply with the condition):

(1a) The presenting content must be adequate to the represented (intentional) object.

Example: Suppose we have to do with a representer that is a sculpture that presents the Slavonic Svetovid deity, which has four faces looking to the four parts of the world (in this way they sought to render the omniscience of the god). In this case, the presenting content of the presentation of the representer (having four faces) is inadequate of Svetovid, as Svetovid has never been believed to have four faces looking in the four directions even though he was believed to be omniscient. The content of the presentation of the four faces looking in the four directions of the world does not constitute the appearance of omniscience, so omniscience is not phenomenally presented by having four faces looking in four directions. The representer presenting Svetovid is not the reproductive object of Svetovid, but it is a symbol of Svetovid.

(1b) The whole made up of the components of the presenting content, corresponding to something in the object, must be independent, that is, the whole can be phenomenally given at the change of disposition the subject takes towards the world of phenomena.

Example: Suppose we are dealing with a map of Europe, where only country boundaries have been outlined. The elements that make up the presenting content of the presentation of the map are not independent whole because the outline of boundaries is not given to us, say, when we are flying and looking down at particular parts of Europe. This map is therefore a schematic object rather than reproductive.

(1c) The properties phenomenally fulfilled in an appearance must

conform to phenomenally unfulfilled properties, that is, there must be agreement between the properties attributed to an intentional object on the basis of appearance and some other properties that are ascribed to it, but ones that are not attributed on the basis of appearance.

Example: Suppose that we have an object that represents an angel — a human silhouette with wings. There is inconsistency between the properties of the intentional object (angel) that are attributed to it on the basis of the representer's appearance — spatiality and physicality — and the properties ascribed to it on grounds other than the properties of the representer – non-spatiality and non-physicality (spiritual being). Therefore, the representer presenting a human figure with wings is not an object that reproduces an angel, it is not an image of an angel, but it is a symbol of an angel.

As we can see, the picture that presents an angel is in Blaustein's conception an object that reproduces an angel, but it is a symbol of an angel. Also, the map of terrain is not an object that reproduces the terrain — it is only an outline of the terrain. Please note that whether an object is a symbol or a reproductive object depends on which object the person that perceives the representer intends to be. Blaustein does not write that explicitly but, arguably, this interpretation seems acceptable on the grounds of his conception. Take the representer R as presenting a figure with wings. If, upon perceiving representer R, someone intends to the imaginary object — a figure with wings — the representer is an object that reproduces a figure with wings. However, if the person that perceives the figure intends to the kind of angel the Bible speaks about, then representer R is a symbol of this angel. Therefore, one and the same object — representer R — will be an object reproducing object P_1 on one occasion and a symbol of another object P_2 on another.

Despite Blaustein's explanations, making a distinction between outlines and reproductive objects remains fraught with problems. As Wallis points out, the passage between *pleromata* and *schemata* is gradual: *pleromata* are obtained from *schemata* in the process of "enrichment" — "addition" of properties, while *schemata* are obtained by means of "impoverishment" — a "subtraction" of properties. However, in Wallis's conception, *schemata* and *pleromata* are signs of the same kind — iconic signs. In Blaustein's conception, even if a *pleromatus* is a reproductive object, the outline it generates by properties being subtracted belongs to a different class of objects — it is not a reproductive object; it is an outline. In Blaustein's conception, as long as imaginary presentations (which we have thanks to reproductive objects) are phenomenal, schematic representations are not phenomenal. Phenomena

are graded, but it is difficult to determine where the boundary lies between imaginary and schematic presentation.

SUMMARY

The semiotic terminology by the members of the Lvov-Warsaw School is not uniform. The term ”image” is used by Kazimierz Twardowski, Tadeusz Witwicki and Stanisław Ossowski. Whereas the term ”iconic sign” is used by Mieczysław Wallis as of 1939, after 1934 he uses the term ”directly presenting sign” to denote iconic signs and following 1937 — the term ”sign-likeness.” Leopold Blaustein uses the term ”reproductive object.” On top of this, one can find the term ”image” in Wallis's writings, but it has a meaning that is completely different from the same term as used by Twardowski, Witwicki and Ossowski. Importantly, those using the term ”image” do not constrain it to the object given to the sense of sight, but they use it to denote the other senses too (hearing, smell, touch, taste).

The representatives of the Lvov-Warsaw School — Kazimierz Twardowski, Tadeusz Witwicki, Stanisław Ossowski, Mieczysław Wallis and Leopold Blaustein — do not agree on what the set of iconic signs is and what the essential properties of iconic signs are, but they all place iconic signs in opposition to conventional signs. Also, they believe that a set of essential properties of iconic signs can be identified, and, for the most part, they demonstrate it explicitly. In his works, Kazimierz Twardowski does not provide any definition of iconic sign, but this definition can be constructed on the basis of his theory of sign. None of the representatives of the School negates a possibility of creating a normal definition of iconic sign, assuming that the notion of iconic sign is one that has a family of meanings (in Pawłowski's sense of the term; Pawłowski 1986).

All those mentioned above agree that an iconic sign is a member of a relation. What they do not agree on is neither what relation it forms a part of nor which member of the relation an iconic sign is. The following elements have been proposed here: the representer is a physical object, such as a canvas covered by particles of paint, a chunk of marble of a certain shape, a theatrical performance; the representative agent is what we see ”in” a painting, sculpture or a theatrical performance; the represented is the designation of a painting, sculpture or a theatrical performance respectively. These elements facilitate for us an analysis of the views held by the representatives of the Lvov-Warsaw School on the nature of iconic signs. Having made a distinction between the content and object of a presentation — two members of a relation of presenting to oneself – Kazimierz Twardowski

writes that in the case of the "external" relation of presentation we have to do with the same kind of members: the content of the presentation is a picture while the object is a landscape. On the basis of Twardowski's statements we can infer that the content of the picture is the representer (a physical object — the surface of canvas transformed by the painter by placing particles of colourful paint on it), while the presented object is the designation of the picture, the represented. The picture is thus the third member of an "external" relation: person T presents y by means of x. An image, thus understood, is not a sign in Twardowski's conception, though, because in this conception, as long as a sign is a permanent (in vague terms) psychophysical creation, it is an object that expresses (and thus one that has its designation) some psychical creation of its creator, some imagination of the creator of the object. According to Tadeusz Witwicki, every image is the first part of a relation of psychological representation: x represents y for O, where x is the representer and y — the represented. Representation is about the representer being spuriously taken for the represented. In *Analiza pojęcia znaku*, Ossowski states that an image is the first part of a three-member subjective relation of presentation: x presents y for O. The relation of presentation that associates the image (the representer) with the designation (the represented) is in Ossowski's opinion a collation of a symmetrical objective relation of similarity which is about the correspondence of the elements of image_1 and the represented object and some asymmetrical subjective relation that is, arguably, about a subject having an intention of associating one object with the other. In *U podstaw estetyki*, Ossowski notices that in the case of an image, it has something to do with not only some physical object (the representer) but also with what we see in the physical object, that is, the representative agent. In this formulation, an image is the first part of a three-member relation of presentation, that is, reproduction, and we are left to believe (Ossowski does not state it explicitly) that the relation is: x presents y by means of z, where x is the representer, y — the represented and z – the representative agent. Ossowski does not mention that the creator of the image was a member. Like Twardowski, Wallis distinguishes between two relations: presentation and presentation to oneself, but he does it in a different way than Twardowski. He does believe that the term "present" is about a psychophysical activity and "present to oneself" is about a psychical activity, but he states that "Presentation is about creator T forming a sensorily perceivable physical object a with an intention that object a should evoke in the recipient O's mind a presentation — an imagining or notion — of object A that is different from object a thanks

to there being a relation of representation between a and A" (Wallis 1968a: 88). Apparently, the relation of presentation is a four-member one for Wallis – creator T presents y, thanks to x, for recipient O, where x is the representer and y — the represented. Wallis believes that the kind of representation that is characteristic for directly presenting signs is the relation: x directly represents y for person O, where x is the representer and y — the represented. This representation is a three-member relation – asymmetrical and counter-reflexive; x is sensorily perceivable and y perceivable or non-perceivable by senses. The directly presenting object is, in Wallis's conception, the second part of a four-member relation of presentation and the first part of a three-member relation of direct representation. The examples Wallis gives of directly representing objects question the proposition that, in the case of the relation of representation, x is the representer. The following assertion seems a plausible interpretation: the x in "x represents y directly for O" is the representative agent. Like Ossowski in his *U podstaw estetyki*, Blaustein believes that in the case of objects such as a painting or sculpture, it has something to do with three objects: the reproductive object, the reproduced object and the imaginary object. The reproductive object is that which was called the representer here: a physical object in time and space; the reproduced object is the designation of the representer, that is, the represented, and the imaginary object is that which we see "in" a painting, "in" a sculpture, on a theatrical stage — the representative agent. Image, in Blaustein's conception, is the first part of the three-member relation of natural representation, which, arguably, may be demonstrated as: x naturally represents y by means of z, where x is the representer, y — the represented and z — the representative agent.

The representatives of the Lvov-Warsaw School are not in agreement on the ontic category of the iconic sign. According to a reconstructed conception by Twardowski, an iconic sign is a persistent psychical product in a vague sense, that is, a thing. For Witwicki, an image is a material, physical object, such as a set of strokes and spots in painted pictures. In Ossowski's opinion, an image is a material object that can be perceived by different senses. On the foundation of this conception an image cannot be equated with a thing as Ossowski counts phonic phenomena as images. Therefore, in Ossowski's conception, the term "material object" has the same range as the phrase "physical object." Material objects would thus include pictures and sculptures but also music, dance, pantomime and the like. According to Wallis, an iconic sign is a physical object that is perceivable by senses. Blaustein sees the reproductive object as a temporal and spatial physical

object, which is part of a real world: an actor, canvass covered by paint, a screen with the phantoms that cover it, a statue made of marble, etc.

Likeness is mentioned in all the conceptions of iconic sign. However, the representatives of the School do not agree on which members it is where this similarity occurs. For most of them, it is between the representer and the represented. In the earlier conception by Ossowski (outlined in *Analiza pojęcia znaku*) the similarity is believed to hold in some sense between the representer and the represented, but it is not limited to appearance. Similarity as limited to the similarity of appearance is discussed by Witwicki, in a later conception by Ossowski (*U podstaw estetyki*) and in the theories by Wallis and Blaustein. Having acknowledged the similarity, Witwicki seeks to explain how it happens that in the case of a painted picture the arrangement of spots and strokes is similar to a three-dimensional object. He provides an explanation of this fact by making a distinction between suggestive characteristics and essential ones as well as fake properties.

The scholars do not agree as far as what appearance is concerned. According to Ossowski, the appearance of an object is a set of sensory qualities, characteristics that can be perceived by senses, which inhere in objects, and to Wallis it is a perceptual presentation of an object. The notion of appearance is most in-depth analysed by Leopold Blaustein, who goes so far as to provide the conditions of the presenting content having the quality of appearance. Note that the notions of the iconic sign, where the similarity between the representer and the represented is not limited to appearance, are broader than the concepts of the iconic sign where similarity is restricted to appearance: an architectural work of art can be considered an iconic sign of a piece of music of the same rhythm, when we consider the similarity of structure. If, however, we consider the similarity of appearance no edifice will be a sign of any piece of music as the appearances of these objects belong to different domains (visual and auditory).

On the basis of the research into the terminology of selected representatives of the Lvov-Warsaw School, upon an assumption that in each conception the iconic sign is the representer (arguably, this assumption holds in all the conceptions analyzed here), we can formulate the following conclusions:

1. The terms "image" in Ossowski's *U podstaw estetyki* ("image$_{Ossowski2}$") and Wallis's "iconic sign," "directly presenting object," "image-likeness" ("iconic sign$_{Wallis}$") are interchangeable.

2. The term "image" for Witwicki ("image$_{Witwicki}$") is interchangeable

with the term "iconic object" used by Blaustein ("iconic object$_{Blaustein}$").

3. The term "iconic object$_{Witwicki}$" is independent from the terms "image$_{Ossowski2}$" and "iconic sign$_{Wallis}$."

4. The broadest in range is Ossowski's term "image" from *Analiza pojęcia znaku* (image$_{Ossowski1}$). All other terms are subordinate to it.

5. The relation between the denotations of the respective terms are presented in Fig. 5.

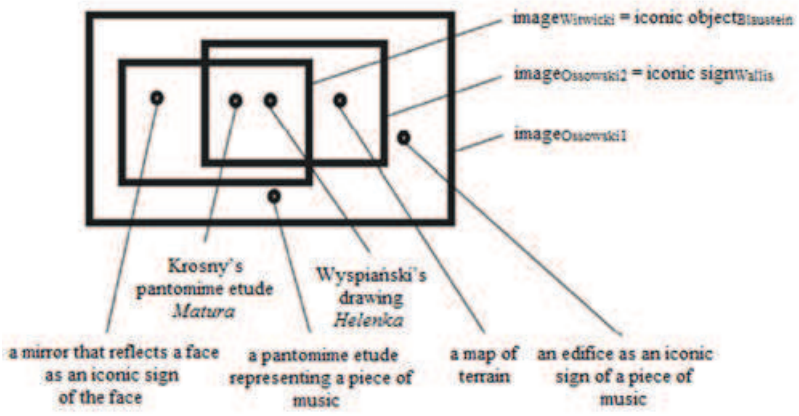

Fig. 5. Relations between the denotations of the terms: "image$_{Witwicki}$," "image$_{Ossowski1}$," "image$_{Ossowski2}$," "iconic sign$_{Wallis}$" and "iconic object$_{Blaustein}$" drawing image$_{Ossowski2}$

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WITTGENSTEIN'S LATER WORK'S INFLUENCE ON THE METHODS OF LANGUAGE RESEARCH

Originally published as "Wpływ późnego Wittgensteina na metody badań nad językiem," Studia Semiotyczne 27 (2010), 353–373. Translated by Lesław Kawalec.

The presentation of the basic principles of Wittgenstein's methodology of language research has two objectives. First, his discussion of language and meaning only becomes intelligible in a broader perspective of the assumptions adopted concerning research methodology. Second, the assumption of some propositions in contemporary theories on the categories of use or the notion of rule that involves accepting or rejecting some more general claims on language. On account of the vastness of the material, ambiguity in Wittgenstein's thought but also the complexity of the issues, means not all the principles of Wittgenstein's later philosophy will be investigated. Only the contexts (of grammar, use and practice) that are vital from the perspective of philosophical dissertations on language will be presented in three steps.

The Context of Grammar: Language-Games and Rules

Using a given linguistic expression occurs in language, which to Wittgenstein is a set of language-games. Along with the methodology he had adopted, the author of the *Investigations* chooses not to provide a strict definition of a language-game, but he explains it. It is made up of language and the activities into which it is implicated (Wittgenstein 1998, #7). As mature users of language, we participate in a lot of interwoven language-games and we hardly ever encounter their simple forms. But even in the case of simple

forms, there is nothing external (other than a game) that would delineate the essence of the language-game, and hence the essence of the meanings of the expressions we use within it. In his attempt to persuade us to the autonomous quality of language-games, Wittgenstein seeks to prove that there is no such determinant. It cannot be said what a language-game is in general, but examples of language-games can be provided. These include: describing an object, resolving a puzzle, solving a task, thanking, greeting, speculating, or singing in a dance parade (Wittgenstein 1998, #23). In admitting the existence of innumerable linguistic uses, Wittgenstein also permits the existence of countless language-games. Language constantly changes, some games disappear, new ones emerge; so, even the multitude of language-games is nothing constant and cannot be defined once and for all.[1] No two Language-games share the same patterns, but they make up a set thanks to their generic similarity: "they are [...] variously AKIN to one another" (Wittgenstein 1998, #54; Wittgenstein 1969: 44).[2] This affiliation can be indicated only by investigating specific games and abstracting similar activities, which Wittgenstein would do in his later philosophy. This similarity that all games share must be treated in special ways. Wittgenstein uses the metaphor of fiber to elucidate on what exactly he means. No single fiber goes all along throughout the thread, and what particular lengths of thread share is single fibers (Wittgenstein 1998, #67).

Language-games are defined by rules (Wittgenstein 1998, #567). The rules do not play any one single part but various roles — depending on the game (Wittgenstein 1998, #53). They function as a signpost, as it were, thanks to which it is clear how to act in a specific game. The metaphor of a "signpost" in the description of rules does not appear in *Investigations* by accident. Wittgenstein wants to make us aware that the rule itself leaves a number of doubts, as does a signpost, which of itself does not "say" anything to us, only where we need to go (its arm or the opposite). A relatively clear and unambiguous interpretation is arrived at thanks to practice (to be discussed later). One can say that a signpost sometimes leaves doubt, and sometimes does not, depending on how deeply its users are involved, immersed in some practice of referring to it, reacting to it; depending on how much the practice seems obvious to them. The latter statement is an empirical

[1]Baker demonstrates that the very treatment of use is for Wittgenstein a matter of theoretical negotiations, which is yet another way of emphasizing the pluralistic character of his later philosophy (Baker 2004: 277).

[2]Elsewhere I argue that the idea of similarity does not perform an explicative function to Wittgenstein (Derra 2006).

proposition to Wittgenstein, rather than a philosophical proposition, though (Wittgenstein 1998, #82-85). Playing a specific game, we learn which rules are important and which are not. So, in chess it is crucial that the figures move in some specific ways, but it does not matter, what fabric they are made of and what size they are. In another game, though, it would be a significant trait — in tennis or football it does matter what the balls are made of and how big they are. Games, then, have some rules and a sense, which might be understood as some order of rules and a hierarchy (along with the distinction: relevant/irrelevant) within a language-game (Wittgenstein 1989a, appendix I, 20).

Consider an example, often brought up by Wittgenstein in *Philosophical Grammar*, where an idea of a linguistic rule is discussed in teleological terms (Wittgenstein 1989c, 184-195). One can judge the rightness of the application of the rules of cooking by making a reference to the purpose they serve, which is external to those rules — obtaining tasty or at least edible food. This purpose can be indicated without discussing the means by which it is attainable or attained. It is not so as regards the constitutive rules of language-games. A language-game cannot be subjected to a value judgment by such means as reference to the category of communicativeness because a game deprived of this purpose ceases to be a language-game. Associating the notion of the language-game with communication has a conceptual nature. The latter is no tool thanks to which the usefulness of the former can be judged. Cooking, as a result of which one obtains a soup that is hard to swallow does not cease to be cooking — it is just bad cooking. A language game cannot be incorrect due to its uncommunicativeness as without it there would be no game of a linguistic kind. If we applied rules other than those of chess, we would not just be playing incorrectly — we would not be playing chess. Language has inner goals, although the results one gets thanks to it might be external (Wittgenstein 1998, #64, Wittgenstein 1989d, point 320) (cf. Glock 1996: 47; Arrington 1993: 72).

Does the fact that it is impossible to strictly determine what a rule is authorize us to say that one cannot speak of anything like this? One can speak of rules, but one must abandon the classical understanding of "ideal" and "boundary." Classical philosophy required definitions which outlined "boundaries," determined what the object of interest was and how it could be recognized. For Wittgenstein an "ideal" is not something we pursue, it is not a hidden essence of the thing one needs to get closer to; an ideal is an inevitable form, a module in which language is received by us (such as a general form of logical judgment). Wittgenstein would not see "boundary" defined the way

it is done in logic. In logic one can speak of it only when one understands it as clear-cut, with clear boundaries. Its boundaries might not be fully defined and their shape can leave doubt that needs interpreting but one can speak of a boundary none the less. The doubt that arises when discussing rules does not make rules disappear or cease to be applicable. (Wittgenstein 1998, #100-105; Wittgenstein 1989d, #441-445). They cannot be made absolute, but this does not mean they are non-existent. Wittgenstein does not want to consent to a peculiar metaphysical-teleological understanding of boundary as we do not always know why we set out such a boundary. One can be established only in a broader context; such as in the case of a fence, which is put up for various reasons, and it is only its use that will help determine whether it has been made in order to prevent someone from entering or for the sake of someone entering or maybe so that one can jump across it. (Wittgenstein 1989a, I, 116; Wittgenstein 1998, #499; Baker, Hacker 1983: 56).

In the description of rules, Wittgenstein always makes use of the plural (playing a game WE learn), which is not accidental but a consistent observation of one's methodological principles. "Being guided by a rule," "abiding by a rule" or "understanding a rule" cannot be applied to one man. None of these activities can be done once, either. It cannot in the sense that what will be done cannot be named with a Wittgenstein's term "rule," "abiding by a rule." These are habits, customs, institutions that by definition are shared, collective and pertain to a group of people (Wittgenstein 1998, #199; Wittgenstein 1989d, part VI, 21). Language is definitely such an institution; understood through language-games, it is defined by means of the category of "rule." Wittgenstein clearly distinguishes between two layers: the stratum of being guided by rules (practical, recognizable by the way in which language is used) and the layer of judging that we are guided by rules. In order to be guided by rules, it does not suffice to think that one does that — one needs to do that in practice, indeed. Thinking that one is guided by a rule may be in a way personal but compliance with a rule cannot be private or individual in nature (Wittgenstein 1998, #202).[3] Somebody may be taught rules and orders only by way of exercise and example, provided long enough for the learner to attain the right competences. The attainment of such competences by means of appropriate training manifests itself as a habit and practical activity, when these become obvious and necessary

[3]This privacy is understood by Wittgenstein in a peculiar manner. Judging is private in that it is a numerical property of some subject but judging occurs in language, which by definition is a social phenomenon.

enough to be called natural. When the teacher has a math task solved, such as 2+3=? the student is able to solve it because by following exercises they have been able to internalize the rules of addition and now they know how to go about doing the task. There is no space for the interpretation of the instruction as it was already done the moment rules were established concerning what to do in such a situation. Going by a rule is a practice but the settlement that 2+3=5 IS INTERPRETATION. The settlement is arbitrary in the sense that there is no reason from outside the language-game why such and such behavior should be called addition (the game is rooted in some essential or metaphysical truth about the subject it concerns). It could be called "pulsating" and it would not change the essential understanding of the regularities and following of the rule (Baker 1981: 64). But when it is constrained by rules, arbitrariness disappears and, alongside with it, the possibility of interpretation. One cannot answer the question why I have to go by this or that rule if I want to add, but it can be stated in full confidence how I need to behave for my actions to be called addition. Wittgenstein says "you follow a rule blindly," without contemplating its steps (1998, #219). If I am not forced by a rule to some specific activity, it cannot be ascertained that we are dealing with the following a rule at all. (Wittgenstein 1989a, VI, point 47).[4] I can justify the subsequent stages of my actions, but they are also established as permissible transitions in some game. In the order of my justifications I finally reach the moment when apparently only one answer can be given: "This is simply the way I act." (Wittgenstein 1998, #219), unable to point to some ultimate reason. Emphasizing the validity of a language community is not tantamount to formulating a "social" theory of rules. Consensus, agreement between users of language is key for the sake of communication, rather than for the sake of rule observance (McGinn 1984: 89-90).

In questions such as "What makes this or that behavior compliant with a rule?" the assumption is, apparently, a kind of separation of the rule from an array of its possible applications. It is customary that in order to establish whether some behavior is compatible with a rule, it is indispensable to appeal to some external properties which will determine the possible consequences of applying the rule in individual cases. This is however not the way Wittgenstein understands the rule. Nothing external determines its correct applications. We only express those things in language that could be imagined in other ways too (Wittgenstein 1989b: 54). When we make use

[4]Wittgenstein thinks that it is extremely interesting that people fix rules and then in fact follow them, sometimes doing it for pleasure, like in chess.

of it, it is subject to rules, and the concept of rule observance contains, as it were, a conception of what conduct is right and which is wrong (Bolton 1981: 160).

This example is directly related to the concept of meaning. When a user of language is asked about the meaning of the phrase "nice cat," they will probably start pointing to objects (nice cats) that are labeled this way, demonstrate contexts in which the term "nice" is used of cats. They will say sentences in which this expression can legitimately be uttered. However, when asked why the phrase "nice cats" means nice cats, all they can do to answer the question is appeal to practice: this is so in the language I use. This much about a linguistic rule. It could be a different one — there is no logical necessity in this — but it is the way it is. One could imagine that "nice cats" might mean rabid dogs if this was practiced in the language. Yet, language is language thanks to rules, which are originally defined by the convergence of actions; in light of this, the term "nice cats" is applied to nice cats. The phenomenon of language is built upon such relationships (Wittgenstein 1989a, VI, 39).

The requirement of descriptiveness, or doing philosophy descriptively, rightly attributed to Wittgenstein becomes better understood in the light of these deliberations, as does the famous Wittgenstein's statement from #124 of *Investigations*:

> Philosophy may in no way interfere with the actual use of language; it can in the end only describe it. For it cannot give it any foundation, either. It leaves everything as it is. (Wittgenstein 1998, #124).

Philosophy, including the part made up of research in meaning, does not consolidate the meaning; it describes it instead. In this sense also, it cannot change the received use — it can only describe it in numerous arrangements. This sort of description is supposed to perform an ordering function to our knowledge of language. The point is not the establishment of order in general; it is always about a specific language-game, a local rather than global order. The description discussed here does not set out to gather a complete set of forever binding rules concerning each and every use of a word. What it attempts to do is "compare and contrast" language-games, describe them, emphasize similarities and differences that are obtained between them (language-games can be compared by treating one as a variant of another)

(Wittgenstein 1989a, II, # 49). In this description, sentences should be treated as tools, and language as something we can use thanks to years of training that has allowed us to learn the appropriate rules.

Grammar, an investigation completely different from traditionally understood logic or from one Wittgenstein postulated in the *Treaty*, becomes key for answering the question of what language is. Also, this is something that distinguishes the philosophy of *Treaty* from the philosophy of *Investigations*. Grammar begins in the same place as language does in human actions (Wittgenstein 1989c: 135; Bolton 1981: 125). Wittgenstein's theses on truthfulness will serve as an example. Sentence p, if true, "corresponds" to facts in some ways: it asserts how things are (they are p). This is happening not because the logical structure is reflected in language, but because what we call the "structure of reality" is only a shadow cast by grammar (Hjacker 1996: 49). How should that be understood? It is not an empirical fact that we call some things "objects" and some "colors" and yet others "relationships;" it follows from the way in which language expressions function. What we are doing at the moment is explaining their meanings. A major lesson that can be drawn from Wittgenstein's discussion is that language (which has deep grammar) is an autonomous structure. In the theory of meaning, understood classically, the starting point was attributing to language the property of representing or describing the world (language reflecting the world), which was also treated as its constitutive quality. In over-reliance on some terminology, it could be said that deep grammar of language exposes a structure that gives us a possibility of a cognitive approach to the world without being a reflection of this world (Glock 2001: 299-302). The rules of language-games not only regulate the permissible moves in some game, but they are also constitutive. Wittgenstein writes:

> The steps which are not brought into question are logical inferences. But the reason why they are not brought into question is not that they "certainly correspond to the truth" [...] There is not any question at all here of some correspondence between what is said and reality; rather it is logic antecedent to any such correspondence; in the same sense, that is, as that in the establishment of a method of measurement is antecedent to the correctness or incorrectness of a statement at length. (Wittgenstein 1989a, part I, section 156)

Grammar cannot collide with the reality as it does not concern something. Grammar determines, in a constitutive manner, the structure of the reality, with the rules of this grammar being arbitrary. Without saying anything about facts, it does not establish what is true and false, either. An answer to the question of what it means that "judgments correspond to some fragment of reality" is valid, but this "correspondence" does not determine what the truth is. In playing a "true-false" language-game and accepting a sentence as true, we also accept it asserting that things are the way they are, which we could simplify as "correspondence" with reality — in a banal sense meaning that the truthfulness of the sentence "It is raining" depends on whether it is raining. This, however, does not entail any metaphysical consequences. In other words use, seen as a key to describing linguistic meaning, cannot be brought down to a generalization of specific language uses of a word or phrase. The essence of language cannot be derived from use, just as language use cannot be justified by a reference to a world external to it. The so-called world and language are interconnected in much more subtle and complex ways than it could be suggested by the classical principle of representation (Canfield, Shanker 1993: 78).

To use another quote from *Investigations*:

> "'Red' means that which occurs to me when I hear the word 'red'" — would be a *definition*. Not an explanation of what signifying something by a word *essentially* is (Wittgenstein 1998, #239).

Apparently, Wittgenstein tries to show us something very simple, something that we have so far been trying to complicate too much in philosophical tradition — so much so that we have lost the right perspective. "Red" simply means red; we usually associate it with the color of something, of some object, because in practice of the use of this word it usually appears in those contexts, but the significance of this word is specifically independent from the existence of red things — no metaphysical nature to be discovered in philosophical research is attributed to meaning. This could betray some minimalistic approaches by Wittgenstein. When I ascertain the existence of a thing (in the sentence such as *X exists*), I am using an existential sentence which expresses our language use. Obviously, we refer x to something that we confer meaning to in our language-game, but in saying that X exists, we say nothing about the nature of X. X does not exist so-to-speak physically as a result; it just exists in the language-game where it is being used (Wittgenstein

1998, #57, 58).[5] Even if we build a grammar based on an "object-signification" relationship, the first of those categories — despite the previously formulated theories of meaning[6] — is not indispensable for language to function. How should that be understood? Wittgenstein's famous beetle example might be given here. Imagine we have boxes with "something" inside — that "something" is called a "beetle" but one cannot look into the others' boxes. So, you cannot say that it is impossible that each has a box with something else or something that keeps changing; perhaps there is nothing there and that nothing is called a "beetle?" Everyone knows what a "beetle" is from the sight of the content of their box. With all these circumstances, the word "beetle" is used as a the name of a thing. The thing is irrelevant for the discussion of this use (Wittgenstein 1998, #293).

Research Context: Category of Use

Wittgenstein encourages us to drop the classical metaphysical questions of the kind "What is the essence of meaning?" "What is meaning?" Using the categories of language-games, rules, use, he does not propose that those questions be replaced with another: "What is use?" He recommends that meaning be explained by a description of how the phrase of interest is used. In most plain terms, the concept such as "meaning" is explained by means of the term "use," which is less philosophically marked. Also, the model of explanation fails to settle an ontological issue for Wittgenstein — the relationship between use and meaning. Rather, he postulates some method of investigation: the question of use rather than the question of meaning. In this approach, the resolution of the issue of meaning is not reduced to the proposition "this and that is the meaning of any expression." This is why the question of meaning is transformed into the question of use (data, expressions of interest, rather than the essence of use or use in general) while the answer comes when we consistently perform properly understood descriptions of expression uses (Wittgenstein 1969: 21). One should neither

[5]This formulation of Wittgenstein's later position gives us no right to call it a peculiar linguistic solipsism. Making "existence" dependent on its functioning in a language-game does not deny the existence of a world that is independent from the user of language. The category of existence is treated differently here than in realistic positions, which are profoundly metaphysical. So, it resembles the position of Hilary Putnam, expressed as "inner realism."

[6]I mean a sense of meaning that would be attributed to any object's status. Suffice to mention the concept of J. Locke and G. Frege, phenomenological concepts or some positivist theories.

succumb to the temptation of treating use as a new name only, which veils the same problems, though. Wittgenstein makes changes that entail a completely new understanding of the theory of meaning (Wittgenstein 1998, #191-197; Wittgenstein 1968: 111, 114).

The way Wittgenstein presents it, no sign is significant "of itself", internally, as it were. Wittgenstein writes:

> Every sign by itself seems dead. What gives it life‘? — In use it is alive. Is life breathed into it there? — Or is the use its life? (Wittgenstein 1998, #432)

We can predicate on the meanings of linguistic expressions thanks to their use. When we ask about meaning, we ask about these, too. #23 of *Investigations*, which initiated a philosophical debate on the category of use, reads that meaning is the use we make of the word. This brief statement by Wittgenstein does not yet make the category of meaning more understood only because it is imperative to explain it with a presumably simpler category of use. Its general rule can be derived from the way in which Wittgenstein describes language. Use is the category by means of which we answer the question of what language is — what one can rightly say is that it is used. Wittgenstein's frequent reference to the fact that activity is prior to any description can be attributed to his deep conviction that even if the category of use were not included in any theory or presented in any description (including his own), people would keep using language. We can say it is what it is because we use it.

The way Wittgenstein argues makes it impossible to find a definition of use in his flagship texts. If we separate passages from texts where the category of use appears, we do not get a clear and unambiguous description of this concept. It must be investigated alongside categories related to it, analyzed in the context of the methodological assumptions adopted and the objectives we want to meet through this investigation. Below are the relevant quotations from Wittgenstein:

> *Investigations* #10 Now what do the words of this language signify? — What is supposed to show what they signify, if not the kind of use they have‘?

> *Investigations* #23 There are countless kinds: countless different kinds of use of what we call symbols, words, sentences.
>
> *Investigations* #43 For a large class of cases-though not for all-in which we employ the word meaning it can be defined thus: the meaning of a word is its use in the language.[7]
>
> *Investigations* #133 It is not our aim to refine or complete the system of rules for the use of our words in unheard-of ways.
>
> *Investigations* #421 Look at the sentence as an instrument, and at its sense as its employment.
>
> *Investigations* #560 [..] if you want to understand the use of the word meaning", look for what are called "explanations of meaning.

How can an unclear and complicated category such as use be understood? Apparently, at least five aspects can be identified which — taken into account together — bring us some understanding of what use is. Canfield proposes that this category be discussed in consideration of these problems (Canfield 1981: 72-75; c*f.* Baker, Hacker 1983: 368-369):

> 1. The way in which beings are built. In other words, what the backdrop for their formation is, and which we would include in grammatical properties, broadly understood, where grammar is perceived in linguistic terms. Here too are basic syntactic facts, characteristic of some specific language expressions (e.g. the way phrases are built).
>
> 2. Circumstances that are external, as it were, in which use is manifested: behavior, the kind of extralinguistic situation. What needs to be considered is the so-called environmental and social

[7]Perhaps the reason why Wittgenstein does not indicate that he means all cases is that in many places he writes that the meaning of a sentence can also be understood as a method of its verification. Also, he precludes such applications of the word "meaning" as in sentences "Dark clouds mean heavy rain," or "Rubens's painting has a great significance for its epoch." (Wittgenstein 1989c, #127).

aspects of meaning. We are investigating what in working terms might be called the most salient practical use.

3. Correctness criteria that can lend themselves to abstraction from the regularities that constitute life. These are investigated in linguistic situations and the extralinguistic situations accompanying them.

4. The roles played by expressions in some specific language-games.

5. Elements of full, deep grammar, whose criteria determine the functioning of expressions in natural language.

All the possible senses of the category of use make up what in theory could be called "meaning," and which can be investigated thanks to this category. Considering the above, this use can be described. For any word, phrase or sentence, there are at least several properties, analyzing them provides us with a picture of their use and affords an explanation of linguistic behavior in regard to this word, expression or sentence. Several levels of this description can be identified; phonological, syntactic, semantic, and pragmatic. This identification is particularly important when we discuss Wittgenstein's category of use. It is so above all because no concept that Wittgenstein uses (*Gebrauch, Satz, Sprache, Sprachspiele, Objekt, Tätigkeit*), along with his own methodology, have no everlasting established, context-free applications (Baker 2004: 67). Their meanings must be read in some totalities, rather than in detachment from them. The more aspects we take into account in the description of the way a given expression functions, the fuller answer we get to the question of what its meaning is. We can say that, in his attempts to describe the use of selected expressions, Wittgenstein demonstrates that this can be done in a number of ways and using various methods (Wittgenstein 1969: 57).

Social Context: The Role of Practice

Stressing the role of practice is an essential element of Wittgenstein's later methodology and of his approach to language in particular. This is so thanks to some key elements of his later philosophy, and thanks to the strong conviction that this activity is something most primeval, and

thanks to the rebuttal of the traditional two-facet theories of meaning.[8] The functioning of language-games can be described thanks to the possibility of investigating some specific language practices. Thanks to practice we have access to language as such. The critique of two-facet theories of meaning, where a sign (inscription, sound) becomes separated from this "something" which endows it with meaning (enlivens it), gives rise to a treatment of practice that is different from the traditional approach (Wittgenstein 1969: 24, 67ff). In the classical two-facet theory of meaning (the "enlivening" theory), it was necessary to demonstrate what and how gives meaning to signs. Figuratively, it was necessary to show the sources of the "enlivening." M. Luntley indicates that there are three such sources: beings (senses, ideas) of a Platonic kind, individual language user's mind and also the community of the users of language (social language practice) (Luntley 2003: 9). Therefore, generally speaking, we have Platonic, mentalist and sociocultural approaches to meaning. Some superficial and hasty interpretations ascribe a claim to Wittgenstein which has it that practice is the source of the enlivening of a sign. The result is dubbing his theory of meaning socio-functionalism or extreme conventionalism in the theory of language (Witek 2005). This, however, has no grounds in the light of the methodology of his philosophical investigations presented here. Wittgenstein is an opponent of separating a sign from that which enlivens it because the concept of a symbol is primitive and simple (irreducible into factors) in his philosophy. Both *Zeichen* and *Sätze* are signs and sentences in use. Wittgenstein then does not have to answer the question about the origin of imparting "life" (meaning) on signs. He cannot answer, then, that the source is practice. For the sake of clarity, we might add that he does not treat *Zeichen* as physical sounds or texts (Wittgenstein 1969: 26). Seeking the source of meaning in a community (society, that which is social, shared) is a blind alley also because the community (society) proves redundant as a source of grammar. Assuming that an individual can use symbols as signifying something thanks to the fact that they refer those to the way in which others use it, we assume that the remaining users of language already use symbols as having a meaning. In so doing we assume something we were supposed to justify. If we do not know in what way a symbol that an individual is using receives its meaning, we will not know it either when we assert that it receives it by confronting the symbols with its other users (Luntley 2003: 16). One cannot ascribe to Wittgenstein a

[8]In two-facet theories it is assumed that a symbol gains meaning thanks to something that "enlivens" it (called content or sense), as the symbol itself is only something physical (writing, sound) (Wittgenstein 1998, #120, 138).

classical conventionalist position, which is illustrated in the introduction of the categories of form of life to the description of language.[9] Reckoning with this category, we must admit that practice is constituted by natural human history (a form of life is, in a way, its effect); therefore history determines our linguistic practices. In some sense, we have no choice — certain practices were established over the course of the long history of the human use of language and they are in a way an effect of many accidental events and ties that obtained in this history. It cannot be alleged then that we chose the rules of our language-games in any way. This deep rooting of language practice (and it also concerns the formation of concepts) makes their description a difficult task, the more so that it must be done in language (Baker 1981: 64; Bogen 1972: 198).

What is the role of practice in the context of the categories of use and the language-games associated with them? The category of use involves also such categories as "rule," "language-game" or "form of life." Language functions have a strict association with action, and action occurs in some context (material, conceptual, social or, more broadly, cultural). More precisely still, using a language is some kind of action, and therefore some practice.[10] Language use, which is most conspicuous and recognizable simply when we are speaking, is part of what Wittgenstein calls a form of life (Wittgenstein #23). What exactly is a form of life? It is not too often discussed in *Investigations*: three times in part I (#19, 23, 241) and twice in part II (p. 243, 317). This is a key to understanding what language is for Wittgenstein ("to imagine a language means to imagine a form of life"). The form of life indicates a broader reference for the research itself, which needs to be acknowledged in the discussion. Language renders itself to description and can be imagined only in a broader extra- and supra-linguistic context (Wittgenstein 1998, #19). What would make up such a context? In the first place it needs to be understood that the context is something that is already given to us as users of language (incl. Philosophers). Language is not formed; nor does it function in a limbo, but it develops in relation to the material world (describes and expresses it), historical, changing man and their environment, feelings and experiences that accompany man; it also adapts to the objectives and needs it is used by man for. In learning a language, we

[9] This reasoning does not concern sophisticated conventionalist theories where conventions are understood as something that can be chosen and, to a degree, changed.

[10] Wittgenstein mentions the following examples of actions in an ordinary sense of the term: speaking, writing, imagining, pursuing, attempting to do something, endeavoring. (Wittgenstein 1998, #615).

also learn the accompanying behavior, we recognize the circumstances in which the expressions can be used, and we also learn to express our attitudes towards judgments in the whole range of their possibilities. This all would add up to make a form of life, that is, the context, which in some sense also determines its use, the way it is. Anyway, it cannot be separated from use (Wittgenstein 1998, #241, part II, 243).

Forms of life can be understood in at least two senses — biological and cultural; the distinction into "nature" and "culture" has a conceptual and arbitrary sense here and by no means does it separate the world into two independent and unrelated domains.[11] The biological would include the attributes of man as a species; the cultural would include the cultural history and the phenomena that perpetuated the way it has functioned. In terms of biology, we might distinguish between forms of life and mind the differences that determine biological changes. Discussing cultural issues, we pay attention to the differences in cultures that we distinguish from each other along some adopted criteria. The two modules of understanding a "form of life" are not mutually exclusive. They are aspects of investigating the same object — a two-legged language-using animal called man. Let us consider this by use of an example. When we recognize a language as foreign, and a culture we find ourselves in as different from our own, we can do that thanks to some shared human system of reference as Wittgenstein calls it. This is constituted by a form of life. We are able to see cultural differences and make attempts to understand other cultures thanks to a shared human biological endowment (Wittgenstein 1998, #206). In literature, the category of a form of life has been subjected to numerous interpretations. It was understood as a vital element of a language-game (S. Hilmy), a peculiar organic model (J.F.M. Hunter), treated as human nature (P. Winch, N. Malcolm), but it was most commonly equated with a cultural system S. Cavell (Conway 1989: 43). The range of possibilities seems broad; for the sake of this discussion it ought to be kept in mind that this category is a relevant research context that should be taken into consideration in the description of the functioning of language.

Back to the mainstream discussion. Practice is neither a phenomenon nor a homogeneous notion. Notably, stressing its primacy is not tantamount to claiming the supremacy of activity. Apparently, we are not dealing with a doctrine like that in Wittgenstein later period. The description of practice we find in his works does not make up any theory (Stern 1995: 192). In his

[11]The arbitrary quality of the nature/culture distinction in the later philosophy of Wittgenstein has been noted by S. Cavell (Cavell 1995: 158).

canonical work — *Philosophical Investigations* — practice is drawn upon for the sake of explaining various issues and resolving a number of problems. First, Wittgenstein makes a reference to it in the most natural context of language use practice seen as some unique activity of using words and expressions in order to achieve a desired effect (Wittgenstein 1998, #7, #21, #251, #132). Second, it is treated as an indispensable element of learning, to use when we find out about rules and their applications in language-games. Here, practice lies in watching the player, their behavior and moves when training to apply the game. We will be able to play it thanks to some practiced habits and permanent customs we will internalize (Wittgenstein 1998, #54, #197, #198). Learning a language, or more specifically — rules of conduct in language games, enables Wittgenstein to point to its social, communal dimension. To learn the rules of a game, I must have someone who will be my teacher and will subject me to the training of learning for as long as playing the game has become something natural to me, and the individual moves in it — obvious. So, I cannot learn a language-game on my own: I need a fellowship of players which, thanks to the practice of playing this game will establish the acceptable transitions (Wittgenstein 1998, #243, #275).

The adjective "practical" appears in *Investigations* also for the sake of theoretical distinction between the objectives of classical philosophy and the practical objectives (here seen as every-day ones, accompanying ordinary rites of human day-to-day life) (Wittgenstein 1998, #411). In the philosophy so far, a rationale was required for each step in the theories being formulated. But whereas reasons can be provided as to why such-and-such expressions were used in a given situation, at some point such a rationale can no longer be provided. What we will be left to with will be practice confirming our conviction that we can behave the way we do (Wittgenstein 1998, #217). Stressing the role of practice in using language means the phenomenon of language is treated as some tool which in appropriate situations serves the attainment of (un)intended objectives (Wittgenstein 1998, #421).

Wittgenstein is not in favor of purely social (conventional) understanding of use (meaning). At the same time he does not undermine the role of practice and the broadly understood context, in which language behaviors (forms of life) occur — moreover, their validity is constantly stressed. However, he grants language a uniquely metaphysical status when he develops his conception of grammar. This is to discuss it.

The Consequences for Language Research

I think that the problem of any philosophical theories trying to elucidate on the category of "meaning" can be explained in two ways. First, it used to be insufficiently realized that the explanation of the functioning of language is conducted in this very language. This was related to a phenomenon, detectable in Wittgenstein's writing, of a radical difference between the phenomenon of "grasping the meaning" and the description of meaning and how it is constituted. Using language can be grasped at once, it is a homogeneous phenomenon also of a mental nature, but the explanation of use (meaning) is a complicated and complex philosophical undertaking, made up from a number of theoretical procedures (Wittgenstein 1998, #197). Second, it was believed that explaining the "workings of language" in language must lead to very superficial results. In effect, attempts were made to include meaning to some extra-linguistic categories of being. That describing a linguistic phenomenon is done in language is not a reason to treat it as a weakness. When, within philosophy, we speak of ways in which the term "philosophy" operates, we are not thus building a foundation for the concept to function, at the same time consolidating here some meta-level, second-order philosophy — we keep doing philosophy. Therefore a linguistic "object," which we are investigating, can be transparent (totally accessible and visible) only in a methodological sense. Realizing this leads us to Wittgentstein's conclusions: at first sight all expressions "act" in language in the same way — those derived from everyday language (such as *tables, cook, falalala lala la la*) and those that have been attributed some philosophical depth (*identical, exist*) (Wittgenstein 1998, #11). One needs to take a closer look at the way language functions to see how these expressions really function. One needs to check how they function in specific, ordinary circumstances. It is in these uses that their meaning becomes manifest.

Several methodological clues can be identified, followed in contemporary language research, which use the later philosophy of Wittgenstein. Wittgenstein posits depriving the category of meaning, and hence the language, too, of mystery: the aura that philosophers shrouded it with on their quest for its essence. In Wittgenstein's investigations, both the classical essence of meaning and the postulate of searching for it are rebutted (Wittgenstein 1998, #92, #371). The language under scrutiny is natural language that flesh-and-blood people, biological and social creatures, use. This social and biological endowment needs to be taken into consideration, which is happening in contemporary language research. We break with the Cartesian paradigm in language research and built theories alternative to

the previously widespread two-facet theory of meaning. Meaning becomes demataphysicalized in contemporary theories and is no longer treated as being; it is usually explained by means of other selected categories.[12] The role of linguistic practice and practice at large is stressed in research. Wittgenstein postulated that language practice not be treated as this sphere of human activity which "reflects" the world of apriorically established meanings. Today, we see practice as a constitutive part of establishing meaning and the functioning of language.

Meanings are objective for Wittgenstein. This objectivity, a form of strong intersubjectivism, asserts that the correctness of use of a given expression does not depend on individual decisions by a language user. Language is not only autonomous but also social. People may use language incorrectly precisely for the reason that this correctness does not depend on their specific use but is conditioned by rules that are normative and are absolutely binding. Today, language is universally believed to be an element of human evolution that is available to the species rather than an individual (Pinker 1994, Pinker 1997). Moreover, significant links are highlighted between the use of language and the existence of "I" (personal identity, self). In his late philosophy, Wittgenstein urged that psychology be linked to research on language meaning. This connection can be illustrated by stressing that subjectivity constitutes itself thanks to an ability to form judgments, and these can be formed by a meaningful language.[13]

In his later thoughts, Wittgenstein looked at language as an element of the natural history of man. It is like that in the contemporary approaches to language research — language is treated as something natural (rather than non-empirical, ideal). However, a major difference between Wittgenstein's methodology and the methodological recommendations traceable in contemporary theories is these theories glorify the methodology of exact, hard sciences. Research within these specific fields of scientific study (such as developmental psychology, neurobiology) is supposed to make it possible to provide answers to philosophical questions concerning language.[14] Again, Wittgenstein thought that the differences between philosophy and hard sciences are great and fundamental, with even the mere posing of questions

[12]E.g. P. Horwich (1998) explains use by means of the property of acceptance, R. Millikan (2001) — concepts of functions.

[13]Luntley (2003: 67) espouses this interpretation of Wittgenstein's thought.

[14]Some commentators go so far as believing that this is a sufficient reason to conclude that nowadays we are not dealing with a continuity of late Wittgenstein's thought (Kelly 1984, vii).

differing between those, and therefore answers cannot be obtained in that manner (Williams 1999: 240-259). It ought to be added, though, that the postulate on refraining from constructing theories of meaning, modeled after theories formulated in empirical sciences, does not close the path of philosophical theorizing. Wittgenstein proposes a theory where we do not use a uniform method allowing an explanation of language facts but, rather, we apply a number of interconnected methods (therapies), leading to the description of language use in all its complexity. For the sake of clarity, it ought to be emphasized here that Wittgenstein's lack of consent to scientificizing philosophy is not an assault on science; it is only a reflection of a certain conviction concerning the shape and functions of philosophy (Conway 1989: 33; Shanker 1997: 9).

Appendix

Wittgenstein's most important passages concerning meaning and language can be presented in the form of simplified propositions. They are as follows:

1. Meaning is no being (neither is it a Platonic idea, mental being or physical being).

2. Meaning has no hidden and mysterious nature, which is only accessible in a deep (classically metaphysical) philosophical investigation.

3. Asking about the meaning of an expression, sentence, we ought to as about the way it is used.

4. Meaning is not the same as use.

5. The category of use enables us to investigate meaning — it performs a methodological function. Meanings of expressions and sentences are available through the investigation of their uses.

6. Use is not an element of meaning. Meaning is not "something" that accompanies use. Introducing the category of use does not introduce a two-faceted quality in the understanding of meaning.

7. We speak of meaning when there is a use of an expression that is tied to an array of extralinguistic practices.

8. Use is investigated properly only when analyzed in connection with practice.

9. Understanding is a practical skill that manifests itself in a correct application of rules (mastering a technique).

10. Remaining in a specific mental state of a private nature is not the essence of comprehension (argument against the existence of a private language) even though comprehension is accompanied by mental states.

11. The complexity of processes accompanying the comprehension of language calls for wide-ranging research which, other than analyses of use, ought to include psychological research of mental states.

12. Language is a set of language-games, constituted by rules.

13. You can speak of use only within language-games.

14. Thanks to use, the rules of language become accessible to a user of language.

15. The skill of using a language is acquired when training to use everyday language practices.

16. Rules are methods of conduct, fortuitously adopted in language (rather than by someone), which have no rationale and which can only be learned in a language community.

17. Language-games have no shared properties of essence. They are characterized by familial similarities.

18. Language is a natural element of the human world, interrelated with its other component parts into complex relationships (forms of life).

19. Language is a set of tools which serve a multitude of purposes.

20. Language (as an object of research) is not merely an empirical "something," even though it is observable in its functioning.

21. Uses make up the deep grammar of language.

22. Deep grammar allows the explication of the links between language and the world.

23. The creation of an ideal language is not a task of philosophy; it is an elucidation of language use in the language we use.

24. The objective of philosophical analyses is introducing order in the ways in which words are used to learn about their meanings and the existing bonds between these and other expressions.

25. Explication of meaning is neither about supplying empirical explanations of the way language functions nor about the demonstration of causal relationships between language and the world.

26. Learning about the factual role of words in language-games makes it possible to resolve the philosophical paradoxes arising when words and expressions are taken out of their natural contexts of use.

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