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COGNITIVE FUNCTIONS OF LANGUAGE ACCORDING TO G. W. LEIBNIZ

The Leibnizian study of language is an unusual phenomenon, not only in comparison with the achievements of the thinkers in the seventeenth century, but also among the issues tackled by the philosopher, as well as in terms of the quality of the results presented by him. This is because Leibniz is a language theorist, showing the fundamental relationship between language and the basics of human thinking in the algebraic form. The Leibnizian algebra of notions was not only a significant step in logic; it was also the first attempt in history to construct the algebraic theory referring neither to numbers nor to space. As a language philosopher and logician Leibniz was discovered only at the beginning of the twentieth century. To some extent, it was caused by E. Husserl, G. Frege and G. Peano. Undoubtedly, the publication of the selection of logical-philosophical writings *Opuscules et Fragmentes Inédits* which constituted an important supplement to the monumental edition of Leibniz's work published by L. Couturat in 1903 consisting of seven volumes of philosophical writings and seven volumes of mathematical works written over nearly forty years of the second half of the nineteenth century contributed to the popularization of the philosopher's legacy. The Leibnizian inspiration underlies the appearance of one of the most important mathematical works of the early twentieth century – *Principia Mathematica*, written by B. Russell and A. Whitehead. One can argue that the Russelian doctrine of logical atomism remains in a strong relation with the solutions provided by Leibniz in *De Arte Combinatoria*. Similar inspirations in the theory of meaning can be found in the writings of G. Frege, where the Leibnizian theory of identity is compared to Frege's contextual theory of meaning (*bedeutung*).¹

¹ See H. Ishiguro, *Leibniz's Philosophy of Logic and Language*, second edition, Cambridge University Press 1990, p. 8–16.

Leibniz's achievements in the field of the formal theory of language recognized after centuries are closely related to his position regarding the philosophical status of language which, according to Leibniz, has an innate character similarly to the ability to think under the principle of striving which updates the ability to think and creates language due to external stimuli.² This ability has essentially the same character as N. Chomsky's model of universal grammar in conjunction with his theory of linguistic competence although Chomsky's reference to its Cartesian lineage is not quite right. A similar abuse is committed by K. Devlin in his famous book *Goodbye, Descartes: the End of Logic and the Search for a New Cosmology of the mind*. It is necessary to agree with the author's thesis that reflection on language and human thinking played a huge role in the history of philosophy and science. Today, in the age of artificial intelligence research and information technology development, the works of psychologists, philosophers of language, sociologists and linguists are becoming particularly important. Answers to the question: what is the human mind and how we think, are essential to the fundamental problems of computer science. The birth of the new discipline, cognitive science, dealing with the structure of the mind, thought and consciousness, has become a challenge to the tradition of rationalist philosophy, as well as an important factor in the development of computer and communication technologies. Devlin settles accounts with the tradition whose shape, according to him, is defined by the figure of Descartes, his philosophy and, above all, his methodology. Certainly, Descartes can be regarded as a symbol of the rationalism heritage, but it seems that, despite his huge impact on the modern philosophy, it is not Descartes but Leibniz who should become the main hero of the endless goodbye in the issue of the relations between language and cognition for a full consideration of the philosopher's idea can provide inspiration for new solutions in this secret land.

Functions of the language sign

According to Leibniz, language signs and, more broadly, all symbolic systems, are involved in the thinking processes and have a supporting function in the whole intellectual process. This conclusion is confirmed by the numerous statements of Leibniz, especially where the object of his atten-

² See H. Świączkowska, *O metafizycznym statusie języka w filozofii Leibniza*, in: H. Jakuszko, L. Kopeć (ed.), *W kręgu zagadnień filozofii XVII wieku*, Lublin 2009.

tion is the system of natural language.³ In *Unvorgreiffliche Gedancken...* the philosopher writes that words are not merely symbols for thoughts but also for things, and that we need symbols not only to transmit our opinion to others but also to support our own thinking.⁴

The idea expressed in *Unvorgreiffliche Gedancken...* is approached by Leibniz precisely in *New Essays...*,⁵ but in fact he refers to the general definition of sign presented in the table of definitions prepared around 1672:

A sign is what we see (and understand) at the moment and, in addition to this, what we consider as united with something else under our or someone else's experience.⁶

Leibniz, as Dascal notes,⁷ defines here a multiargumental predicate x being the sign y for z in time i (where x is a variable for signs or rather medium of signs; y replaces what is being indicated; z refers to the users of signs; t refers to time parameters). To state that something functions as a sign, the definition requires the fulfillment of the following two conditions:

³ Let us quote here the fragment of Leibniz's manuscript which remains in Leibniz's Archives in Niedersächsischen Landensbibliothek in Hannover, sign. IV, VII, B, 3,16 r where the author explains what he means by the function of sign: "La plus part de nos raisonnemens, sur tout ceux qui s'entremellent dans les principales veues, se font par un jeu de caractères, comme on joue du clavecin par costume en partie, sans que l'ame en cela s'en apperçoive assez, et forge les raisons avec reflexion. Autrement on parleroit trop lentement. Cela sert a mieux entendre comment (l'ame) le corps exprime par ses propres loix tout ce qui passe dans l'ame. Car ce jeu de caractères peult aller loin et va loin en effect, jusqu'à un point qu'on ne pourrait penser des choses abstraites sans aide de caractères arbitraires". Quoted after M. Dascal, *Leibniz. Language, Signs and Thought*, Foreword, s. VII, John Benjamins Publishing Company, Amsterdam/Philadelphia 1990.

⁴ G. W. Leibniz, *Unvorgreiffliche Gedancken betreffend die Ausübung und Verbesserung der Deutschen Sprache*, in: G. W. Leibniz, *Collectanea Etymologica*, Hanoverae 1717, § 5: "Es ist aber bey dem Gebrauch der Sprache, auch dieses sonderlich zu betrachten, dass die Worte nicht nur der Gedancken, sondern auch der Dinge Zeichen seyn, und dass wir Zeichen nöthig haben, nicht nur unsere Meynung andern anzudeuten, sondern auch unsern Gedancken selbst zu helffen. Den gleichwie man in grossen Handels-Städten, auch im Spiel und sonst nicht allezeit Geld zahlet, sondern sich an dessen Statt der Zeddel oder Marcken, biss zur letzten Abrechnung oder Zahlung bedienet; also thut auch der Verstand mit den Bildnissen der Dinge, zumahl wenn er viel zu denken hat, dass er nehmlich Zeichen dafür brauchet, damit er nicht nöthig habe, die Sache idesmahls so oft sie vorkomt, von neuen zu bedencken. Daher wenn es sie einmahl wohl gefasset, begnügt er sich hernach oft, nicht nur in äusserlichen Reden, sondern auch in den Gedancken und innerlichen Selbst-Gespräch das Wort and die Stelle der Sache zu setzen".

⁵ See G. W. Leibniz, *New Essays Concerning Human Understanding* (Ed. A. G. Langley), The Macmillan Company, London 1896, Book III, Ch. ix, p. 370.

⁶ G. W. Leibniz, *Sämtliche Schriften und Briefe* 6 Reihen, Darmstadt 1923, Berlin 1950, Leipzig 1983, later in the text referred to as AA (and quoted as volume, part, page) VI ii, 500: "Signum est quod nunc sentimus et alioquin cum aliquo connexum esse ex priore experientia nostra vel aliena judicamus". See also G. W. Leibniz *Opusculæ et Fragments Inédits de Leibniz*, L. Couturat (ed.) Paris 1903 (later in the text referred to as C), p. 497.

⁷ M. Dascal, *Leibniz. Language, Signs and Thought*, op. cit., p. 31.

- x must be seen (experienced) by z ,
- x must cause y (in the mind of z), under certain existing link between x and y , on the part of z . The whole process is situated in the time i .

According to this definition, the primary function of each sign is recalling its reference (meaning) in the mind of the interpreter (user) of the sign. Staying within this basic function and taking into account the differences between users of signs and the things to which they refer as well as differences of time parameters, it is possible, however, to distinguish several additional features of the signs. The first distinction introduced by Leibniz immediately after the introduction of the above definition is the difference between “informative” and “mnemonic” function of the sign. Signs that have an informative function are referred to as signs, whereas those with a mnemonic function are called concepts. According to Leibniz, words were invented primarily to support human memory, so they are marks (*notae*) for us on the same terms as they are *sings* for others.⁸

While making this distinction, Leibniz refers directly to Hobbes.⁹ Therefore, it is useful to present the source of the difference between the sign and the concept in order to understand their different functions. According to Hobbes, philosophy consists of the knowledge achieved (acquired) by reasoning. Reasoning is a type of account whose basic operations are the sum and difference of ideas, concepts and thoughts. However, human thoughts are fluid and transient. Thus the mind encounters a basic difficulty to collect them in a whole, organize them or compare them. The process of the thought analysis, and thus the acquisition of knowledge, must be accompanied by some tools – meaningful signs allowing us to return to past thoughts, reproduce their order and connections.¹⁰ Hobbes calls such signs concepts. But the use of concepts is highly individualized and private. That is, they support only a memory unit and disappear with the death of their users. A real progress of science is seen as the accumulation of knowledge acquired over generations and it requires a system of signs which are common to many individuals. Such signs are called signs in the strict sense.¹¹

⁸ AA VI ii, 500.

⁹ AA VI i, 278: “Verba enim non tantum signa sunt cogitationis meae praesentis ad alios, sed et notae cogitationis meae praeteritae ad me ipsum, ut demonstravit Th. Hobbes principio *Elementorum de Corpore*”.

¹⁰ T. Hobbes, *De Corpore*, 1,1,3 – subsequent numbers represent chapter, part and fragment, in: T. Hobbes, *The English works of Thomas Hobbes of Malmesbury*, W. Molesworth (ed.) London 1839–1845, vol. IV. See M. Dascal, *Leibniz. Language, Signs and Thought*, op. cit.

¹¹ T. Hobbes, *De Corpore*, I, 2, 2. See M. Dascal, *Leibniz. Language, Signs and Thought*, op. cit., p. 32 and following.

For Hobbes, the difference between the signs and concepts comes down to the difference of function.¹² Signs serve to reveal our thoughts to others whereas concepts are to refer to themselves or to recall themselves to ourselves. Although both functions are very clearly distinguished, it appears that they are not independent for Hobbes. The mnemonic-recalling function of the concept is in some sense basic. While we can easily realize the concepts that are not signs, or those we use only for our personal use, without any communicative value, a reverse process is not possible. Therefore, to have a communicative function each sign should be a concept itself or it has to be connected with the concept which “fixes” the thought transmitted by that sign.

Priority or superiority of the mnemonic function over a communicative one is illustrated, according to Hobbes, by natural languages. Words or, precisely, names have a dual function of signs and concepts, but most of all they are concepts, and then signs. He claims that no name taken in isolation can fulfill a communicative function. It is simply lacking. Only when words and names come together in a sentence, they begin to fulfill their sign function, that is, they transmit the thought of its recipient.¹³

It is worth noting here that Hobbes takes a particular point of view. Signs and concepts are treated by him as tools in the development of science and philosophy. In this sense, he concentrates rather on the language of science than on everyday language. Of course, he also indicates the use of language for pleasure and decoration, but it is a marginal use. However, a social function of language, conditioned by the existence of the social consensus as to how to apply signs, is nothing more but a transfer of knowledge necessary for functioning of the society from one generation to another.¹⁴

According to Hobbes, there is a certain hierarchy of sign functions, subordinated to the development of science. In order to achieve the advancement of knowledge, transmission of information is needed, because only in

¹² T. Hobbes, *De Corpore*, I, 2, 3.

¹³ T. Hobbes, *De Corpore*, I, 2, 3: “[...] nomina per se singula notae sunt, nam cogitata revocant etiam solas, signa vore non sunt, nisi quatenus in oratione disponuntur et partes ejus sunt. Verbi gratia, *vox homo* excitat quidem in audiente ideam hominis, non tamen (nisi quis addat, est animal, vel aliud aliquid aequivalens) significat aliquam ideam fuisse in animo loquentis, sed voluisse eum aliquid dicere, quod potuit quidem incipere a voce *homo*, potuit vero etiam a voce *homogeneum*. Natura itaque nominis consistit primario in eo quod serviat quoque significandis, demonstrandisque ils rebus quas memoria tenemus”. Let us note that Hobbes recognizes the correct unit of communication, which is a sentence, not a name or a word. This discovery could provide a starting point for the semantics of sentences, radically different from the traditional semantics, which focuses mainly on the word. Unfortunately, neither Hobbes nor his successors developed this idea.

¹⁴ T. Hobbes, *Lewiathan*, eBooks@Adelaide 2007, I, 4, 5.

this way the experience of the past eras can be accumulated. But fragments of knowledge are acquired in reasoning. Therefore, it is necessary to be capable of indicating our thoughts and recalling their relationship. A hierarchy of sign functions can be represented as follows:

- advancement of knowledge,
- information, communication,
- discovery by reasoning,
- indication and recalling thoughts.

In accordance with the above-mentioned considerations, concepts, for Hobbes, have only the last function. This mnemonic function is essential for the remaining ones and in this sense all the others, especially reasoning, depend on the use of meaningful concepts. However, concepts, though necessary, serve a supportive role in the very reasoning. Reasoning (conversion) directly affects ideas and thoughts evoked by concepts – (...*animo, sine verbis, tacita cogitationes ratiocinando addere et substrahere solemus*).¹⁵ The use of concepts in reasoning is therefore indispensable in the sense that in the mind they evoke the content that is necessary to start this process and sustain it. The reasoning in itself is a process of thinking in which there is no room for the use of any meaningful signs.¹⁶

It is only in this context that Hobbes's attack on algebraic symbolism is understood. He writes in *De Corpore*: "The so-called 'symbolics' used by many scholars who believe that it is truly analytical, is neither analytic nor symbolic. It is only a simple shortcut of mathematical accounts, but not geometric, because it does not add anything to the learning or teaching of geometry, and is just a quick and short summary of what has already been discovered by geometricians. Even if the use of symbols can facilitate the discourse of the judgements distant from each other, I am not sure whether this symbolic discourse could be considered as useful if things corresponding to the idea are taken into account".¹⁷ Therefore, Hobbes ar-

¹⁵ T. Hobbes, *De Corpore*, I, 1, 3.

¹⁶ The interpretation of Hobbes presented here is proposed by M. Dascal (*Leibniz. Language, Signs and Thought*, op. cit., s. 34); it differs from the interpretation presented by W. Kneale and M. Kneale in: *Development of Logic*, The Clarendon Press, Oxford 1962, p. 312 and others assuming that for Hobbes thinking is merely an operation on signs. The reason for these differences is a lack of certainty on this issue on Hobbes's part. In *Leviathan*, op. cit., Part I, Chapter 5, he actually presents thinking as an operation on general names and adds that science is nothing more but the acquisition of knowledge being the consequence derived from names in the subject. Although at the beginning of the same part of *Leviathan* he shows this type of reasoning as a possible rather than necessary characteristic of all types of reasoning. Moreover, he assumes the existence of a purely mental discourse, different and completely independent of verbal discourse.

¹⁷ T. Hobbes, *De Corpore*, III, 20.

gues that algebraic symbols allow only to shorten reasoning; their didactic value is also questionable. A symbolic discourse is secondary to the process of thought whose constitutive elements include ideas or performance, and that, in his opinion, is sufficient to challenge the cognitive usefulness of symbolism itself, its role is purely marginal. A sign does not constitute thinking being only capable of its acceleration; a mnemonic function is its basic function.

There is no doubt that Leibniz's views on the functions of the language sign were shaped by the critical analysis of Hobbes's works. In *Nova Methodus Docendaeque Jurisprudentiae* he lists mnemonics as one of the disciplines treating about human 'habits' which has to do with memory. Analytics and topos respectively deal with judging and discovering. To keep order, he also adds methodology; all these disciplines make didactics.¹⁸ Leibniz accepts the existence of some objects of thought called judgements typical for men which we can recall, judge, discover and organize. Signs are only considered in terms of recalling. Thus, the analysis of signs is treated as part of mnemonics. It is interesting that what was said in the first edition (1667) is repeated by Leibniz in the second edition (1697). The only novelty is the inclusion of natural languages in the semiotic systems assigning them a mnemonic function as their primary function. Hence, linguistics is subordinated to mnemonics.

However, in his studies on mnemonics Leibniz is original and goes beyond his contemporaries. He draws attention to specific techniques of memorizing linking the sign with the sound, encoding information with the use of cryptograms; moreover, he analyzes signs and stylistic figures in terms of their suitability for archiving data. The sign constitutes the basis for mnemonics, being a sensuous object remaining in a definite relation to things.¹⁹

Symbolic thinking

The basic principle of mnemonics is the principle of economics. Our ability to memorize is limited, so we have to manage memory in the most efficient manner. A proper use of signs is the most important way to achieve this goal. For example, when Leibniz offers a compilation of the *Brewis of*

¹⁸ *Nova Methodus...*, AA VI i, 277.

¹⁹ *Nova Methodus...*, AA VI i, 277–278.

discussion, he recommends the use of special signs that indicate how each argument for and against is part of the law elements and other laws. Thus, if the argument is based on the opposition, the suggested marking looks as follows:)(when it relates to the similarity: (), causes: 0-; effects: -0 etc.²⁰ The function of these signs is to point out the obvious relationship between the premises and the conclusion, the user is experiencing this kind of obvious relationship immediately, and symbolism allows him to capture all the dependencies immediately and without any effort. The word 'intuition' is a key concept here which captures the essence of such an approach. The possibility of obtaining such a result by means of the signs makes symbolism an essential tool of reasoning.

Leibniz explains the essence of this mechanism by referring to arithmetic symbolism: "Suppose someone learns Arithmetic, including, e.g., the pythagorean table. What does he learn? Does he learn something new, except the words? When I learn that two multiplied by two is four, do I learn more than a numeral name, whose use – afterwards – in speaking and calculating is more economical? And Yet, without such words, or any other constant signs in their places, Arithmetic would be completely useless for us Therefore, it is true to say that he who learns only matters of reason, theorems, and definitions, does not in fact learn anything but how to use what is already known. Thus, nobody could calculate, especially with very large numbers, without names or numerical signs, i.e., if he had to imagine distinctly, for each number, all the units comprised in it. Who intended, could imagine distinctly the units contained in 1.000.000.000.000 in a time shorter than the age of Methuselach? And even if he could, he would forget the first units as he progressed towards the end."²¹

Therefore no long argumentation can do without the use of certain names or symbolism. It is thanks to them, according to Leibniz, that a huge number of things can be covered in the way that makes it possible to run through them very quickly, which would be impossible, if their definitions were used instead of the names and symbols. However, it is essential to note that a necessary condition for the correctness of the whole process of reasoning is the knowledge of the meaning of the symbols used, that is the ability to provide their appropriate definitions. The intellectual process, whose integral part is the operation on symbols, is called blind or

²⁰ *Nova Methodus...*, AA VI i, 346.

²¹ G. W. Leibniz, *On the demonstration of primary propositions*, in: M. Dascal, *Leibniz, Language, Signs and Thought*, op. cit. p. 149.

symbolic thinking by Leibniz. “We use it in algebra and arithmetic, indeed everywhere”.²² There is nothing, in his opinion, what would be more common and necessary for all people. “If we were simultaneously aware of the arrangement of words clearly and consistently, blind reasoning itself would be sufficient for clear reasoning. That is why modern *Analysis Symbolica*, despite Hobbes’s criticism, is so useful for quick and reliable reasoning”.²³

Analyzing the mechanism of thought, Leibniz indicates at least two types: idea processing and definition and sign processing: (*Differentur inter processum per ideas ed processum per definitiones vel caracteres*).²⁴ In his opinion, the use of signs results in the following benefits: by marking ideas signs get rid of the ideas’ liquidity which can make proper reasoning difficult and allow to take one simple look (of the mind) at a whole chain of thoughts (*totus noster cogitandi processus uno obtutu perspicui*).²⁵ If it is true that the one who speaks, thinks (*qui loquitur cogitat*),²⁶ it follows that each operation on signs, any use of language is in a certain relationship, or even causes an operation on ideas. Let us recall that in accordance with the Leibnizian theory of representation “speech expresses thoughts and truth [...], provided some analogy of relations has been preserved”.²⁷ According to Leibniz, the analysis of thoughts itself is sufficient to discover and prove the truth. And if the analysis is consistent with the analysis of signs (characters) which we use to mark thoughts, some thought corresponds to each sign. It is possible, therefore, to provide an analysis of thought in a sensual way, leading it according to some mechanical thread, since the analysis of signs is sensual as well.²⁸

That mechanical thread that takes a man through the maze of human thoughts, which Leibniz metaphorically calls Ariadne’s thread, is the only true way, “some sensual and simple tool to manage the mind, as lines

²² G. W. Leibniz, *Meditationes de cognitione, veritate et ideis*, in: G. W. Leibniz, *Philosophische Schriften von G. W. Leibniz*, VII vol., C. I. Gerhardt (ed.), Halle 1846 (repr. Hildesheim 1960), assigned as GP, Volume IV, p. 423.

²³ *Demonstratio propositionum primarum*, AA VI ii, 481.

²⁴ G. W. Leibniz, *Leibnitiana. Elementa philosophicæ arcanae de summa rerum*, ed. I. Jagodinski, Kazań 1904, p. 2.

²⁵ *Ibid.*, p. 4.

²⁶ *Ibid.*, p. 4.

²⁷ *Quid sit idea*, GP VII, 263–264.

²⁸ *Analysis linguarum*, C, 351: “Ad inventionem ac demonstrationem veitatum opus est analysi cogitationum, quae quia respondet analysi characterum, [...] hinc analysin cogitationum possumus sensibilem reddere, et velut quodam filo mechanico dirigere; quia analysis characterum quiddam sensibile est”.

outlined in geometry and forms of action given to arithmetic learners”.²⁹ According to Leibniz, syllogisms have such a property. He even considers that “the invention of the form of syllogisms was one of the most beautiful, and also one of the most important products made by human mind. It is a species of universal mathematics (...) and it maybe said that infallible art is therein contained.”³⁰ For Leibniz, however, algebra is a perfect example of usefulness. In the algebraic reasoning ideas corresponding to symbolism are neither caused nor present to the mind at any stage of arguing for it would make the process of reasoning impossible. The mind would be busy just with the ideas all the time which would block reasoning by being constantly invoked. This means that the mind is focused solely on signs and operations performed on them without directing the attention to what they relate to. In this sense, algebraic reasoning is just a mere transformation of signs. This is possible only when there is a well-defined system of rules, which guarantees the truth of the results of such operations. Analyzing this standard way of thinking, Leibniz highlights several functions of signs. Signs present our thoughts to others having an informative function; they solidify those thoughts in our memory revealing a mnemonic function; they allow to shorten thoughts reducing their number to a few only – so it is possible to say that signs have a “compression” function as well as an arrangement function allowing one to grasp the whole chain of thoughts *uno obtutu*.³¹

²⁹ *List Leibniza do Jean'a Gallois z września 1677*, AA II i, 381: “La veritable methode nous doit fournir un *filum Ariadnes*, c'est à dire un certain moyen sensible et grossier, qvi conduise l'esprit comme sont les lignes tracées en geometrie, et les formes des operations qu'on prescrit aux apprentifs en Arithmetique”.

³⁰ G. W. Leibniz, *New Essays...*, Book IV, Ch. XVI, p. 559.

³¹ See *Leibniz's letter to Walter von Tschirnaus written in May 1678*, in: G. W. Leibniz, *Philosophical Papers and Letters*, L. E. Loemker (ed.) D. Reidel Publishing Company, Dordrecht 1965, p. 193. See also H. Świączkowska, *La perspective platonicienne sur la langue chez Descartes et chez Leibniz*, in: “Idea. Studia nad strukturą i rozwojem pojęć filozoficznych” VII, Białystok 1996. To understand why symbolism can play such an important role in reasoning, let us refer to modern psychology and the study of memory. The first model of memory is represented as consisting of two distinct mechanisms of storage. One is short time memory (STM) that captures information from the senses and keeps it for a very short period of time. This ability is limited so that the unit of information is only stored until it is replaced by another information unit. STM capabilities are estimated numerically: approximately it can accommodate seven such units. While stored in STM, such units of information can be encoded and transmitted to another mechanism or tool of memory – *long time memory*, whose possibilities are immeasurably greater. If this process of transfer has been made, units of information are stored long enough. STM is limited to seven units of information, which are stored at the moment, but this restriction does not apply to the amount of information the unit contains. If we refer to the information theory, STM can accommodate not 7 bits, but rather 7 chunks of information. Bits and chunks differ in that the chunk may comprise many bits. For example, the number of six digits – 101101 – contains six bits of information. If each digit is considered as a separate

Compendia loquendi and dispute over universals

Although, according to Leibniz, the usefulness of signs fully reveals itself in mathematics, “blind or symbolic thinking” (*caeca vel symbolica cogitatio*) accompanies all the reasoning processes.³² An important role of supporting or improving the thought process is assigned to general and abstract. Leibniz even writes that he treats all of them *per modum loquendi compendiosum* for production (fiction) of the mind useful while calculating.³³ For it is “the art of classifying things into genere et species is of no little importance and of much use both to the judgment and memory.”³⁴ As Benson Mates notes, Leibniz did not believe in the existence of numbers, geometric figures or other mathematical objects; what is more, he did not accept abstract things such as heat, light, justice, goodness, beauty, time and space; he did not allow the existence of metaphysical objects such as concepts, judgments, properties etc. The only units of his ontology were substances and their attributes, but sometimes he doubted even the existence of attributes. Such ontology reinforces a certain perspective on language; Mates claims that, basically, Leibniz was a nominalist.³⁵ Leibniz himself seemed to confirm that opinion writing that he saw no other way to avoid the difficulty in determining whether the characteristics of the substance should be considered separately as part of a reality rather than the treatment of abstracts not as the real thing (*res*), but as shortcuts of speaking (*compendia loquendi*).³⁶ However, there are other statements made by Leibniz which contradict his nominalistic declarations. In *New Essays...* he writes that virtues, truth and species should not be dependent on us. “They exist in nature whether we

bit or chunk, storing the total number covers almost the entire STM. But if you group the numbers in pairs, each chunk now contains two bits, while STM is used only up to some degree. See E. R. Hilgard, R. C. Atkinson, *Introduction to Psychology*, Harcourt, Brace and World, New York 1967, p. 328 and following and G. R. Miller, *The magical number seven, plus or minus two: some limits on our capacity for processing information*, in: *The Psychology of Communication*, Allen Lane, The Penguin Press, London 1967, p. 33 and following. Referring to this data, M. Dascal claims that the Leibnizian *uno obtutu* can be identified with STM. See M. Dascal, *Leibniz. Language, Signs and Thought*, op. cit., p. 38.

³² *Meditationes de cognitione, veritate et ideis*, GP IV, 423.

³³ *Leibniz's letter to des Bosses March, 1706*, GP II, 305: “Utrisque enim per modum loquendi compendiosum pro mentis fictionibus habeo, ad calculus aptis...”

³⁴ G. W. Leibniz, *New Essays...*, Book III, Ch. iii, p. 311.

³⁵ Benson Mates, *The Philosophy of Leibniz. Metaphysic and Language*, Oxford University Press, New York, Oxford 1986, p. 171 and following.

³⁶ G. W. Leibniz, *De accidentibus*, in: G. W. Leibniz, *Textes inédits d'après les manuscrits de la bibliothèque provinciale de Hanovre*, G. Grua (ed.), II Vol., Presses Universitaires de France, Paris 1948, Volume II, p. 574.

know it and approve or not.”³⁷ A little earlier he notes that “it is true you do not see justice as you see a horse, but you understand it no less, or rather you understand it better, it is no less in acts than directness or obliqueness is in motion, whether you consider it or not.”³⁸ For generality depends on the similarity of specific things and this similarity is, according to Leibniz, reality. In similar subjects we detect their mutual feature which is nothing more but an apriori possibility of their existence.³⁹ Leibniz calls these creatures *real abstracts* and they are *accidens* that is, entities added to the substance.⁴⁰

However, it is difficult to find Leibniz’s clear program declarations. Referring to the medieval dispute over universals, he wrote that realists’ axiom is as good as nominalists’ axiom as long as they are properly understood.⁴¹ It is possible to get the impression that Leibniz deliberately avoids radical decisions in the dispute regarding the ontological status of universals directing his attention rather to purely grammatical or linguistic properties of phrases which mark abstracts or universals. He wrote in *Characteristica verbalis*: “Words are signs either concepts, as in the case of nouns, or of modes of conceiving, as in the case of the other parts of speech. Concepts are viewed either in themselves or by accident”.⁴² Those that are taken in themselves, apart from the metaphysical object or subject, as well as the time, place and event are abstract concepts (*formalitates*), such as humanity, beauty and being triplelegged. Concepts taken *per accidens* express the convergence of many ‘forms’ in the same subject when it happens, for example, that the same subject has poetic and juridical abilities. Thus names, depending on the terms they cover, fall into the abstract ones, such as ‘warmth’, ‘humanity’ and precise ones, such as ‘man’, ‘hot’.⁴³ Therefore one can say that the grammatical division of names into precise and abstract ones corresponds to the semantic division of terms into *per se*

³⁷ G. W. Leibniz, *New Essays...*, Book III, Ch. vi, p. 360.

³⁸ *Ibid.*, Book III, Ch. v. p. 329.

³⁹ *Ibid.*, Book III., Ch. iii, p. 313.

⁴⁰ G. W. Leibniz, *New Essays...*, Book III, Ch. viii, p. 368. Leibniz clearly distinguishes between modifications and attributes. The ability to perceive and act, extent and permanence are, according to him, the attributes of the substance or, in other words, eternal and basic judgments. Thus, modifications of these attributes are: thinking, violence, shapes and movements. See. G. W. Leibniz, *New Essays...*, *Preface*, p. 58.

⁴¹ G. W. Leibniz, This ambiguous position of Leibniz on the issue of universals reveals clearly in *New Essays...*, in Book III, Ch. vi, p. 356.

⁴² G. W. Leibniz, *Verbal characteristic*, in: M. Dascal, *Leibniz, Language, Signs and Thought*, op. cit. p. 175.

⁴³ C, 437.

and *per accidens*. In the table of definitions once again Leibniz defines abstracts as entities (*entia*) which differentiate various predicates within the same subject. *Concretum* is where *entia* are included and what contains no contradiction.⁴⁴

In his division of names into precise and abstract ones, Leibniz noticed some ambiguity accompanying different uses of precise names. Precise names such as ‘man’ or ‘horse’ may have different references. In *Intoduction to Nizolius*, commenting on the position of nominalists on universals who, as for instance Nizolius, claim that universals are nothing more but taking all the entities collectively and at the same time so that they are collective wholes, Leibniz agrees that when we say ‘every man is an animal’ it means that all people are animals. However, in his opinion, it does not mean that universals are collective wholes as Nizolius claims for a whole (*totum*) marked by the phrase ‘every man’ has a distributive sense apart from a collective one. If, as Nizolius wishes, the phrases ‘omnis homo’ or ‘omnes homines’ meant the same thing as the human species, it would lead to absurd substitutions such as ‘The human species is an animal’.⁴⁵

According to Leibniz, this confusion of terms results in more serious consequences. If universals were nothing more but a collection of individuals which, as Nizolius claims, being precise totals are sets in the collective sense, it would be impossible to arrive at any knowledge on the basis of arguments; induction becomes the only possible way to increase knowledge. And on that basis, according to Leibniz, it is impossible to accept any perfect general sentence for it is necessary to stop at the judgment that all investigated cases are such and just such. Leibniz claims that true knowledge can only be achieved through the analysis of general sentences whose truth does not depend on induction, but on a general idea or a definition of terms. As he writes, practical and moral certainty of the sentence ‘fire burns’ is guaranteed by the following principles: 1. If in all cases the cause is the same, or similar, the effect will be similar or the same. 2. The existence of the thing that is not understood is not assumed. 3. Whatever is not assumed should be ignored in practice until you can prove it.⁴⁶ Defending the so-called general rhetoric against the Aristotelian logic and Renaissance dialectic, Marius Nizolius sought to exclude arguing as the acknowledged way of the explanation of the nature of things (as it was taught by Aristotle). Nizolius wrote that if universals are false as it was said and proved,

⁴⁴ C. 437.

⁴⁵ AA VI ii, 430.

⁴⁶ AA VI ii, 431.

one can say that the whole dialectic they support fall down with them.⁴⁷ Leibniz's answer to this question is: This is false! Nominalists as well as others used the dialectic of Aristotle and they were right. Although there is seldom some truth in what people attribute to things in their names, the thing itself is always preserved when we use names to explain things.⁴⁸ In other words, for arguing it would be enough if universals were pure names of things.⁴⁹

Leibniz agrees, therefore, that the names of universals may not in fact have any relevance, but even as *compendia loquendi* they are helpful in proving and explaining the properties of things. By adopting this solution, Leibniz meant the nominalist definition of truth, especially in the version formulated by Hobbes. Indeed, Hobbes claimed that because truths of the mind result from definition, definitions have a purely arbitrary character; therefore, the same character is revealed by truths. Arbitrary definitions are nominal definitions. According to Leibniz, they refer only to the features necessary to differentiate a given thing from other things and they are not sufficient to obtain certain knowledge unless it is somehow known that the defined thing is possible.⁵⁰ But although the definitions of names are dependent on our designation, the use and link of signs, according to Leibniz, is no longer optional. There is a constant correspondence between signs and things, which is the "foundation of truth".⁵¹

What does it really mean that it would be sufficient for proving if universals were pure names? It seems that Leibniz assumes that proving does not depend on the assumptions of semantic or ontological nature and can be built on the purely syntactic basis. Definitions of names, as nominal definitions, would have to meet only one condition that the defined thing is possible. Leibniz categorically states that we cannot have an idea of the circle. We can imagine it; we can have its definition and the idea of every property that a circle should have. But since we cannot imagine all

⁴⁷ AA VI ii, 451: "Nam Si universalia ista falsa sunt, ut nos dicimus, et probaturi sumus, continuo una cum univesalibus Cadet pene tota Dialectica, quae in illis tanquam columinisd fundata est..."

⁴⁸ AA VI ii 451: "Hoc fal sum Est. Neque enim minus Nominales quam caeteri, Dialectica Aristotelis usi sunt, et recte quidem. Nam etsi in nominibus saltem vera sint quae vulgo rebus tribuebantur, salva re est; quando nominibus istis in explicandis rebus utimur."

⁴⁹ AA VI ii, 429: "...quod Universalia non sint in rerum natura (cum tamen sufficiat ad demonstrandum:nomina esse universalia)..."

⁵⁰ *Meditationes de cognitione, veritate et ideis*, GP IV, 424.

⁵¹ G. W. Leibniz, *Dialogus*, in: G. W. Leibniz, *Philosophical Papers and Letters* (ed. L. Loemker), D. Reidel Publishing Company, Dordrecht 1969, p. 184.

of them simultaneously, we cannot have the idea of it. Only God has the insight into the complex ideas of things because he can think of everything at the same time. Because of its limitations, the human mind is only capable of recognizing the essence of the circle and other complex things only partly. But how can we be sure of the possibility of such an idea, that is the agreement of all the ingredients present in it, if we take into account our intrinsic limitations? Leibniz explains that “When we do not have an idea, its functions are performed by sensual or by definition that is, a collection of signs. The place of idea is always filled by certain perception (*phantasma*), which is at the same time completely understood”.⁵² Therefore, Leibniz assumes that the possession of these sensory perceptions and definitions of the circle has the same value as the statement by experience that a circular object exists. In this sense, the formation and transformation of signs replaces the experience if it is not available. Therefore, signs allow to present our abstract thoughts in a ‘visible’ and ‘static’ way, and their juxtaposition is purely mechanical. Thus, argumentation conducted like this is a kind of calculation where definitions can be treated as syntactic rules allowing for the replacement of one chain of signs by the other. With this method we are able to make decisions about possibilities or, in other words, the consistency of such terms as infinity, perfection or set. Thus, according to Leibniz, to discover and prove the truth the analysis of signs itself is sufficient, provided that the signs express some thoughts.⁵³

However, the truth obtained in this way has the status of rational truth which, similarly to the intuitive truth, does not require any proof. It is necessary to remember that, according to Leibniz, all rational truths refer to the sphere of possibility. Hence it means that they are not existential judgments. Rational truths state what would be true in any possible case, whereas true existential judgments depend on God’s choice of some possible world. So when we say that ‘a triangle has three sides’ we do not state that there are triangular bodies, as well as when we predicate that ‘a man is an animal’, we say nothing about the existence of man or animals although surely these statements relate to beings or universals. In fact, by treating them as possibility sentences Leibniz avoids decisions regarding their

⁵² G. W. Leibniz, *Leibnitiana. Elementa...*, op. cit., p. 6: “Ideam defectam in nobis supplet imago aliqua sensibilis, aut definitio, sive aggregatum characterum, in quibus nulla opus est similitudine. Semper ideae locum supplet phantasma aliquod, quod totum simul sentitur”. See M. Dascal, *Leibniz. Langue, Signs and Thought*, op. cit., p. 51.

⁵³ *Analysis linguarum*, C, 351 and GP VII, 11–15.

existence. Let us recall that professing ontological individualism Leibniz was a nominalist in ontology. If the world is made up, as he claimed, of the substances and their attributes, universals do not exist in nature. But also there are no such objects as bodies, rainbow or sea. These are, according to Leibniz, aggregates which are the accumulation of substances, having the status of well-established phenomena. In fact they are constructions of the mind which attribute their foundation to the coexistence of monads, remaining their aggregates. For Leibniz, time and space are similar mental entities. Consequently, there is no obstacle to say that the same rational character is revealed by sets. In language the attributes of substances and their modifications are corresponded by the predicates: is a man, is an animal, is thinking. Thus, the mind classifies objects according to the criteria whether the object fulfills the propositional function: x is such and such, dividing the objects into, for example, sets of people or animals. Such classification has its basis in the existence of property, which corresponds to the specified predicate; consequently, although universals do not really exist, they have their foundation in reality, and they are, as Leibniz calls them, *entia rationis*.⁵⁴ This interpretation seems to be confirmed by Leibniz's remarks on syntactic functions of general names: *Nomen Universale est vel subjectum, quod dicitur species vel praedicatum*.⁵⁵ Commenting on Book IV written by Nizolius, he wrote that when *omnis* is applied to the (specific) name in the singular, the sentence is a figurative sentence, for example *omnis homo est animal* and it is synonymous with the right sentence: *omnes homines sunt animalia*. Therefore, as he writes, "the supposition that universals in combination with singulars are real results from language".⁵⁶ One can assume that Leibniz inclined to the contextual analysis in which a sentence is the basic unit of the analysis. It is clear in case of such sentences that a grammatical subject is not a logical subject, and the name *homo* is a predicate, like *animal*.

It seems that in the so-called dispute over universals Leibniz takes a pragmatic stand. In fact, he was concerned about the precise use of language and adapting it to the needs of science. Arguing with Nizolius, he highlighted the ambiguity of terms which, when used inappropriately, may lead to absurd substitutions. To avoid this, he even postulated the elimi-

⁵⁴ See Hans Burkhardt, *Adam's Mind and Body*, in: M. Dascal, E. Yakira (ed.), *Leibniz and Adam*, University Publishing Project Ltd., Tel Aviv 1993, p. 46.

⁵⁵ AA VI ii, 453.

⁵⁶ AA VI ii, 448: "Universalium igitur imaginaria realitas extra singularia a sermone figura to orta".

nation of abstract terms from the language of science.⁵⁷ He did not claim, however, that they are completely useless – abstraction is not a mistake, as long as one knows that it contains what is hidden.⁵⁸ In other words, if we use a term, we have to give its definition. Treating general and abstract terms as *compendia loquendi*, Leibniz, however, assigns them a particular function. If they are properly defined, as the signs of concepts present in our minds, they allow us to derive the truth about the nature of things. By “grabbing” the thought, a sign allows us to approach the idea of the thing or even replaces it when that idea is not available. It becomes essential and sometimes even the only tool in the process of cognition.

Signs and operations performed on them have a cognitive value only when they reflect the inner order of the idea or ‘imitate’ it on the basis of the assumption that the thing under consideration is possible. Nonetheless, this condition is not always fulfilled. Indeed, there are signs and actions that have no relation to the perfect order and these, as we know, are the main cause of erroneous thoughts and judgments. How to get certainty that when we make some judgment, it is compatible with any part of this inner structure? Leibniz was aware of this difficulty when he wrote: “When I think of something and I cannot imagine anything bigger than this, what is it I am thinking about apart from separate thoughts about singular ideas (things) contained in the words ‘something’, ‘bigger’, ‘imagine’, ‘no’, ‘can’? Separately, I have an idea of what I call ‘something’, what I call ‘bigger’, what I call ‘thought’ and I can think of them one after the other. But I have no idea of all of these things together. I link only words or signs and I only imagine that I have an idea of something of which nothing bigger can be conceived”.⁵⁹ The same problem was tackled by him in *New Essays...* Analyzing the imperfection of words, Leibniz talks “of our uncertainty as to whether ideas are consistent when experience does not provide us with them being linked in the same subject”. In this case it is necessary to recognize

⁵⁷ Leibniz was quite consistent in questioning the usefulness of abstract names, especially in philosophy. This fact could lead to assigning him a nominalistic attitude. L. Couturat in *La Logique de Leibniz*, Presse Universitaires de France, Paris 1901, p. 470 argues against such an interpretation, even when it comes to early ideas of Leibniz. C. S. Peirce shows the evolution of Leibniz’s ideas from nominalism to realism. See M. Fisch, *Peirce and Leibniz*, “Journal of the History of Ideas” 33, 1972, p. 485–496.

⁵⁸ G. W. Leibniz, *New Essays...*, Book III, viii.

⁵⁹ G. W. Leibniz, *Leibnitiana. Elementa...*, op. cit., p. 4: “Cum cogito aliquid, quo majus cogitare non potest, quid aliud cogito, quam separatim ideas singulorum, quae sub his vobus continentur, ut: aliquid, majus cogitare, non, posse. Separatim habeo ideam eius quod voco cogitationem, itaque unum post alteram cogitans. Non ideas horum inter se, sed postea vocabula tantum seu characteres conjungo et fingo me ideam habere eius, quo majus cogitare non potest”.

the need for “temporary definitions of sensual things when the experience is not sufficient to obtain fuller definitions”.⁶⁰

Leibniz says that in constructing this type of definition we should take into consideration our intrinsic imperfection, but also negligence and laziness, which, in his opinion, is a direct cause of errors.⁶¹ This ‘imperfection’ can be reducible through the analysis and definitions of the terms included in each language. According to Leibniz, “Everything doubtless returns to definitions which may extend even to primitive ideas. One and the same subject may have several definitions, but the knowledge that they agree with themselves must be learned by reason, by demonstrating one definition by another or by experience, by proving that they constantly together”.⁶² It can therefore be concluded that the ability to get to know goes hand in hand with the ability to define. Improving cognitive abilities is conditioned by perfect mastery of the language. Bearing this in mind, Leibniz called for the review of the German language dictionary resources, the creation of specialized dictionaries covering the specialist vocabulary, etymological dictionaries, and establishment of the standards of linguistic correctness. He believed that “in time all languages of the World will be recorded and placed in the dictionaries and grammars, and compared together: this will be of very great use both for knowledge of things, (...) and for the knowledge of our mind.”⁶³

S U M M A R Y

This article is an attempt to critically analyze Leibniz’s views on the cognitive value of natural language and other symbolic systems involved in the processes of thought. Confronting his position regarding the linguistic sign function with the position of Hobbes, Leibniz presents his own solution which is consistent with the results of modern research in the field of cognitive psychology. Analyzing symbolic thinking, Leibniz positions it in the context of the dispute over universals consciously avoiding taking a position for or against. That makes him a precursor to the modern concept in which the ‘realism – nominalism’ dichotomy loses its justification.

⁶⁰ G. W. Leibniz, *New Essays...*, Book III, Ch. ix, p. 373.

⁶¹ *Ibidem*, p. 376–378.

⁶² *Ibidem*, p. 392.

⁶³ *Ibidem*, p. 372.