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Considerations Concerning the Appropriation of Numbers and Numerical Language

Considerações sobre a apropriação do número e da linguagem numérica

Considérations sur la propriété du nombre et de la langage et numérique

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ABSTRACT

This article discusses numbers as a form of language that explains contemporary social reality in instances in which it depends on mathematical information. It presents the components of numerical language - code and meaning - and argues against concepts of numbers that limit their understanding to order and quantity. Such reductionism limits the scope of appropriation of human relations when the meaning attributed to the number extrapolates its ordinal and cardinal condition and expresses conventional aspects. The central hypothesis of this article is to consider numerical code and the meaning assigned to it as reflexive and interdependent elements, which can only be understood by taking into account the social function of this language form and the social exchanges which require the use of this conceptual tool.

Index terms: mathematics, number, numerical language, code, meaning.

RESUMO

O presente artigo discute o número como uma forma de linguagem explicativa da realidade social contemporânea quando esta depende de informações matemáticas. Apresenta os elementos constituintes da linguagem numérica – código e sentido – e argumenta contra as concepções de número que reduzem sua compreensão aos aspectos de ordem e quantidade. Afirma que tais reducionismos limitam as possibilidades de apropriação das relações humanas quando o sentido atribuído ao número extrapola sua condição ordinal e cardinal e exprime aspectos convencionados. A hipótese central do artigo consiste em considerar o

código numérico e o sentido atribuído a ele como elementos reflexivos, interdependentes, que só podem ser compreendidos levando-se em conta a função social dessa forma de linguagem e os câmbios sociais que pressupõem o uso de tal ferramenta conceitual.

Palavras-chave: matemática, número, linguagem numérica, código, sentido.

RÉSUMÉ

Cet article examine le nombre comme une forme de la langue pour expliquer la réalité sociale contemporaine dans laquelle cette information dépend de les mathématiques. Il présente les éléments du langage numérique- le code et la direction- et il est contre des conceptions du nombre qui réduisent leur compréhension aux aspects de l'ordre et de la quantité. Il précise que ces réductions limitent les possibilités de les relations humaines lorsque le sens attribué au nombre extrapole sa condition ordinal et cardinal et exprime les aspects convenus. L'hypothèse centrale de cet article est d'examiner le code numérique et le sens qui lui est assigné comme des éléments de réflexion, interdépendants, qui peuvent être compris en tenant compte de la fonction sociale de cette forme de langage et des éexchanges sociales qui exigent l'utilisation de cet outil conceptuel.

Mots clés: mathématiques, du nombre, de la langue numérique, le code et la direction.

1. Introduction

This article was produced from research conducted for a Master's in Education and Culture at the State University of Santa Catherine, in light of the third chapter of the dissertation entitled "The number from a historical perspective," which was defended and approved in 1991.[1] From there, we defend the teaching of numbers, especially in primary education, as a

[1]In the first chapter of this thesis, we present the theoretical principles that support a number of historical approaches, relying mainly on a conception of language drawn from Marx's approach in The Economic and Philosophical Manuscripts (1844), The German Ideology (1845), and Capital (1867), which emphasize the inherently social nature of man and his self-production. These assumptions were later adopted and developed in the context of psychology by Lev Vygotsky and Henri Wallon.

complex form which people urgently need to appropriate, considering the fact that today's society is mostly expressed through numbers. Examples of this are our daily contact with ATMs, financial transactions, graphics and tables in newspapers, economic indicators, product labels, etc. We live immersed in a world of numerical information and we need to understand it, process it and operate it so as not to be excluded from important social exchange in the contemporary world.

The aim of this article is to argue the need to overcome the prevailing reductionist concept of numbers, which, in our view, does not take into account the full complexity and social function of numerical language. To accomplish this objective, we developed a study on the elements that make up numerical language and their importance in socialization of mathematical science, still viewed as a villain when looking at educational indicators and academic success in elementary, middle and high school.

2. Assumptions of numerical language

Like any form of language, numerical language responds to the needs that humans have created over the course of their historical development. Allowing humans to mathematically express their social reality, this language consists of a specific code or sign and of a signifier or idea to be conveyed through that code or sign. In some form or another, these elements of numerical language will separate or oppose each other, while the name of the number and what it represents are reflexive,[2] since a number is never used when the sign does not express specific numerical

[2]We chose to use the term "reflexivity" for greater accuracy as it suggests interdependence between sign and meaning in the case of the number. Marx exemplifies well the reflexivity between two concepts, saying: "It's interesting what happens with these reflexive concepts. A man, for example, is king because others with him behave like subjects. These others believe that they are subjects because he is king" (Marx, 1985, p.66).

content given by social relations that involve mathematical elements. Given the nature of conventional numerical language, as determined by humans' particular needs during each historical time period, the relationship between code and meaning/signified is not arbitrated by the interlocutors, but is rather ruled and ordered by a numbering system, which in Hindu and Arabic is decimal. This means that we do not use the numeric code in any which way we wish, but instead under the imperative of logic: the numbering system, which forces us to comply with a given form of ordering numbers.

The elements that make up numerical language, code and meaning are assembled and articulated in social practices which, in truth, is the very reason for the use of this particular language form. It is from this type of practice that the use of numerical language for the most varied purposes of communication that depend on mathematical resources occur.

Viewing numbers as a form of language means that numbers can express the dynamism of contemporary social relations. However, it is common to attribute an ambivalent nature of quantity and series to numbers. This stems from a partial understanding of the social use of numerical language, which effectively reduces numerical language's applicability. Of course, if the number is considered on its own, as is often the case in a classroom explanation that strips it of its historical element, there is a formal division of the number into cardinal and ordinal orders. However, the social exercise of numerical language organizes numerical code in such a way as to extrapolate this formality, which is the result of insistance on the part of the very content of social relations that determines the use of numbers.

We will attempt to illustrate to what extent numerical code structure, in its social application, goes beyond the cardinal and ordinal aspects of the number.

In a card game, the numbers may represent order and amount or, depending on the players and the type of game, can be both or neither simultaneously, since game conventions structure numerical code in a way

that communicates only abritrariness, such as the number of a certain card becoming a wildcard which can represent any number. In this set-up, the ace can be equivalent to the number one, twenty one or both.

Numbers in an elevator communicate both the order of floors as well as the number of floors above ground; but a telephone number is completely arbitrary in its representation, for it scorns the formal nature of the number and instead represents the name of the subscriber. Note that in this case, for the telephone company the telephone number may represent a certain series of subscribers, which the actual use of the number by subscribers may exhibit a very diverse nature. Only social use can explain the function of a specific number. Let's look at this address: 140 May 13th Avenue, room 305. [3] We do not need to be told what floor the room is located on, because the number 305 refers to both the third floor of the building as well as the room on the third floor. The *data*, third floor, was implied in the arbitrary structure of code. We could list infinite social uses of numbers, in which the number or numbers do not express order or quantity, due to the arbitrary and conventional nature of numerical language mentioned above.

From these examples we can infer that in being a language form, numbers express content of certain human relations and hence the need for appropriation of this language by individuals so that they can understand and act in the contemporary world when circumstances require mathematical reading. This requires the individual to fully grasp code, its meaning and the structural elements of code, in other words, the foundation of numeration; otherwise, reading becomes fragmented or even impossible.

As we know, Piaget's concept views the number as a mental relationship between individual and objects: it is a logical and mathematical understanding that the individual makes when he categorizes and connects objects to other things around him. In turn, this knowledge is a synthesis

[3] The original in Portuguese: Avenida 13 de maio, 140, sala 305.

between social knowledge and physical or empirical knowledge. In the case of the number, social knowledge refers to code or the name of the number (the sign) and empirical knowledge refers to the meaning or signified, i.e., the quantity or number corresponding to the sign. By categorizing and connecting objects to one's reality, according to Piageti's theory, the individual constructs what he calls numerical conservation. On the one hand, we have subject primacy (mental relations), the other, object primacy (physical and social). We unequivocally detect here Piaget's concessions to innate and empirical conceptions of knowledge. As knowledge is defined as an adaptation and assuming these two schemes, one of assimilation and one of accommodation, both schemes simultaneously give primacy to the subject and object. We believe that before resolving the debate between innateness and empiricism, which has become ever more heated since the fifteenth century, what Piaget does is combine the two primaries, subject and environment, which are initially at odds, aggregating them under the name of adaptation. Thus he explains how from a biological point of view, the a prioris can be reconciled:

> [...] Accommodation is determined by the object, while assimilation is determined by the individual. Thus, just as there is no accommodation without assimilation – as it is always the accommodation of something that is assimilated into a scheme of conduct – there can not be assimilation without accommodation denouncing that the assimilation scheme is general and that it is always necessary to adjust it according to particular situations. (BRINGUIER, 1978, p.63)

From the epistemological mosaic, which considers the number as the synthesis between social and empirical knowledge, comes the non-ontological questioning of the possibility of the existence of non-social knowledge; another question that arises is that when you manipulate objects empirically they will not be configured by society, either in form or content. We will discuss these problems later, because the question we wish to

address now is whether it is possible to separate code from meaning/signified when it comes to numerical language.

Previously, we admitted that there was reflexivity between code and meaning in numerical language, since in social practice we use code to express or interpret mathematically certain messages. For this to occur, we must assume the dominance of the numbering system, which structures and organizes numerical language and without which it would not make sense to use code. It is then in thinking and assuming a meaning that I use code to communicate or appropriate communication in this form of language. Therefore, in the study of the number, we argue the impossibility of fragmentation between code and meaning; this is only possible by considering the number itself and not materialized in the form of language. When we speak or write the number 13, we never do so without intent or semantic implication. The converse is true, because to express ourselves mathematically, we can only do so taking into account numerical code structure, what we could call number syntax, i.e., the decimal system's own determinations concerning numerical organization. Even if we consider the number 13 as meaning luck or chance (semantic aspect), we have to respect the positional value of each of these numbers (syntactic aspect). Although this second aspect is not what most interests us at the moment, it remains fundamental. This overlap between code and meaning is not rigid, but rather much the opposite; it must be adequate for the demands of human relationships that involve the use of numbers. Therefore, the determination of which aspect (semantic or syntactic) will be privileged occurs in social exchange. Certainly the doctor, when asking the patient to say "33," is not concerned with code but with the sonority of this joining of numbers; the drink named "51" can not be explained through code, since the number is its name and could be any other number that the manufacturer wanted, but the number "1" of beer is (intentionally) limiting because it means that was is most important about this beer is its first place position among all beers,

giving weight to the structuring of the code, the value of its positioning. Only thinking abstractly can we separate numerical code from its corresponding meaning. In objective situations that involve the use of numbers, which occur in the form of language, the numerical sign (code) and meaning (idea) are reflective in such a way that one can not exist with the other in social practice.

Contrary to Piaget's understanding, we note that the individual appropriates not only the number itself, but also numerical language as a whole, extrapolating the meaning of numerical conservation, which traps and crystallizes the social use of numbers, indicating only order or inclusion of classes. Hence the ownership of the number cannot reside in the individual's relationship with the object or in relating objects to each other, as if it were an internal, mute construction; on the contrary, when encountering a particular object, the individual has already had encounters with many others before that particular object and is familiar with the social determinants of the object, configured for various language forms and, among them, mathematical language. But to admit to this understanding, we must confront not only language but the individual as well as a social product, as a being who only exists in society. In this regard, Marx elucidates the relationship between individual and society:

> Above all, we must avoid thinking of "society" yet again as an abstraction that the individual confronts. The individual is the social being. The manifestation of his life - even when it does not come directly in the form of an expression of community life in cooperation with other men - is therefore an expression and confirmation of social life. The individual life and man's generic life are no different, however much - and this is necessary – the mode of existence of the individual life is more specific or more general than the generic life, or however much the generic life constitutes a more specific or more general individual life. (MARX, 1979, p.119)

From that perspective, we consider objects never in themselves, but as humanized objects - objective humanity - and not an abstraction of every

society. It is inconceivable to have a relationship, so to speak, that is original and Adamic with a given object that society has not previously configured and determined the type of relationship to be established. To admit to this possibility would mean saying that the individual produces himself, isolated from the social whole. Contrary to this understanding, recall that in the *Jungle Book*, Mowgli becomes human only through contact with the villagers and even with Robinson Crusoe, on his desert island, there is nothing original about his crafting tools, religious artifacts, etc.; he crafts them as a seventeenth-century Englishman would. He is a product of his time.[4] Our Robinson is only the synthesis of multiple social relations, given that the social character is the universal character of every movement; just as society produces man as man, society is also produced by him (Cf. MARX, 1979, p.118).

In considering the number as an individual construction, such as Piaget does, the social nature of man completely transforms, giving way to a human-syncretic vision, giving rise to the species. The piagetic "[M]an himself" can only admit to an abstract subject-object relationship; it is at once the abstract subject, the original and the abstract object, uncontaminated by society, which inevitably flows into a sense that is abstract to the social body, ignoring the fact that even the most simple objects are only attributed meaning through social development, industry and trade (cf. MARX, 1984, p. 27).

Since objects are syntheses of human relations, the relation between subject and object is not immediate; this is a subject-subjects-object relation; in other words, my action does not occur in any which world, but in a humanized object-world. The latter consideration precludes an abstract

[4]Robinson, noting that he had already spent a year on the desert island, fasted and thanked God for being alive. One might wonder why a man lost on a desert island has to tell time or build a calendar? The reason is that even in his deepest solitude, Robinson lives in society. As Marx would say: man can only isolate himself within society.

understanding of man, solitary, individual, because when a man is faced with himself, he is also faced with other men. This is true in man's relationship with his work, as well as with the product of his work and his relationships with other men, their work and the objects of this work (cf. MARX, 1979, p.97).

In Piaget, there exists not only the possibility of construction isolated from knowledge but a defense of this. At one point, he argues that the individual can create his symbols independent of society, in his relationship with objects:

> Let us make clear that, according to a useful habit of linguists to keep abreast of psychology, a symbol must be defined as implying a relationship of resemblance between signifier and signified, while the sign is "arbitrary" and rests necessarily in accordance with convention. The sign therefore requires social life to form, while the symbol can already be elaborated upon by the individual on his own (as with a children's toy). (PIAGET, 1983, p.128)

In this passage, when he evokes the children's game "making food," Piaget considers it original, thus independent of social conventions, as children use, for example, a stone to symbolize a treat. Let us look more closely at this case. First, to symbolize a treat presupposes a convention that it is a treat; second, it presupposes a child that likes candy and can eat it; third, "making food" is in itself a social product, a product of the adult world. We do not need to go much further to find the social determinations of the "symbolic act" of considering a stone as a treat. In this little scene, nothing originates from the subject, there is nothing that has not already been set before him because children cannot relate to things that have not been, over time, humanized for them. There are not, in either the child or adult world, merely objects. Everything that exists are objects configured at the hands of humans.

The ideal abstract conceptualization of the number belittles its objectified understanding in the form of numerical language, whereby men

relate to each other, mathematically naming the people that belong to their reality. By scorning the social nature of humans, Piagetian constructivism also scorns the social nature of the conceptual categories that that social natures produces.

As the number is understood in the field of language, where the contribution of genetic epistemology is vague, we have thought to give it a conceptualization that goes beyond its logical-mathematical character. Piaget himself explains the impossibility of his constructivism to explain acquisition of knowledge that does not derive from the subject's possible activities, thus somewhat restricting excessively the application of this frame of reference to education. He admits:

> But problems that persist in the case of literary subjects consist of predicting how to grant a satisfactory place, in training current and future students, these two key components of science education: an authentic "activity" for the students that calls them to reconstruct and in part reinvent the truths that we must assimilate, and especially individual practice of the experimental spirit and its methods. Neither Latin or history is reinvented, and no one would venture into experiences ("to see", therefore heuristics, or control of explicative hypotheses) about Greek civilization. On the other hand, if we begin to familiarize ourselves with the stages of logical-mathematical operations, or causality in the students' intelligence, in their partly spontaneous manifestations, we do not have – or do not have yet – equivalent knowledge –regarding the mechanisms that create linguistic structure or determine understanding of historical facts. From the point of view of psychopedagogical research, we have before us a series of outstanding problems which may or may not be compatible with the solutions addressed
> above. (PIAGET, 1978, p.25)

In this passage, as we understand it, Piaget admits a differentiation between logic-mathematical knowledge and that arising from what he calls derivatives of linguistic structures of the individual. In other words: he admits to not knowing how subjects learn, or rather construct, historical facts, literature, arts, etc. because there is no possibility of action from these objects of knowledge. As he himself says, it is not possible to experience

"Ancient Greece" or "the French Revolution" etc., hence these contents are not susceptible to explanation through constructive action and are therefore not susceptible to explanation through genetic epistemology. The solution thus presented to solve this impasse seems superficial (in contrasted with the author's scientific posture), i.e., the hypothetical admission of the existence of linguistic pseudo-structures in the subject. Since in social contexts, knowledge is rarely derived from possible constructive actions, we believe that there still lacks an explanation for everything, even in the case of the number that under our analysis is shifted to the field of language.

On the other hand, in understanding the number as a form of language, we glimpse the possibility of its instruction and its appropriation by students, assuming, on the part of the interlocutors involved in the process of teaching and learning, competency related to mastery of numerical code - including the rules of decimal numeration - and clarity regarding the meaning or idea conveyed by the code.

In order to explain numerical language, we will now study it in a more systematic fashion.

3. Elements of numerical language

Although we will highlight each element of numerical language separately here, doing so merely serves to provide a better didatic explanation of the subject at hand since, as we said, code and meaning/signified are reflective, forming the various possibilities of numerical expression of human reality.

The appropriation of mathematical language in its current configuration, requires not only mastery of numerical code, in other words, knowledge of numbers, but also knowledge regarding the use of numbers in diverse semantic contexts. Moreover, in order to give meaning to the use of

this code, we must master all of the principles and implications of the foundation of decimal numeration.

To consider someone competent in the field of numerical language, one must take into account his knowledge of the two aspects to which we referred, i.e. the syntactic aspect (numerals and base numbering) and semantic (mathematical expression of a given reality).

4. The code

Just as alphabetic writing is comprised of a given set of signs, the writing of numbers also has a code. The dominance of the alphabetic code, because of the amount of audible signs (letters) at its disposal (in addition to diatrics, accents, etc.), is from our point of view infinitely more complex than numerical code. If we only considered the syllables formed by the junction of the consonants (with the exception of H, Q, K, Y and W) to the five vowels, this results in roughly 80 units. Numerical code is far simpler,[5] as it consists of only ten digits (from the Latin *digitus*: fingers) that articulated form all existing numerical expressions. It is clear that there are other complicating factors such as the additive and multiplicative properties of the decimal system, the positional value of numbers, etc. Considering numerals only, just ten digits are needed.

In analyzing numerical code, the first data point to consider is the correspondence between the digit (sign) and the name given to it (numeral), because this is a purely arbitrary convention, which varies from language to language. While we can find similarities between the names of the same numbers in languages from different families, each language determines a

[5] Professor Bernal attests to the simplicity of our numerical code: "... the improvement of a numerical system that notes place and introduces the concept of zero - what we today call Arabic numerals, which have made arithmetic operations something that any child can learn"(Bernal, 1975, p.282).

unique name for numbers: in English, the digit 5 is called "five," in Portuguese it is “cinco” and in French it is “cinq.” It is important to remember that the name of the number does not always correspond with its representation in the code because there are other factors involved. Let us take an example: after forming a group of ten, the next number should be (according to the additive property of the system) 10 plus 1 (a group of ten plus one more unit) and the resulting number should be called “tenandone”[6] and its successor should be “tenandtwo,”[7]etc. Note that this structure only happens after the number 15, i.e., the number 10 and 6 is ten(and)six.[8] However, it became the convention to call them as follows: eleven (11), twelve (12), thirteen (13), fourteen (14) and fifteen (15).[9] That "illogicality" also appears in the formation of multiples of base numbering. The number after nineteen is not called "ten and ten”[10] but rather two groups of ten or “twenty.” This remains the pattern until we reach ten tens, which we call a hundred instead of "*ninety and ten*"[11] or even greater a thousand instead of "nine hundred and ninety and ten."[12] These arbitrary names should be considered in the current representation of numerical code because the movement of the language is implied in them. The numerical forms that use today were not always so, even for Hindi-Arabic numerals. For example, not long ago among the Arabs, zero was represented by a point and not by a small circle and graphical numerical representations did not necessarily obey the current order.

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[6] The original Portuguese, “dezeum,” is a made-up word combining “dez” (10), “e” (and), and “um” (one) to illustrate a point about numerical naming logic.

[7] “Dezedois” is the Portuguese version of this made-up number name.

[8] Sixteen in Portuguese is “dezesseis” or literally “ten and six.”

[9] Onze (11), doze (12), treze (13), quatorze (14) e quinze (15)

[10] “dezedez”

[11] “noventaedez”

[12] “novecentos e noventaedez”

The ordering principles of numeric code that we use are derived from the base of decimal numeration so in order to use this type of code, we must comply with the rules of the ten-digit group, i.e. take into account its positional value, the order of addition, the use of zero to represent nothing and other rules. In any use of numbers, the organizing function of the base of decimal numeration is understood. For example, the numbers of a car's chassis, which appear to be arbitrary or perhaps a manufacturing order number, follow the rigor of the value of each positional number, in this case, the absolute value of each one, even if they are only for the purpose of demarcation and letters are mixed in. The use of numbers, even as cabalistic numbers, assumes its dependence on the same numerical base, as in the case of the number thirteen (13), which independent of what it means, can only be formed by the junction of the number one and and the number three, respecting the positional value of the number one with ten inclusions. The same occurs with the biblical number 666, which certainly does not represent any order or quantity but in this case, it is without a doubt that what matters are not the absolute values but rather the relative values of the sixes; there is no other explanation for why then the number of the apocalyptic beast from the Bible is 666 (six hundred and sixty-six). Even if this number is written in Roman numerals, we must respect the rules of that numbering system, thus: DCLXVI. However, for graphic records, the Arabic system is much simpler. Consider the year 1869: using the Roman system, we have: MDCCCLXIX. The Arabic numeral notation is incomparably easier than this record, eliminating five inscriptions of the Roman system, since it uses only four signs.

5. Some key features of the decimal system

IN REGARDS TO THE NUMBERS - Ten (10) digits for a biunivocal representation of the base numbers: 1 to 9 and zero to represent no unit.

POSITIONAL VALUE – Attributes an absolute value to each number – the number in and of itself and a relative value (the value that it holds inside the class that it represents). For example, 1869: 9 has an absolute value of 9 and a relative value of 9 (class: units); the 6 has an absolute value of 6 and a relative value of 60 (class: tens); the 8 has an absolute value of 8 and a relative value 800 (class: hundreds); and one has an absolute value of 1 and its relative value is 1000 (class: thousands unit).

NAME OF NUMBERS - Each figure has a name. There is some level of arbritrariness in the pronunciation of the numbers after ten.

ADDITIVE PROPERTY - In a numerical sequence, we always add a new unit to the previous unit.

MULTIPLICATIVE PROPERTY - Ease of working with the multiples of base numbers by inclusion of zero, for example: 10, 20, 100, 1000.

ARITHMETIC OPERATIONS – It is easy to do graphic calculations through the use of algorithms.

6. Meaning/Signified

Use of numeric code, just as is the case with using any code, stems from the assumption of an intrinsic meaning to our social use of numbers. In addition to quantifying and ordering in the mathematical world, the range of possible ideas that could be conveyed by the number go far beyond these operations, as has already been argued. There exists an infinite range of ideas in completely different semantic contexts and numbers' application in contemporary society seems limitless. Being understood the conventionality of the numeric code, with its rules of organization, the meaning to be

conveyed by this is only determined by the partners involved in the communicative process made possible by numbers. Certainly two mathematicians talking about a certain theorem will give a technical meaning to the use of the numbers in question. To exemplify this case, we turn to Professor Paulos, who recounts the following humorous case of a technical use of numbers:

> The mathematician G.H. Hardy went to visit his pupil – the Indian mathematician Ramanujan – in the hospital. Lacking anything better to talk about, he decided to make the observation that one thousand seven hundred and twenty-nine, the number of the taxi that brought his pupil to the hospital – was a very boring number. Ramanujan immediately replied: "No, Hardy, no! It is a very interesting number! It is the smallest number that can express in two different ways the sum of two cubes. (PAULOS, 1988, p.17)

Even a housewife, while following her recipes, will see in the numbers only the exact portions of the ingredients. A runner, on the contrary, gives numbers a highly accurate meaning that eludes ordinary people. It is common to attribute an obscure meaning to the use of numerical code; in the example of "economic package," an ideological meaning is attributed. The versatility of meaning embedded in numerical code is unlimited because of the universality of numerical language and its ubiquitous presence in human activity. Therefore, we defend the idea that ownership of the meaning of the use of numbers also means understanding the human relations that configure such use. In this sense, mastery of the application of numerical code is the ability to adapt numerical representation in a socially acceptable manner in the most varied dimensions of human life. This becomes a viable possibility when we consider the number as a form of language and not just as a logical-mathematical feature, as the number is much more than that; it is a language that explains reality that is, above all, multifaceted, or as Marx said, a synthesis of multiple determinations. We could say that the current human

reality is full of numbers and their use. On many occasions, numerical language is confused with other languages forms, such as the alphabet, traffic lights, music, etc. Even in esoteric languages, numbers are a key element and this is not limited to numerology. Thus it is quite possible that an esoteric assign a special meaning to numbers at any given moment and in the next, view those same numbers as merely accounting elements. It follows from this that the meaning of the use of numerical code will depend on the social relations in which it is inserted and on the possibility of mathematical expression of such a context, keeping in mind the objectives of the interlocutors involved.

As the number is a foundational element of mathematical language, since the beginning of modernity mathematics education should consider this content as its own backbone and focus on its instruction, keeping in mind that it is not just a technical and specific content, but it is also a specific type of language, whose internalization by the students is essential to enable them to appropriate the very way of life of people of our time, a way of life that is increasingly expressed numerically.

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