The Semantics of the Fundamental Elements of Language in Ernst von Glasersfeld's Work

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> Context • The constructivist approach to the definition (or analysis) of the fundamental meanings of language in Ernst von Glasersfeld's work. **> Problem** • Has this approach achieved better results than other approaches? **> Method** • Review of a book chapter by von Glasersfeld that is devoted to the analysis of the concepts of "unity," "plurality" and "number." **> Results** • The constructivist approach to the semantics of the fundamental elements of language (some of which are fundamental for sciences too) seems to have produced positive results; moreover these are in a field where other approaches have produced results that do not objectively seem satisfactory.
> Key words • Semantics, numbers, mental operations, attention, language.

Introduction

Ernst von Glasersfeld's work is surely extensive and complex. His contribution to constructivism is essential. Nevertheless, in this contribution to the Commemorative Issue I will not consider von Glasersfeld's work from a general point of view. I will not consider constructivism in general or von Glasersfeld's position inside constructivism, either. My contribution concerns a specific part of von Glasersfeld's work and a particular aspect of constructivism. Indeed, I will focus my attention only on the application of a constructivist approach to the definition (or analysis) of the fundamental meanings of language (I will soon explain what I mean by "fundamental meanings of language"). This is because I believe that the constructivist approach is the only one that has produced any results in such a difficult field to date. This goes to prove the importance and value of constructivism in my opinion.

Fundamental meanings of language

What do I mean by "fundamental meanings of language" (FML)? It is easy to realize that in language some meanings can be accounted for by means of other more basic meanings.[1] First, there are meanings that immediately appear to be made up of other simpler meanings (for example, "un-avail-able") and others that appear to be such after a more in-depth examination (for example, an etymological one). Other meanings immediately appear to be easily paraphrasable by means of other simpler meanings (for example, "bachelor" = unmarried adult male) and very many others prove to be paraphrasable after a more careful examination. Certain meanings seem to be very general and the basis of other more "specialized" meanings (for example, the verb "to make" in comparison with verbs such as "to build," "to produce," "to manufacture" etc). But most of all, if any sufficiently long sample of language, in any language, is considered, we can see that a small group of words/morphemes are very frequently used and that without them speaking would be impossible. These are the linguistic elements that may be called "grammatical," i.e., those listed in Table 1.

A very serious and rigorous approach to semantics such as Wierzbicka's (Wierzbicka 1972, 1989a,b, 1992; Goddard 2001, 2002; Goddard and Wierzbicka 1994, 2002), which is based on a reductive paraphrase (that is, breaking meanings/words down into combinations of simpler meanings/words), has shown that in language there is *a core of fundamental*, "atomic" *meanings* (which Wierzbicka calls "semantic primitives"), which allow us to define any other meaning, but are *absolutely irreducible*, that is, *undefinable* by means of other words, as Wierzbicka explicitly states. The "semantic primitives" are believed to be present in all human languages. This assumption was tested extensively against

1 | "Meanings" have sometimes been assimilated to "concepts." I think this is acceptable only in some cases. In fact, the expression "the concept of X" seems to indicate nothing but the meaning of the word "X" only in some cases (for example, in the expression "children learn the concept of number at the age of …," the word "concept" seems to indicate nothing but the mental entity that is designated by the word "number"). Nevertheless, many other times the word "concept" seems to indicate something much broader, i.e., a set of notions, ideas, beliefs etc about something. This set may vary from person to person (for example, my concept of "water" includes the notion of "H_2O" while someone else's may not, my concept of "dog" may include the notion of "nasty animal" while for another person this may be "lovely animal"). On the contrary, the meanings of words must be the same for everybody, otherwise linguistic communication would be impossible. In this paper, I will refer to "meanings." The word "concept" will be used in the first sense only.

adpositions, i.e., prepositions and postpositions	with, of, to, at, from, by, in, for, on, between/ among, etc.
conjunctions	and, or, if, because, but, etc.
interrogative-indefinite-relative pronouns and adjectives	who, what, which, whoever, whatever, whichever, etc.
demonstrative adjectives and pronouns	this, that, other, the same, etc.
main adverbs of place, time, manner etc	here, there, where, when, how, why, etc.
pronouns and adjectives of quantity	all, whole, many, some, few, etc.
negation	not, no, in- or un- as a prefix, etc.
numerals	one/first/once; two/second/twice; three/third, etc.
"grammatical" verbs	"to be," "to have," "can," "must", etc.
most morphemes in the large number of languages with a more or less rich morphology	the ones which indicate cases, in languages that have cases; the number of nouns and, in many languages, of adjectives; tenses, moods, forms, aspects of the verb, etc.
subject, object, noun, verb, etc.	morphological marks, word order or anything else that indicate them

Table 1: List of "grammatical" linguistic elements.

a wide and extremely diversified range of languages. Table 2 shows the present list of the 60 or so "semantic primitives."

Language therefore seems to have a core of meanings that cannot be accounted for *inside* language itself. This thesis had been already theoretically maintained by Arnauld, Descartes, Pascal and Leibniz (Goddard 1998). As we can see, most of the meanings listed by Wierzbicka (Table 2) coincide with fundamental grammatical words/morphemes listed in Table 1.

Amongst the meanings in Table 1, numbers (and the word "number") deserve separate consideration. In addition to being used very frequently in common language, these meanings are also the so-called "fundamental entities" of mathematics. Without them, mathematics would not exist. Similar considerations can be made for meanings such as "point," "line," "plane" etc: these meanings are used in common language, but are also fundamental entities of geometry, and without them geometry would not exist. If mathematics and geometry would not exist, what about the other disciplines we call "sciences"? This is easy to imagine. In addition to these meanings that are considered "fundamental entities" of mathematics and geometry, other meanings in Wierzbicka's list (such as "part," "all," "more" and others) are also continuously used in science as well as in common language.

Semantics of FML

A small core of meanings are therefore fundamental for the very existence of common language and science. For the sake of simplicity, in this paper I will use the acronym FML (Fundamental Meanings of Language). Accounting for these meanings is not a practical problem, of course. As a matter of fact, we understand and are able to use these meanings very well, even if we are not able to define them. But from the theoretical point of view, this problem is obviously extremely interesting.

Well, what are these meanings? They are clearly very different from the meanings of words such as "stone," "water," "air," i.e., physical objects. So what are they? At first sight, one may think that these words indicate *relationships* amongst physical objects. Words such as "above/below," "far/near," "in," "before/after" etc may seem to indicate spatial or temporal relationships, and space and time are dimensions of the physical world (nevertheless, these words are also used in situations that have nothing to do with the physical world, for example "*in* this list," "two comes *before* three"). But other words, such as "to have," "to get," "to make," "with," "genitive," "not," do not seem to necessarily indicate physical relationships at all: we can say both "bottle *of* wine" and "stream *of* consciousness," both "he *has* a moustache" and "*to have* an idea," without changing the meaning of the preposition "of" in the first couple of examples, and of the verb "to have" in the second. Solutions put forward by linguists to the problem of the meaning of words/morphemes that are strictly related to space, such as certain prepositions (see, for example: Cooper 1968; Bennett 1975; Herskovits 1981, 1986; Zelinsky-Wibbelt 1993; Di Tomaso 1996; Tyler, Evans 2003), can seem satisfactory enough, but for other words/morphemes the situation is very different. In some cases, nothing more than circular definitions or tautologies have been proposed (for example, "not" is defined as "negation," "all" is defined as "totality"). In other cases, the solution is said to be an extensive polysemy. I have tried to show (Benedetti 2008, 2009, 2010) that this solution does not seem satisfactory either (The reasons for this cannot be explained in depth in a short article such as this. Here, we can only briefly mention the emblematic case of the genitive—or other linguistic element with an equivalent meaning[2]. The supposed polysemy of the genitive, which is one of the most-used elements of language, is so extensive that it seems to include *any possible* kind of relationship. What is the sense of expressing so many relationships by means of a single word/morpheme? Furthermore, the many supposed meanings of the genitive are unrelated to and completely different from each other, unlike the kind of polysemy that is commonly found, which is made up

2| According to the language, the genitive meaning can be expressed by a case mark or an adposition or word order (English uses all three of these: "John's car," "the scent of roses," "safety belt," for example).

of a main meaning plus a few other meanings that derive from the main meaning for easily understandable reasons).

Therefore I think that the semantics of the fundamental grammatical elements is very far from having been clarified. So, given their importance, a big enigma in the study of language still remains. In my view, the fundamental reason why traditional approaches have substantially failed to solve this problem is that they are based on the more or less tacit and unconscious presupposition that language is only a set of "labels" to designate objects of the objective reality, or features of them, or relationships amongst them. That is, that language is only a "labeling" of the objective reality and therefore the meanings of the words/morphemes should be searched for in *objective* reality only. Language is surely used to describe something that is independent of our mind, which may be called "reality," nevertheless I am convinced that language is not a mere "labeling" of parts of this reality. In my opinion, in order to account for these meanings, it is necessary instead to use a constructivist approach, i.e., to also consider what *the subject* (i.e., the speaker) *actively does*, i.e., his or her mental operations. This because language is highly constructive (i.e., an expression of the subject's mental activity, not a mere "mirroring" of an objective reality) in my opinion. We can see this even when we consider words that apparently indicate physical objects only, such as "dog," "fir," "stone," for example. Are all "dogs," "firs," "stones" equal to each other? Certainly not. Nevertheless, we designate items that are even noticeably different from each other with the same word. If we designate objects that are noticeably different from each other with the same word, it is clear that we *actively build* a general pattern with our mind, a pattern within which these particular objects fall. It is also clear that this pattern does not exist by itself, i.e., independently. Its existence depends on a certain mental activity, it is a product of this. All of this is even more evident if we consider more abstract words, such as "animal" and "tree" instead of " dog" and "fir," respectively.

substantives:	I, you, someone, people, something~thing, body
relational substantives:	kind, part
determiners:	this, the same, other~else
quantifiers:	one, two, some, all, many~much, little~few
evaluators:	good, bad
descriptors:	big, small
mental predicates:	think, know, want, feel, see, hear
speech:	say, words, true
actions, events, movement, contact:	do, happen, move, touch
existence and possession:	be (somewhere), there is, have, be (someone/something)
life and death:	live, die
time:	when~time, now, before, after, a long time, a short time, for some time, moment
space:	where~place, here, above, below; far, near; side, inside
"logical" concepts:	not, maybe, can, because, if
intensifier, augmentor:	very, more
similarity:	like~as~way

Table 2: List of proposed semantic primitives (from http://www.une.edu.au/lcl/nsm/nsm.php)

A constructivist approach

The assumption that language is highly constructive is, in my opinion, even truer (or "viable"[3]) in the case of the FML (we will see an example of this). If language (which is nothing else but the expression of meanings) is highly constructive, a constructivist approach is the only possible (or a more "viable") approach for semantics.

The application of a constructivist approach to the study of the FML can be found in von Glasersfeld's work, even if not the main part of it. Probably, von Glasersfeld was mainly interested in a general theorization of constructivism, or in other applications of constructivism, such as didactics. Nevertheless, the application of a constructivist approach to the study of the FML is clearly present and not marginal. To this application von Glasersfeld devoted a whole chapter of his 1995 book and articles on the concepts of "unity," "plurality" and "number" (Glasersfeld 1981, 2006), on the concept of "causation" (Glasersfeld 1974), and on the semantics of verbs (Glasersfeld 1972). Actually, very few meanings are considered. Even if the meanings considered are very few, what is important is the principle, i.e., the application of a constructivist approach to the problem of the meaning of the FML. If the principle is right and the main assumptions developed in this perspective are substantially right too, then all of this can be also applied to the other meanings. This has been done by other researchers: Ceccato (Ceccato 1969; Ceccato & Zonta 1980), Benedetti (2008, 2009, 2010), Vaccarino (1988, 1997, 2000), and Marchetti (1993, 1997, 2010).

Let us see what these presuppositions are. The first and fundamental presupposition is that these meanings must (or must also) be accounted for in terms of *something that the subject actively does with his or her mind*, i.e., in terms of *mental operations*. The

3| In von Glasersfeld's constructivism, the notion of "viability" substitutes that of "truth." In this article, I will use both terminologies for the sake of interdisciplinarity.

second is that operations of attention, and memory operations too, play a key role in these operations. Von Glasersfeld borrowed this idea from Ceccato. Von Glasersfeld's work was indeed deeply influenced by Ceccato's thought (von Glasersfeld himself said this explicitly, for example in Glasersfeld 1995): even if there are differences between von Glasersfeld's thought and Ceccato's, many basic ideas are certainly the same.

Ernst von Glasersfeld's analysis of "unity," "plurality" and "number"

As I have just said, one of these ideas is that the meaning of the FML has to be accounted for in terms of the subject's mental operations, which are mainly attentional and memory operations. Let us now take an in-depth look at von Glasersfeld's analysis of the meaning of the words "unity," "plurality" and "number," quoting this from Glasersfeld (1995).[4]

Initially, von Glasersfeld stresses how elusive the definition of these meanings is. Mathematics textbooks are indeed not very illuminating in this regard and mathematicians and philosophers of mathematics rarely say anything about the basic elements of mathematics. One of the few exceptions was the Italian mathematician Giuseppe Peano, who nevertheless concluded that number cannot be defined and therefore it is not advisable to try to give a definition of number to students, since this idea is perfectly clear to them, even if unconsciously.

Von Glasersfeld then quotes some passages by authors where we can find the intuition that numbers must not be conceived in ontological terms, i.e., as existing by themselves, but as a product (of operations) of our mind, i.e., passages where a constructivist conception of numbers is anticipated:

> "…to count and to consider several things contemporaneously are different activities [...] This difference is not inherent in the things, independent of the operations of the mind. On the contrary, it depends on the mind of him who counts. The intellect, therefore, does not find numbers but makes them; it considers different things, each distinct in itself, and intentionally unites them in thought." (Caramuel 1670: xliii–xliv, translated by Ernst von Glasersfeld)

> "Number not without the mind in anything…" (Berkeley 1706–1708: §106)

> "Number is a rational process, not a sense fact." (McLellan & Dewey 1908: 23)

> "…number arises from certain rational processes in construing, defining and relating the material of sense perception." (ibid: 35)

Von Glasersfeld points out that the latter two authors (McLellan & Dewey) have tried to identify the necessary operations:

> "In the simple recognition, for example, of three things such as three the following intellectual operations are involved: The recognition of the three objects as forming one connected whole or group — that is, there must be a recognition of the three things as individuals, and of the one, the unity, the whole, made up of the three things." (McLellan & Dewey 1908: 24)

Hence von Glasersfeld deduces that separating and uniting are the fundamental activities. That is, first we create discrete unitary items, then we unite various such individual items so that they can again be seen as a unit. Therefore, the first question is how do we come to have a unit.

This question, as von Glasersfeld points out, had already been formulated by the physicist Percy Bridgman (it should be noted that Bridgman is one of the authors who most influenced Ceccato's thought, by which von Glasersfeld was in turn deeply influenced, as mentioned) when he asked what is the thing that we count. He answered this question in a constructivist way:

> "It is obviously not like the objects of common sense experience – the thing that we count was not there before we counted it, but we create it as we go along. It is the acts of creation that we count." (Bridgman 1961: 103)

Therefore, units are not an intrinsic property of objects, but the result of an operation that is actively carried out by the subject. Von Glasersfeld stresses that Husserl explicitly stated that the concept of unit is an abstraction from sensorimotor objects. Von Glasersfeld acknowledges that sensory signals are needed for the development of the concept of unity, but reaffirms that this concept is the product of operations which are actively performed by the subject and uses a simple example of visual experience to demonstrate this:

> "Looking at Figure 1, you can see the wave line as one continuous unitary item; but you can see it also as three crests or two troughs; and then you can see it as a multitude of discrete unitary dots.

Figure 1

> The sensory signals remain the same throughout, yet they can be organised into different kinds of units." (Glasersfeld 1995: 165f.)

At this point, von Glasersfeld highlights an operation that is absolutely essential in the process of construction of the concept of number, i.e., to first consider the items we want to count as being equal to each other. With reference to Figure 1 once again, he stresses that the troughs we see must be different, distinct things, because otherwise we would not say that there are two of them. Nevertheless, they must also be the same, in the sense that they are both troughs. A trough and a crest would not produce a plurality. However, they can be used to form a plurality, if the sensory signals that are the basis for their constitution are categorized differently, for example as curves or deviations from the straight line.

The constructive character of this fundamental phase is very evident. In fact, sometimes we count items that are absolutely identical to each other, and in this case the operation of considering them equal to each other may escape us. But often we count items with small differences (e.g., apples), others with noticeable differences (e.g., books), others with very big differences and only one feature or a few features in common (e.g., fruits that are different from each other), and even items that have nothing to do with each other (when we consider them as items in an extremely

4| I have chosen these meanings because they are analyzed in depth.

general category such as "objects"). Therefore, in all these cases mental operations lead to the formation of even very abstract categories, while discarding (even very big and numerous) differences, which are nevertheless present.

Von Glasersfeld goes on to underline another essential feature in the process of construction of the concept of number, i.e., the fact that this process is performed on *two* levels. The first level is the categorization of the perceived things as items of the same class. The second is given by the fact that the subject must become aware that he or she is *repeating* a particular categorization.

At this point, von Glasersfeld introduces the other idea (the first idea is the general constructivist idea of the active character of knowledge) that is central in Ceccato's school, i.e., the idea that the operations of attention play a key role in the formation of the abstract concepts. Here, von Glasersfeld uses a very technical and precise language, therefore I think it is better to quote his words, instead of trying to summarize them, and to use the same diagrams he uses (see Box 1).

Last, von Glasersfeld introduces two further operations that are necessary in constructing the concept of number, i.e., the iteration of moments of attention focused on unitary items (these moments are separated by other moments of unfocused attention) and coordinating this iteration with a conventional sequence of number words, which must be known and strictly followed, and which must start with "one." All of this is the difference between the concept of number and that of "plurality," because, if we simply repeat the attentional pattern that produces unitary items, we do not count, but merely establish a plurality.

Von Glasersfeld ends by pointing out that what makes up the abstract concept of number is the attentional pattern abstracted from the counting procedure, a pattern in which it is irrelevant what the focused moments of attention are actually focused on, and by summarizing the essential features of the activity of counting, namely:

> "(1) the iteration of moments that are focused on some unitary items and attentional moments that are not; (2) that the iterated sequence itself is bounded by unfocused moments; and (3) that the focused moments are coordinated with number words." (Glasersfeld 1995: 172)

This is the definition (or analysis) of the concept of number provided by von Glasersfeld (in Ceccato's footsteps). We can now think this over and evaluate it, i.e., ask ourselves what result von Glasersfeld achieved.

BOX 1: The key role of operations of attention

"The idea that the structure of certain abstract concepts could be interpreted as patterns of attention, was first proposed by Silvio Ceccato (1966). In the pages that follow I shall outline a possible application of that idea to numerical concepts. Attention, in this model, is conceived as a pulse-like activity that picks out, for further processing, some of the signals from the more or less continuous multitude of signals which the organism's nervous system supplies. That is to say, a single pulse or moment of attention can be, but need not be, focused on a particular signal. When it is unfocused it does not pick out particular signals, but this does not mean that there are no signals that could have been picked out. The unfocused moment merely creates a break in the process of composition [...]

I say that an organism focuses attention on signals in its nervous system. This implies that the organism must be able to operate on at least two levels. One, on which sensorimotor signals are generated and conveyed to other parts of the neural network, and a second level of attentional activity where focused pulses pick out particular sensorimotor signals, while unfocused pulses create discontinuities or intervals. To do this, the system needs some kind of memory where the results of attentional activity can be maintained in such a way that they, too, can subsequently become the object of attentional focusing [...]

It is the two moments of unfocused attention at the beginning and at the end of a sequence that provide the closure and cohesion of a unitary item. A mapping or diagram of the conceptual structure of a perceptual thing, such as an apple, could look like this:

O	(	I	I	I	. . .	I	)	O
		a	b	c	. . .	n		

where 'O' designates unfocused moments of attention, 'I' focused moments, and 'a, b, c, ... n' different sensorimotor signals that were individually picked out by consecutive focused moments of attention [...]

According to this model, a discrete unitary perceptual item is constituted by an attentional pattern that consist of an unfocused moment, an unspecified sequence of focused moments, and a terminal unfocused moment that closes it. In the suggested graphic notation, it would be represented by the sequence:

O I I . . . I O

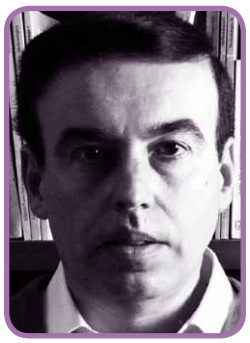
[...] In a further step of abstraction, the uninterrupted sequence of focused attentional pulses becomes fused and yields the generic attentional pattern of a *unit*:

O I O

This represents a wholly abstract entity, because it no longer matters what the central moment of attention was focused on or wether there was one or several." (Glasersfeld 1995: 167–169)

Evaluation of von Glasersfeld's results

First of all, it can be said that he arrived at *a definition* of the concept of number. I mean that he provided an *actual* definition of this concept, not a generic attempt of definition or a vague indication of the direc-



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After obtaining a degree in medicine, Giulio Benedetti became a student of Silvio Ceccato and his *Scuola Operativa Italiana* (Italian Operational School). Benedetti has continued Ceccato's work and formulated a complete and systematic theory, which he calls "Operational Semantics." In terms of operations within cognitive functions such as attention and memory, it accounts for the meaning of the fundamental grammatical words/morphemes and gives a precise definition of the fundamental grammatical concepts. Together with Giorgio Marchetti he maintains the website http://www.mind-consciousness-language.com

tion to follow. Furthermore, it is a *real* definition, because: a) it is not a tautology (the *definiendum* is not used as a *definiens*); b) it is not circular (i.e., in the definition there is not something, *A*, which sends us to *B* and *B* in turn sends us to *A*); c) it is not negative but positive (i.e., von Glasersfeld says what number, unity and plurality *are*, not what they *are not*); d) it is a definition in proper terms (i.e., without irreducible metaphors); e) it is a definition *outside* language, i.e., in terms of something that is *different* (mental operations of attention and memory) from the *definiendum*.

Furthermore, this definition solves the problem of the nature of numbers. Numbers are conceived by von Glasersfeld as being the result of mental operations, and, as such, exist only when and if this activity is performed. Numbers are not considered to exist independently, as is the case with ontological approaches, either explicitly or implicitly. In this way we can solve a major (unsolvable, in my opinion) problem that an ontological conception implies: if we consider numbers in a substantially ontological manner, what is their nature? Surely numbers cannot be considered physical things. So what is the nature of numbers? If they "exist" in an ontological sense (i.e., have a somehow independent existence), in which "world" do they exist? And how can the human mind grasp them?

Von Glasersfeld's definition of number is very simple, from a certain point of view. One could object that it is *too* simple to be the right solution to a problem that has always seemed so difficult. My answer to this objection is that the concept of number not only *can*, but *must* be very simple; and that, from another point of view, the solution that has been suggested is not simple at all. The concept of number *must* be very simple because even very little children show that they possess and learn this concept from adults simply by looking at them counting, obviously without being able to perceive what is happening in the mind of the adults in any way, but, at best, with the only help of the gestures the adults may use to accompany their activity of counting. Evidently, the concept of number consists of a *simple* combination of mental operations (the ability to perform which is very probably innate in human beings). The solution that has been suggested is, in contrast, not simple in the sense that it was not simple to formulate its basic presuppositions (since these presuppositions had never been formulated before).

One could also object that the FML considered by von Glasersfeld are extremely few, i.e., only three (and strictly related to each other). This is probably because von Glasersfeld was most likely less interested in applying a constructivist approach to the definition of the FML than he was in the theorization of constructivism in general or the application of this approach to other fields. Nevertheless, the constructivist approach (with the aforesaid basic presupposition that the FML must, or must also be accounted for, in terms of mainly attentional operations) has been applied, as mentioned, to the definition of the other FML, with the same positive results as these, in my opinion.

It is also possible to compare von Glasersfeld's analysis of the concept of number with Ceccato's. The basic presupposition (numbers do not have an independent existence, but are actively produced by the subject by means of mental operations in which attention plays a key role) is the same. The two analyses, too, are similar, because according to Ceccato numbers derive "from the repetition of the 'singular' category" (Ceccato & Zonta 1980; Ceccato's 'singular' category is substantially the same as von Glasersfeld's "unity" category). Nevertheless, it can be said that von Glasersfeld's analysis has noticeably improved Ceccato's. Von Glasersfeld's description is indeed clearer and much broader than Ceccato's. Moreover, von Glasersfeld clearly stresses that the items that are counted must be considered equal, which Ceccato does not or does not clearly point out.

Conclusion

As a conclusion, the constructivist approach to the semantics of the fundamental elements of language (some of which are fundamental for sciences too) seems to be, to my knowledge, the only one that produces results. These results, besides being convincing (in my opinion) from the subjective point of view, also agree with objective data, i.e., linguistic data (Benedetti 2008, 2009, 2010). Experiments have also been planned to provide experimental evidence (something of this kind already exists, even if to a limited extent, see Amietta & Magnani (1998), where these authors propose the study of gesture as an experimental confirmation of analyses of FML, by using some Ceccato's analyses). The constructivist approach to such an important aspect of language, as the semantics of its fundamental elements is, has therefore produced results that seem positive, moreover in a field where other approaches have produced results that do not objectively seem satisfactory. Other aspects or applications of constructivism

may be confirmed or not, or may remain controversial, but I believe that the results of constructivism in this field cannot be ignored and the validity of constructivism will have to be acknowledged, at least partly. Von Glasersfeld has been one of the most important theoreticians of constructivism in general and has also given a contribution in applying the constructivist approach to the semantics of the fundamental elements of language (even if the extension of this contribution was limited, probably because of von Glasersfeld's prevailing interest in the most general aspects of constructivism and other possible applications of it). For these very reasons I believe that von Glasersfeld should be remembered as a pioneer and a prominent figure in this stream of thought.

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