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A presentation of Operational Methodology

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(Translation from Italian is my own; it has been kindly revised by Mr Nicholas White)

Abstract
The author introduces Operational Methodology (O.M.), a human mind studying method which is radically new in regard to traditional methods, i.e. those of neural biology, cognitive psychology, linguistics, artificial intelligence and philosophy. According to the author O.M. is a decisive step in understanding the human mind and through it we could succeed in the extremely difficult task of the artificial reproduction of the way the mind works. This is because O.M. allows to define in terms of operations (which therefore theoretically can be artificially reproduced) the meanings of words absolutely indispensable in order to think and to speak like conjunctions, prepositions, pronouns, fundamental verbs like "to be", "to have" etc., main adverbs etc.. Neither traditional linguistics or modern semantic nor philosophy or cognitive psychology were able to give satisfactory definitions of such words. O.M. is also important in didactics because it allows to understand what are the so-called "fundamental elements" of many disciplines like, as an example, number for arithmetic, point, line etc. for geometry, noun, verb etc. for grammar and so on.

Key words: *Operational Methodology,* Scuola Operativa Italiana*, mind, attention, thought, perception, neural biology, cognitive psychology, linguistics, artificial intelligence, philosophy, semantics, didactics, arithmetic, geometry, grammar, machine translation.*

Operational Methodology (O.M.) is *a human mind studying method* which is *radically new* in regard to traditional methods, i.e. those of neural biology, cognitive psychology, linguistics, artificial intelligence and philosophy. O.M. was born in the 50's, fundamentally by Silvio Ceccato[1] (1914-1997), whose thought reached its full maturity in the 60's and 70's. The evolution of O.M. continues until today thanks to the contribution of other researchers, who with Ceccato form the *Scuola Operativa Italiana* (*S.O.I.*) [Italian Operational School].

In my opinion, many important practical and theoretical results can be obtained by adopting the O.M. point of view in human mind study. The kinds of such outcome are at least four.

1) First of all O.M. allows to begin satisfying the millenarian interest of the human being about his own mind. The human mind, which reached such striking results in all fields it applied itself to, when it tried to understand itself, its working, was not able to do it. In this field we have the impression to be in front of an impassable barrier. O.M. allows us to open a wide passage in this barrier.

2) Secondly, in my opinion O.M. is the only kind of approach to the study of human mind through which we could succeed in the extremely difficult task of the artificial reproduction of the way the mind works. We cannot deny that till today, despite astonishing progress in electronics, computer science and so-called artificial intelligence, no machine is able to reproduce the characteristics of human beings the common sense ever considered distinctive of human species, that is, thinking and speaking, not even in its simpler ways, like to describe a scene we are looking at. O.M. has models to propose about the meaning of those words like prepositions, conjunctions, articles, pronouns, fundamental verbs and adverbs etc. that, as we will see in this article, are absolutely necessary in order to speak and to think. The fundamental presupposition of O.M., as we shall soon see, is that the meanings of such fundamental words are sequences of mental operations, and therefore it is theoretically possible to successfully reproduce these operations carried out by natural organs (that is specific neural structures) also by artificial organs. In my opinion this presupposition is the only one that allows us to hope to be to some degree successful in this extremely difficult task. Apart from this possibility, in shorter times OM could allow us to improve the quality of machine translation by computer (see further on).

3) Thirdly, O.M. is also important in the didactics of many disciplines. The so-called "fundamental elements" of arithmetic and geometry, like number, point, line etc. are not yet defined in a satisfactory and clear way. Things that grammar is concerned with such as prepositions, conjunctions, cases, etc. have been simply classified, leaving their meanings undefined; and fundamentals of grammar notions like those of name, verb etc. are also defined in an unsatisfactory way. This has practically no consequences for pupils learning these disciplines, because children understand very well what a number, a point, a noun etc. are even if we do not know how to give satisfactory definitions of them. Nevertheless, to give satisfactory and clear definitions would surely be desirable. With regard to this *it is best to make clear that O.M. absolutely does not allow us to improve our knowledge of these disciplines, nor means to teach teachers their matter, nor how to teach it. O.M. simply allows us to clarify the meanings of the fundamental elements of these disciplines* like number, point, noun, verb etc. Moreover, O.M. makes the student not only carry out the mental activity necessary for understanding these disciplines but also think about this activity and have clear and precise answers about it. This is surely formative for his mind.

4) Fourthly, O.M. makes clear that the many attitudes that human beings can assume (scientific, aesthetic, economic, of work or play etc. etc.) are consequence of different sequences of mental operations (of which O.M. supplies an analysis). This consciousness allows us to develop a less rigid, polyvalent, more tolerant mentality and greater adaptability to circumstances.

S.O.I.'s theories have often turned out not easy to understand. I believe this is mainly a consequence of the way they have been traditionally introduced. If we use another type of presentation I think that they

[1] With G. Vaccarino and V. Somenzi.

turn out relatively easy, so that they could be partially exposed to 10-12 years old children too. This article is an example of this kind of presentation simpler than the traditional one.
The fundamental presupposition of O.M. is to conceive the human mind as a set of operations, carried out by neural structures, that is to say as *something active*. On the contrary philosophical tradition often conceived the mind as something which *passively* "reflects" external objects[2].
It is easy to realise that the activity of human mind does not consist of a simple "reflection" of the physical world, not even when we simply describe a scene. For this purpose it is sufficient to do an easy experiment, which simply consists in taking any example of the product of this fundamental activity, that is any thought, and analysing it in a way I will say as follows. Speech naturally is the "public" (that is perceptible by others) expression of thought. Then it is enough to choose at random any part of a speech or a text in any language: the result of the experiment will be always the same. We can take as an example the beginning of one of the most famous books in the world: Pinocchio.

Once upon a time there was…
— A king! — my small readers will say at once.
No, children, you are wrong. Once upon a time there was a piece of wood.
It was not a luxury wood, but a simple stack piece, one of those pieces we use to put in stoves and fireplaces in winter to light fire and to heat rooms."

It is clear that in this passage some words, like "wood", "stoves", "fireplaces", "fire", "rooms" etc., undoubtedly designate something perceptible by our senses, that is, something physical. On the other hand some others words, like the verbs "to be" and "to have", the article "a", the prepositions "at", "of", "in", "to", the demonstrative adjective "that", the negation "not", the conjunctions "and" and "but" etc., designate undoubtedly something that cannot be considered physical. It is also clear that without prepositions, conjunctions, cases and articles (in languages which have cases and articles), pronouns, fundamental verbs like "to be", "to have", etc., main adverbs, in a word all that grammar is concerned with, it is absolutely impossible to think and to speak. It is easy to realise that these words are extremely frequent and absolutely necessary in order to express any kind of thought, even the simplest.
O.M. asserts that such kind of words designates something mental, that is sets of mental operations, and that without an "operational" approach, it is impossible to understand the way the human mind works and to try to build a machine which reproduces this operation itself.
O.M. has called these sets of mental operations "mental categories" (as a tribute to Kant, who first understood their nature). Traditional linguistics found it very hard to define the meanings of the corresponding words. An emblematic example is the case of a group of mental categories of fundamental importance, the prepositions (in English one word out of seven, on average, is a preposition). Two different solutions, both of philosophical derivation, have been proposed. According to the first solution, which is generally the solution chosen by dictionaries and grammars, such words would have a lot of meanings, that is they would indicate many kinds of relationship (such as place, time, manner, cause, means or instrument, company or union, origin etc.). According to the other solution such words would instead lack a meaning and they would take their meaning from the other words of the speech, that is, from the context.
It is easy to object to the first solution that it seems improbable at all that words, composed by very few

[2] Such a conception of the human mind as something active, conception which is typical of OM, absolutely must not be confused with the conception typical of the idealistic philosophy, according to which the physical world is an "emanation" of a spirit, *logos* and so on which exists before the world itself. OM has nothing to do with such a philosophy. On the contrary, OM, in accordance with common sense, believes that the physical world is completely independent of the operating of the mind.

letters, extremely frequent and indispensable to use, have so many meanings. In fact, words have generally only one meaning, the main one, and often some other meanings of figured, extensive, specific kind etc., which derive from the former in an easy comprehensible way (for instance, the term "nose" properly means the part of face, but also snout, muzzle, shrewdness, the opening of a tube etc., a spy). It is more likely that prepositions have only one meaning, more general (that is why it is not so easy to determine), and that the many relationships grammar speaks about are only specifications, just introduced by grammar itself, which are included in this more general meaning: that is, as an example, that the preposition "with" does not designate the relationship of company or union, manner, cause etc., but something more general in which the relationship of company or union, manner, cause etc. are included. The second hypothesis also seems wrong because, if we build a series of sentences in which context is the same and what varies is only the mental category, for example

to go in the water
to go to the water
to go for the water
to go on the water
to go over the water etc.,

we feel very well that the meaning of each expression is precise and each meaning is very different from the others.

Difficulties found by linguistics in the effort to define the meaning of other mental categories are evident too. Definitions we find in dictionaries (which are supposed to be able to supply them) are of three kinds:

a) clearly tautological (for example the word "not" is defined by the word "negation");

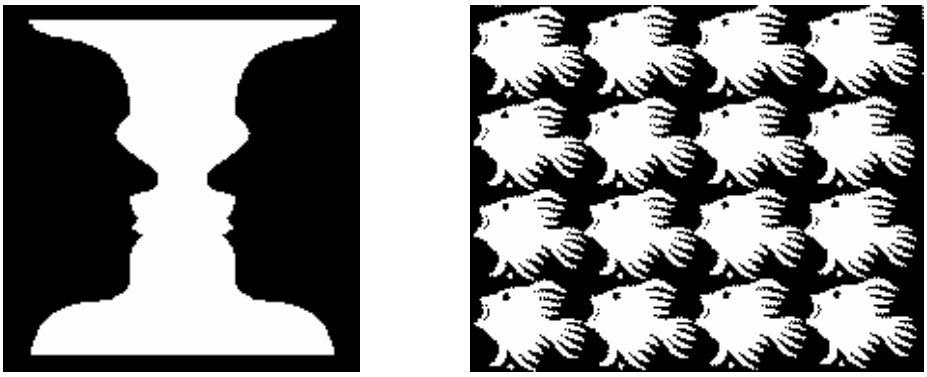
b) they use pseudo-synonyms (for example "to begin" would mean "to start, to commence, to undertake"; "to have" would mean "to possess, to own", "to keep", "to get, to obtain" etc.);

c) they send back us from one term to the other clearly evading the defining task (for example "to look for" is defined as "to carry out an activity in order to find something or someone", and "to find" is defined as "to succeed in meeting, seeing, knowing, discovering and so on the thing or the person that we were looking for").

O.M. instead proposes the theory that words that do not designate something physical generally have only one, main meaning, as those words indicating physical things do, and that this meaning is a set of mental operations.

According to O.M., mental operations are mainly operations of attention. Everyone feels very well, I believe, the operating of his own attention. This operating is carried out by sure extremely complex neural structures: so their description is up to neural biology. Nevertheless we can also analyse this operating down to its basic elements through an essentially introspective method whose results could be confirmed by the future ones of neural biology itself. Therefore O.M. has a collaborative and mutual enrichment relationship with neural biology.

Nevertheless, according to O.M. attention has a key role not only in construction of mental categories but also in perception. To realise that it is sufficient to notice that a moment ago, while our attention was concentrated on reading these lines, we did not perceive some little stimuli like pressure of our arms on the desktop or of our fingers on the sheet of paper, of our feet on the floor, weak continuing noises coming from the environment etc.. Instead now we do perceive these stimuli because our attention focused on them. The importance of attention in perception clearly turns out also from so-called "alternating figures" (Picture 1).

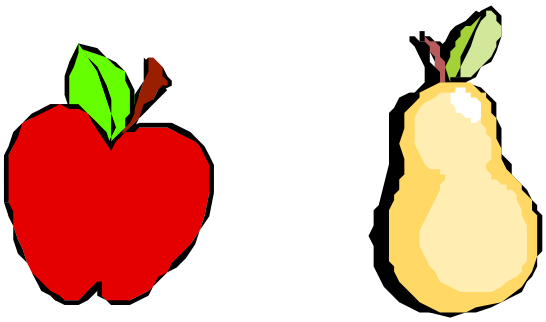


Picture 1

According to whether we direct our attention to black or to white we see different things in these pictures (a pot or two profiles and fish or birds, respectively).
The fundamental characteristic of attention is in fact to focus in a selective way, that is to make present in our mind, to take to the level of consciousness, only one part in turn of the huge amount of information coming from the physical interaction of our senses with the environment.
The key role of attention in perception, more and more confirmed by modern cognitive psychology and neural biology, has been asserted by *S.O.I.* since the 50's. Thus *S.O.I.* since its birth has taken upon itself the task of supplying a model of perceptive activity based on attentional operations. In my opinion the model proposed is only partially correct: cognitive psychology and neural biology were able to supply better models, from some points of view. *S.O.I.* yet also tried, and above all, to analyse mental categories in terms of elementary operations of attention (and memory, another fundamental element of mental activity). In my opinion *S.O.I.* has obtained incomparably better results in this task than any other discipline. However the task proved very hard, and no definitive and accepted from all members of *S.O.I.* results have been achieved. Because of lack of space here it is not possible to illustrate, not even in the most summarising way, neither presuppositions and methods used during analytical task nor results achieved. I can only say that Ceccato proposed approximately 300 analyses of mental categories consisting of a description of corresponding sequences of mental operations essentially given in linguistic terms, that is, by means of words of the common language. Approximately a third of these 300 analyses could be "translated" by means of a rather simple symbolic system into as many formulas that would exactly represent the operation of attention and memory forming every single mental category. Therefore the so forming analytical system seems too small in regard to the number of categories analysed in linguistic terms and even more in regard to the presumable whole number of the mental categories. Moreover, this system does not look easily admitting of further developments, so that the presuppositions on which it is based have been called in question by Ceccato himself too. Trying to overcome these difficulties G. Vaccarino built a large and complex analytical system (beyond 2000 mental categories analysed) based on a different conception of mental operations and their modalities of combination[3]. Much smaller is von Glasersfeld's system, which only considers a few categories which are fundamental for arithmetic (as "number", for instance, and a few others). Some analyses of mental categories have been proposed also by G. Marchetti. I am now proposing a resumption and a development of Ceccato's system (the one consisting of analysis in linguistic terms), based on a review of his model of the mind.

[3] E. Arturi, C. E. Menga and A. A. Gùrnari. also have contributed to research in the direction proposed by Vaccarino.

I propose below some examples, chosen from the simplest, of analyses of mental categories operated by *S.O.I.*, so that the reader can have at least a vague idea of them. They are analyses operated by Ceccato using linguistic terms. Some of them have been modified by me. Let's look at Picture 2.



Picture 2

In a situation like this we could say for instance "there is an apple and a pear", but also "I want an apple or a pear". Obviously in both cases nothing has changed in the physical situation, but evidently it is our mind that has operated in different ways. What different operations do we do when we use the conjunction "or" or the conjunction "and"? According to Ceccato, when we use "or" our attention, by means of its fundamental selective ability, first focuses on the pear, then it leaves, it discards the pear while it goes to focus on the apple. Exclusion of an object is therefore obtained when we consider the other. Instead, in the case of the conjunction "and", attention, after having focused on the pear, does not discard it, but to the contrary it keeps the pear mentally present while it focuses also on the apple, which therefore turns out joined to the former.
Picture 3 is used to illustrate the analysis of the Italian preposition "*con*" ("with" in English, in most cases). According to this analysis "*con*" indicates that two distinct objects are found in such a relationship that attention is induced to focus them as a unity, together[4].

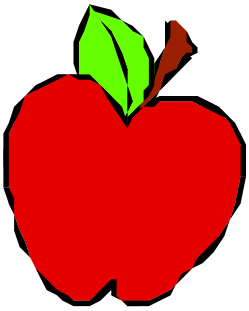
cup with handle to write with pen

Picture 3

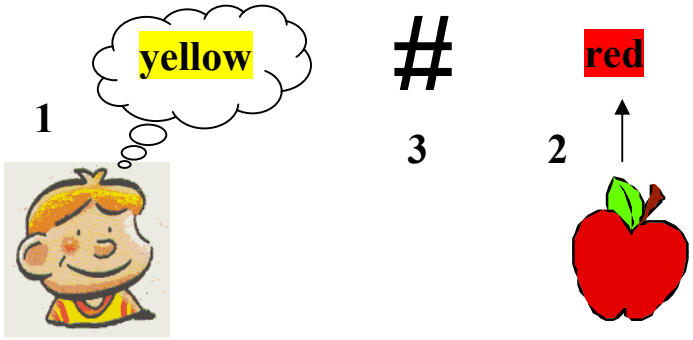
We have to notice that this analysis explains very well the fact that this preposition is used to express both the relationship of company or union between two things and the one of means or instrument between an activity and an object, that is two kinds of relationship that are, from another point of view, rather different (so that some languages, as Latin, and, partially, also English, express them in different ways). In fact, both when we say "cup with handle" and when we say "to write with pen" what appears to our attention are two objects which are distinct but which are in such a relationship that our attention is induced to focus them together, as a unity. In fact the handle is joined to the cup and therefore we see

[4] This analysis has been modified by me: the original analysis was "two things are focused together by attention and then they are divided by it".

them together; and until we watch the action of writing we see the pen.
Let's now look at Picture 4 and suppose someone ask us the question “Is this apple yellow?” which obviously must have a negative answer. Picture 5 shows the operations we do to give this answer. First we imagine the colour yellow, then we look at the colour of the apple (that is red), we do an operation of comparison between the two colours and because this gives as its outcome a diversity, we use the negation. In my opinion indeed negation indicates that an operation of comparison between the representation of a meaning and a second term of comparison gives as its outcome a diversity[5].



Picture 4



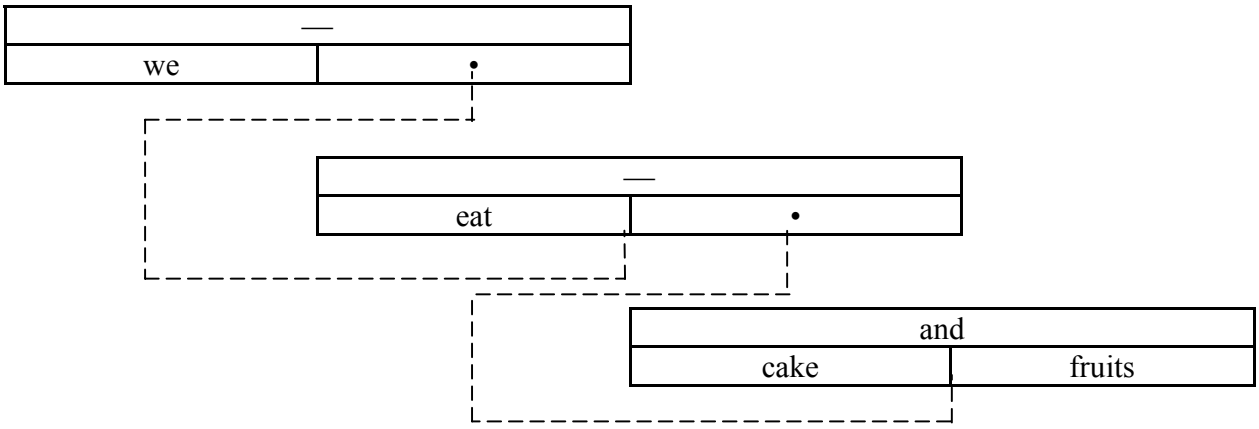
Picture 5

Categories like “and”, “or” and “with” which have the function to put in connection two things are called by O.M. “mental categories of connection” or “correlators” and comprise prepositions, conjunctions and cases (in languages that have cases). The two things connected by a correlator are called “first correlatum” and “second correlatum”, respectively, according to the order attention focuses on them; the whole structure is called “correlation” or “correlational triad” and is schematically represented in the following way:

correlator	
first correlatum	second correlatum

The simplest of correlators consists in keeping present the first correlatum when we add the second correlatum. This is the correlator we use when we relate for instance an adjective to a substantive, or a verb to a subject, or a direct object to a verb. Since this is the most used of correlators, as we can easily understand, it is convenient not to express it with a word and to indicate its presence with the simple sequence of the two words (when this is possible). Because of this it has been called “implicit correlator”.
Correlation is the basic unit of thought. Thought in fact is a network formed by correlations (“correlational network”) in which a correlation acts as a correlatum of another correlation. Therefore a sentence as “we eat cake and fruits”, for instance, has the following structure of thought (the horizontal bar indicates the implicit correlator):

[5] This analysis is partially Ceccato's own and partially my own.



This model of the structure of thought allows us to easily understand why grammarians have always considered the so-called "nouns" a distinct class, without being successful in giving a satisfactory definition of what a noun is[6]. In fact the words of a language are divided into two classes, the first, the words that can occupy only the upper case of a correlational triad (the box of correlator), which are just the correlators (prepositions and conjunctions)[7]; and the second the words that can occupy only the lower boxes (those of correlata), that are the nouns (unless they have particular characteristic, which we can't speak about here because of lack of space, which make them adjectives, verbs or adverbs).
The structure of thought, as we can see in the former scheme, is something similar to a network (that is, some elements are partially temporarily placed one upon another), while the words of a speech have to be pronounced one after the other. Moreover, the three elements forming a correlational triad are not enough, as it can seem at first sight, but three other indications are also necessary in order to specify which place in the correlational triad every single element occupies, for a total of six types of information (in reality four types of information are sufficient because the last one can be understood being obliged, as obliged too is the position of correlators, as we have just said). The fact that thought has a network structure and speech cannot have is a problem that has been solved in different ways. Some languages resort to morphology (in Latin, as an example, flexion of noun indicates, for instance, which is the subject and which is the direct object in a sentence like "pater filium amat", which can in fact be replaced by "filium pater amat" without its meaning changing). Other languages resort to the order of succession of words (in Italian and in English, for example, the two sentences "the father loves his son" and "the son loves his father" have different meaning). Finally, a saving in the amount of words necessary to express a thought is frequently achieved resorting to the shared culture, the knowledge we all possess which makes some information unnecessary (for example in the phrase "some water amount, even small" nothing indicates that "small" is reported to "amount" and not to "water", as instead happens for "cold" in the phrase "some water amount, even cold").
Such cases, not rare, are one of the reasons which prevent us from having good results in translation by computer (another important reason is the fact that many words of a language have more than one meaning and when we translate the choice of the correct meaning depends on understanding context). In fact, one of the reasons why, if we build a translating machine, provided with a bilingual dictionary

[6] According to grammar nouns are the elements of a series of classes we can't nevertheless understand what have in common. However their list does not succeed in being exhaustive (main classes are "persons, animals and things"; then someone felt the necessity of joining "ideas, qualities, quantities" etc.; but there is no reason not to join also, for instance, "feelings, moods, emotions" etc.).
[7] In very rare cases the correlators can occupy the inferior boxes too. However, such cases, which we can't here talk about for lack of space, are generally marked in a particular way.

and based on simple word by word translation, we obtain very unsatisfactory results, is that often it is only understanding context which allows us to decide what other word each word is referred to, that is, to reconstruct the network of correlations of thought (considering for example the two aforesaid sentences, if we had to translate them into a language having cases, as Latin for instance, the two adjectives "small" and "cold" would have to be translated with corresponding Latin words flexed into two different cases, and this choice can be done only if we understand the sentence). *S.O.I.* could nevertheless attend to the problem of translation by computer since the second half of the 50's thanks to a device (that we can't describe here for lack of space[8]) conceived by Ceccato in order to bypass the problem that a machine doesn't understand the text. Nevertheless such a device involves a huge amount of human work before machine programming also for dictionaries done by very small number of words, so that, when, in the mid 60's, funds to the plan stopped[9], it was necessary to abandon it, but not without having achieved, even if in the limits of a very small dictionary, interesting results.
Another occasion in which *S.O.I.*'s theoretical approach showed its fertility was the Lana Project (USA, 70's), a research about the possibility of linguistic communication between man and animal (the female chimpanzee named Lana). Within this research von Glasersfeld created, basing on the aforesaid Ceccato's correlators theory, an artificial language, comprising some mental categories, that allowed the chimpanzee to show having acquired such mental abilities to produce sentences, which were grammatically correct and had a sense, even if they were very simple. Achieved results, beyond demonstrating that chimpanzees have considerable mental abilities, represent also a confirmation of the theory, peculiar of *S.O.I.*, that correlators and, more generally, mental categories play a fundamental role in the constitution of thought[10].
The so-called "mechanical reporter", a project proposed by Ceccato and carried out from 1958 till 1966, was instead not able to proceed beyond its first phases. The "mechanical reporter" would have had to be a machine able to observe and to describe what was happening on a stage where there were seven objects. The project was unsuccessful because of funds stopping but also because, in my opinion, the analysis of mental activity operated by Ceccato was not yet advanced enough to face such an ambitious task.
Lack of techniques of analysis of the structure of mental categories commonly accepted inside *S.O.I.* and such as to carry researchers who use them to univocal and at least partially verifiable results is in fact up till now the main problem research within O.M. has to face.
Analysis of attitudes has instead been less problematic. Its results are in fact widely accepted inside *S.O.I.*. Research was begun and carried out mainly by Ceccato, but recently also Amietta and Magnani have given an important contribution (they have also shown, besides the rest, the possibility of an experimental verification of some analyses of mental categories and attitudes proposed by Ceccato by means of the study of gesture). Marchetti's contribution is important too. Research has been directed to attitudes: aesthetic (including attitudes of some literary genres, as the dramatic, the tragic, the epic one etc.), scientific, comic, of play or work, etc.. P. Parini attended very much to aesthetic attitude and to didactics of art from O.M.. point of view, besides to perception.
Despite the fact that Ceccato's fundamental works have been published between the end of the 60's and

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[8] This device (with some improvements of my own) is described in my article *A device in order to improve the quality of machine translation, based on the correlational theory of thought*. A description of Ceccato's original device can be found in S. Ceccato (edited by) (1969) *Corso di linguistica operativa*, Milan, Longanesi, part II, chapter II (by B Zonta and V. Giuliani).
[9] In 1964, the government sponsors of machine translation in the USA formed the Automatic Language Processing Advisory Commitee (ALPAC), whose report, in 1966, saw no need for further investment in machine translation research, bringing a virtual end to machine translation research in the USA for over ten years [Hutchins W. J., Somers H. L. (1992) *An introduction to machine translation*, Academic Press, London, p. 7].
[10] Glasersfeld E. von (1989) *Linguaggio e comunicazione nel costruttivismo radicale,* pages 167-178, 231-275.

the beginning of the 80's O.M. didn't achieve the wide diffusion it deserved in my opinion[11]. There are many reasons for this and it is not possible to analyse them here. It is, however, opportune to point out the main reason at least, that is, in my opinion, the fact that O.M. has always been presented as a total "heresy" born inside philosophy, which indeed it really is from a historical point of view. Presented in this way it does not attract the attention of most people because they feel it as a thing that, even if "heretically", has something to do with philosophy (a discipline very few are interested in). On the other side, people interested in philosophy, feeling O.M. like just a total "heresy" in regard to their own discipline, tend to refuse it. in a word, a good popularisation work has not been done in my opinion. The recent foundation of the *Centro di Didattica Operativa*[12] *(C.I.D.O.)* in Tito Balestra Foundation in Longiano (Forlì, Italy) and the creation by G. Marchetti of an Internet site

www.mind-consciousness-language.com

are instead two important initiatives in such a direction. This short article goes in the same direction.
As a conclusion of this article I think that it is necessary to supply readers wishing to better know O.M. with a very small bibliography, consisting only of books that can be a good introduction to O.M.. The first book is *Corso di Linguistica Operativa* [A course of Operational Linguistics] (Several Authors, edited by Silvio Ceccato, Longanesi, 1969; only the first 111 pages are fundamental); the second book is *Linguaggio consapevolezza pensiero* [Language consciousness thought] (Silvio Ceccato/Bruna Zonta, Feltrinelli, 1980). Both books are unfortunately no longer printed but can be found in some libraries and, anyway, are available in the library of the aforesaid Tito Balestra Foundation. Some other books which can be an introduction to *S.O.I.*'s theories, which are however in my opinion to be read best after having read one of the two aforesaid books, are: P.L. Amietta, *Dal gesto al pensiero* [From gesture to thought] (Franco Angeli, Milan, 1998); E. von Glasersfeld, *Il costruttivismo radicale* [Radical constructivism] (Società Stampa Sportiva, Rome, 1998); G. Vaccarino, *Scienza e semantica costruttivista* [C*onstructivistic science and semantics*] (Clup, Milan, 1988); F. Accame, *L'individuazione e la designazione dell'attività mentale* [Characterisation and designation of mental activity] (Editrice Espansione, Rome, 1994), with a preface by M. M. Sigiani, which clearly points out important problems in *S.O.I.'*s theories. An unfortunately defective bibliography of *S.O.I* can be found in the Internet site

www.methodologia.it

No updated introductory to O.M handbook is unfortunately up till now available. Such a book has been nevertheless planned and begun by the author of this article. A reprint of Ceccato's fundamental works has also been proposed.

[11] Two facts prove that O.M. really deserved such wide diffusion. First, as we said, cognitive psychology and neural biology of the last two decades have formulated again some of the main hypotheses of O.M.. Second, Artificial Intelligence finds persisting difficulties in the reproduction of the activity of human mind, even in its most simple forms. O.M. foresaw such difficulties and clearly pointed out that its reason is just the lack of a correct description of this activity.
[12] Italian Centre of Operational Didactics.

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