Foundations of Attentional Semantics

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Abstract

Words are tools that pilot attention. As such, they can be analyzed in terms of the attentional changes they convey. In this article, the process by which words produce attentional changes in the subject hearing or reading them is examined. A very important step in this process is represented by the subject's conscious experience of the meaning of words. The conscious experience of the meaning differs from the conscious experience of images and perceptions in that the former lacks the qualitative properties of the latter; moreover, while meanings refer to a whole class of objects or events, images and perceptions do not. The peculiar quality and the context- and object-independent character of this form of consciousness is determined by the kind of elements that constitute meanings: attentional operations. As shown by the psychological literature on attention, and by personal experience, attention can be variously piloted to perform several kinds of operations: it can be oriented, focused at variable levels of size and intensity, sustained for variable amounts of time, each single attentional operation can be variously combined with other attentional operations, forming an orderly, albeit complex, sequence of attentional operations, etc. Each meaning is composed of a specific sequence of attentional operations. This sequence represents the skeleton that supports and allows the conversion or actualization of the meaning into any of its sensible, perceptible instances. It is precisely the presence of the attentional operations that induces in the subjects the conscious experience of the meaning.

The subject learns the meanings of words by focusing its attention on the attentional operations that constitute them. The capacity, here labelled as a meta-attentional one, to isolate the attentional operation constituting the meaning does not entail a secondary process occurring at a different level from, but simultaneous with, the primary process to be analyzed. On the contrary, the analyzing process occurs at the same level - the conscious one - as the analyzed process, but a moment later: the subject becomes conscious of the attentional operations constituting the meaning simply by performing them.

Once the process that makes it possible for words to produce attentional changes is explained, and the kind of components constituting meanings is identified, the foundations of Attentional Semantics are laid: the road to analyze the meaning of words in terms of attentional operations is open.

Keywords: attention, conscious experience, meaning, words, language, attentional operations, semantics

1. Words are tools to pilot attention

As many authors have observed - Vygotskij (1973), Ceccato (1968, 1969, 1970, 1972, 1974), Ceccato and Zonta (1980), Vaccarino (1974, 1981, 1997, 2000), Logan (1995)[1], Karmiloff and Karmiloff-Smith (2001) -, words and language have the function, among many others, of piloting human being's attention (and sometimes also that of animals): they are able to direct it towards

objects, places, events, thoughts, memories, other words, and so on. By piloting other people's attention, we can have them understand our intentions, ideas and worries, force or convince them to do something, and inform them about the dangers of the environment or about the opportunities provided by it.

Obviously, language is not the only way we have of directing other people's attention. We can also use other means: for instance, we can indicate something to somebody by extending our finger towards it, or we can wear certain clothes in order to capture somebody's attention. However, language remains the easiest, most economic and best structured instrument.

That words and language can pilot human being's attention, is evident above all in deictic expressions referring to spatial or temporal elements and relations, such as "The spoon is there", or "The lamp is left of the table". Expressions of this kind, often accompanied by an explicit gesture of the body, serve to show somebody the place where they have to direct their attention, turn their eyes, or direct their action.

Even those kinds of expressions that do not contain deictic elements, but that nevertheless indicate the direction that our thoughts have to take ("Do you remember where you put the key?", "Consider this idea carefully"), or instruct us on what to do physically ("Now, press the button"), testify to the power of language in piloting attention. What we usually do after hearing such expressions, is first of all to address our attention towards the object, idea, thought or whatever else is specified by the sentence: indeed, it is only by moving our attention from where it was to where it is requested that we can accomplish what we are asked for.

Less evident may seem at first sight the influence on attention of those kinds of expressions that neither contain deictic elements, nor seem to give any explicit instruction on the course that our thoughts or actions should take. How could, for instance, a sentence like "a photo of a pond" pilot our attention? What kind of instruction does this sentence give to our attention?

Finally, even less intuitive may seem the action of a single word on attention. Indeed, how could a single word change the direction or the focus of our attention?

On closer analysis, however, we discover that all kind of expressions and, more in general, all words exert some influence on attention. Let us consider, for example, Fig. 1.

[1] "The semantics specify the computational goals that the attention system must satisfy", Logan (1995 p. 169).

Fig. 1

The fact that we can see or describe it in many ways – such as, for instance, “trees”, “a thicket”, “a photo of a pond”, “a nice photo”, “a black and white figure”, and so on – is quite patent. Less patent is the fact that every time we are somehow led, induced or asked to see it in a certain way, we tend to focus our attention only on certain elements of the figure, leaving the others outside of it; besides, and perhaps what’s more, we also tend to relate the focused elements to each other in a way that differs from the way we would relate them if we saw it as something else. For instance, if someone tells us that Fig. 1 represents some “trees”, we will be led to focus our attention principally on the single trees, and to relate each single tree to the others, regardless of some of the elements of the figure, such as the water, the sun’s rays, and so on. If, instead, we are induced to see Fig. 1 as “a black and white figure”, we will be mostly attracted by the contrast and the interplay between these two colours, and we will use the contrast and the interplay as the only basis on which making the various elements of the figure – the trees, the pond, the sun’s rays - emerge.

The power of words to pilot human beings’ attention is clearly evidenced by psychological findings. In an experiment by Jonides and Gleitman (1972), subjects were asked to search for a letter or digit target embedded in either letter or digit distractors. Previous experiments had shown that when target and distractors were of the same category, reaction time increased with display size; when target and distractors differed, reaction times were independent of display size. The interesting manipulation by Jonides and Gleitman was to use the very same physical target stimulus (the symbol O) as either a letter or a digit (the target was presented to subjects as a digit “zero” or as the vowel “o”). So while the featural properties remained exactly the same, the category membership could be changed. Jonides and Gleitman found that depending on whether subjects were told to search for the vowel “o” or for the digit “zero” the physically identical figure behaved either as a letter or a digit. Naming the identical physical stimulus in one way rather than in another one makes the subject move its attention according to the instruction conveyed by the word, and consequently perceive it differently.

Conversely, Gentilucci et al. (2000) found that different words such as "near" and "far" taped on a small wooden bar located either near or far from the subject modulated the kinematics of the subject's reaching behaviour: both in the near and far condition, reach was faster and slower when, respectively, the words "far" and "near" were printed on the target. Moreover, the grammatical class of the words – adjectives or adverbs – differently affected visual analysis and motor control: adjectives ("high" and "low") influenced visual analysis of target-object properties, whereas adverbs ("up" and "down") more directly influenced the control of the action. In other words, words and grammar, piloting the subject's attention, influence its perception of the target, and consequently the kinematics of its action.

By saying that words and language pilot our attention, I do not intend at all to imply that only they can do this. As I have said before, many other communication systems have been created in order to convey instructions on how, when and where to move attention. Some instances are the various artistic genres - plastic and figurative arts, music, cinema, dance, architecture, etc. -, fashion, advertising, scientific notation, mathematics, logic, and so on. Despite some of them (such as music: see Negrotti, 1996) have reached such a point of formalisation as to become real languages, natural languages hold supremacy over them in terms of usability, economy and potentiality.

Neither is my intention to contend that only a structured language or communication system can drive our attention: we all experience daily occasional, random events, images, smells or sounds that make our attention move from where it was towards new courses, and consequently make us perform actions, have ideas, feelings, and so on. Moreover, it sometimes happens that we have a feeling or an idea that we would like to communicate to someone else, but for which we cannot find the adequate words or expression: which shows that language is not the only possible way of conveying instructions on how to move attention[2].

Nor even do I deny the possibility that we can autonomously pilot our attention without the intervention of external stimuli, whether words, sounds or others: as a matter of fact, we can move or focus our attention in consequence of a completely subjective, personal decision, or of an act of will. In this case, we generate the stimulus by and within ourselves, simply by thinking about what to do, or imagining how the situation can evolve.

What I maintain, on the contrary, is, first, that our attention can be controlled and directed; second, that this can be done either through an external stimulus, or through an internal one; and, third, that such stimuli can be either structured or unstructured. The movements of our attention can

[2] More in general, language does not represent the only form human beings as well as animals have for organizing and processing their conscious mental activity: images, perceptions and rudimentary forms of thought are only some instances of the alternative possibilities. On this issue, see Gambarara (1996).

be caused by what someone else says to us, as well as by what we say to ourselves; but they can also result from the action of artificial languages, as well as from unstructured stimuli such as an unknown, abrupt sound, or a new, sudden emotion. Nevertheless, natural language remains the most common, favourite tool human beings use to influence each other's attention and their own.

2. The foundations of Attentional Semantics

If words have the power of piloting human being's attention, then it is possible to study and analyze them in terms of the attentional changes they convey. This implies addressing three main kinds of problems. First of all: How do words pilot human being's attention? What is the process that makes it possible for words to produce attentional changes? Understanding this process will give us the possibility of identifying its main elements and steps, thus allowing us to answer the second kind of question: How is the specific instruction that each word conveys and that affects the human being's behavior coded? What are the key components of this code? Obviously, being able to answer these questions will in turn allow us to face a third kind of problem, the identification of the instruction conveyed by each word and its differentiation from the instruction conveyed by the other ones.

In this paper, I will focus on the first two kinds of problems. Solving them, means laying the foundations of a new kind of semantics, which I have chosen to name *Attentional Semantics*. Solving the third kind of problem, instead, is the specific aim of Attentional Semantics.

2.1. How words pilot attention

In this section I will try to describe the process by which a word or a sentence pilots our attention when we hear or read it. To accomplish this task, I will resort to the theory of consciousness I have developed (Marchetti, 2001). The process will then be described in terms of the sequence of conscious and unconscious operations we have to perform in order to understand the meaning of a word or of a sentence.

2.1.1 Conscious expectation

Usual descriptions of such a process do not take a very important step into account: the perception of sounds and images as "words". The process by means of which we get to perceive words, rather than inarticulate sounds, noise or something else is usually neglected. It is taken for granted that

right from the beginning we perceive "words", that is, sounds and images that are grouped into well formed and structured assemblies. Why, when and how it happened that those inarticulate sounds and images were assembled into units known as "words" is usually not investigated[3]. Neglecting this step has the consequence of overlooking the importance that awareness has in the process of perceiving and understanding sounds and images as words, and not as bare sounds and images, or as something else. Indeed, only by being aware that what we are going to hear or see are words, can we predispose ourselves to perceive and categorize sounds and images as "words", that is, as something that has a meaning and that has to be processed as such. The fact that, after hearing or seeing a certain word, we mentally process it in a specific way so that its meaning emerges in our consciousness, is a direct consequence of having the expectation that what we are going to perceive is a word.

The importance that conscious expectation has in perceiving and processing certain inputs as words rather than something else, can easily be grasped if we imagine a situation where an object that is usually perceived as such (for instance, a stone), has to be considered instead as a word or a sign having a precise meaning (for instance, "Be careful, here there is a danger"). In this situation, only if we are conscious that what we are going to see is not simply a stone, but something functioning as a word or as a sign, will we mentally process it in such a way as to make its additional meaning emerge in our mind. If, on the contrary, we do not expect any particular meaning from the stone, the former will go unnoticed.

There are instances that would seem to contradict the importance of conscious expectations. Sometimes, as shown for example by the cocktail party effect, it may happen that attention is captured by a meaningful word, such as our name, despite the fact that we do not expect it or have any intention toward it. These occurrences could be taken as evidence that we do not always necessarily have to be aware of what we are going to perceive, in order to correctly understand what we will perceive. However, it is important to note that such experiences take place in specific contexts in which, even though we do not expect to hear or see that word *in particular*, nevertheless we actually expect to hear or see words *in general*: it is just this broad expectation induced by the specific context that facilitates our understanding meaningful, unattended words.

Therefore, to correctly describe the process by which a word or a sentence pilots our attention when we hear or see it, we must not overlook the role played by our conscious expectations. Indeed,

[3] Obviously, the same line of reasoning also applies to any other kind of perception, included "inarticulate sounds and images". Actually, what we perceive are not "inarticulate sounds and images" in themselves: what we perceive are "inarticulate sounds and images" insofar as we mentally and perceptually construct them as such. I have used here the expression "inarticulate sounds and images" just as an exemplification, but any other expression would fit as well: "input", "noise", and so on. What we perceive *are* not "words" or "inarticulate sounds and images": they *become* "words" or "inarticulate sounds and images" after our perceiving or mentally conceiving them as such.

it is precisely the kind of expectations we have that predisposes our mind and body to operate in a certain way, guiding our way of perceiving, conceiving, and mental processing. The role played by expectations in guiding attention is investigated by La Berge (1995). He observes that expectations induce a specific form of attention, namely "preparatory attention", which has the property of shortening the reaction time to the expected event, making the processing of the relevant information more effective when the event eventually occurs. Preparatory attention, being marked by rapid fluctuation within a period of a few seconds, cannot be sustained over long periods of time, particularly when high levels of attention are involved. Therefore, to maintain active attentional preparation of an event over time, an independent mechanism is required able to remain comparatively stable over long periods of time. This mechanism is represented precisely by expectation. According to La Berge, expectations can be assumed to be expressions of memory: "An expectation is an item stored in long-term or working memory that codes an event in terms of its attributes and its spatial and temporal characteristics" (La Berge, 1995, p. 51). When a subject voluntarily decides to sustain an appropriate level of activity over time, the relevant representations are stored in working memory, which is refreshed by long-term memory from time to time.

Let us now proceed with the next steps of the process of word comprehension.

2.1.2. The conscious experience of meanings

Once we have consciously perceived the physical side of the word or sentence, that is, its acoustic or graphic form, the result of the perception is sent to the schema of self. In my model (Marchetti, 2001), the schema of self plays a double role. On the one hand, it provides us with a hierarchy of principles, goals and rules necessary to guarantee our existence and development; at the top of this hierarchy there is the fundamental principle of survival that can operationally be so expressed: "operate in order to continue to operate". On the other hand, the schema of self embodies all the kinds of competences and abilities – linguistic, social, physical, and so on – we innately possess or have acquired during our life up to that time. The schema of self, whose working is unconscious to us, is constantly fed with, and updated by, what we consciously perceive. The information provided by conscious perception constitutes the basis on which the schema of self works to issue the instructions for the actions we have to perform afterwards.

Despite the fact that the working of the schema of self is unconscious to us, when it processes a word or a sentence it leads nevertheless to a conscious outcome. When we hear a certain word, for instance "cat", what we are aware of is not so much the processes that are taking place inside our brain and that make us understand the meaning of the word "cat", remember or imagine a cat, think

about it or look for it, as the meaning of "cat", the recollection, image, thought or perception of the cat itself: that is, the word "cat" produces in us certain unconscious processes that in turn produce a conscious experience of a cat, either in the form of a meaning, a recollection, an image, a complex thought or a perception of a cat.

How can an unconscious process produce a conscious experience? I think that only by acting on attention can an unconscious process produce a conscious experience. As I have tried to show (Marchetti, 2001), attention is not only the main gateway to consciousness, but is also mainly responsible for the phenomenal and subjective quality of our experiences and perceptions, that is, for the fact that we actually understand meanings and have feelings, thoughts, recollections and sensations. There cannot be consciousness without the previous engagement of attention (Mack and Rock, 1998).

Each word or sentence conveys, through the working of the schema of self, a specific instruction for attention. As a consequence, each word or sentence, when heard or read, induces in us a conscious experience of some kind. The first, most common and foremost conscious experience we have after hearing or reading a word or a sentence, is certainly its *meaning*. When hearing or reading a word or a sentence, the first thing we have in mind is its meaning. If this does not occur, for instance because we have not caught what has been said, or because the meaning of a certain word is unknown to us, then we feel immediately that we are lacking something: a feeling that sometimes can even assumes the form of a true disappointment, frustration or impotence, so usual is it for us to be aware of the meaning of words after having heard them.

Such a kind of awareness and the relevance that it has to our correctly understanding words and sentences is also very evident in all those instances where words and sentences can be interpreted in more than one way. For example, the sentence "I live near the bank" can be interpreted in at least two ways, depending on whether "bank" is taken to mean "the building where you can keep your money safely", or "the land near the river". Let us suppose that someone tells us that they live near the bank, intending "near the river", whereas we understand "near the Chase Manhattan Bank". When we realize that we have misunderstood what they meant, we experience a switch in our consciousness: what was present in our mind and what we were aware of until a moment ago, is no longer present and has now been substituted by a new entity. Now we are aware of a different meaning: we feel that our consciousness is "filled" (La Berge, 1995) with a new object. It is precisely the experience of such a substitution that reveals the presence in our consciousness of the meanings of the word "bank". By the way, this same experience of a switch in our consciousness testifies to the internal consistency of conscious experiences (Baars, 1988): we are not able to consciously entertain more than one thought, idea, or perception per unit of time. As the classical

experiences with the Necker's cube, Ames' room or Rubin's figure show, consciousness gives rise to a unique, selective, and unitary content, however complex it may be: we cannot be conscious of two objects or think of two alternative ideas at the very same instant.

There are also other occurrences that clearly put on view the conscious existence of meanings, even if it is not specifically occasioned by words. Think of all those cases in which we realize that an object, which usually does not possess other meaning than the one conveyed by the word identifying it, suddenly acquires a particular, new meaning. For instance, a hat is usually seen as a hat: it conveys no particular meaning other than that of being a hat, that is, "a covering made to fit on the head, usually worn out of doors". However, it may happen that someone uses a hat as a sign to represent or indicate something particular that has nothing to do with the usual use of a hat. Let us suppose that criminals use hats to mean: "Pay attention, cops are here". If we do not know that hats can also have such a meaning, we will continue to see and consider them as usual. But when we get to realize that they also have that meaning, we experience a sudden change in our conscious state: the original and usual meaning of hat is now substituted by the new, particular meaning. The hat no longer refers to itself, but to a specific meaning. The conscious perception of the hat gives rise, and leaves room, to a new conscious presence: the consciousness of the meaning assigned to hats by criminals.

Think also of all the occurrences in which a tip-of-the-tongue state is experienced. Suppose we try to recall a forgotten name, or have an intention to-say-so-and-so but we do not find the right word. We are fully aware of what we want to say, of its meaning, even if we do not remember the corresponding word or words. As argued by Baars (1988), this state resembles very much any other conscious state: when occurring, it excludes other conscious contents; it is interrupted by incompatible conscious events; it stops dominating our limited capacities when the right word is found; it must be a complex state, like a mental image or a percept, since it implies our ability to accurately detect matches and mismatches of the candidate word. However, in one respect, the tip-of-the-tongue state differs from all other conscious states: it does not have the experienced qualities – like colour, size or warmth – of feelings, mental images, and perceptual experiences.

Denying the fact that we consciously experience the meaning of words would be tantamount to denying the fact that, more in general, we have conscious perceptions, images, ideas, and so on. Understanding the meaning of a word or sentence implies consciously experiencing such a meaning: that is, feeling it in, and by, our mind, having a phenomenal experience of it - however empty, poor or limited such experience may seem -, and consequently being able to differentiate it from other meanings. If we do not have such a subjective experience, we cannot be said to have understood the meaning of the word or sentence, as we cannot be said to have seen or heard a

certain object if we have not consciously perceived it. What shows that we are conscious of something, whether a meaning, a perception, or anything else, is precisely the fact that we can recognize it and distinguish it from other things. If someone presents us with a banana, and if we say that we see a banana, and not an apple or something else, then we can satisfactorily be considered to be conscious of the banana; likewise, if someone tells us that he has eaten a "banana", and if we understand that he has eaten a banana, and not an apple or something else, then we can satisfactorily be considered to be conscious of the meaning of the word "banana".

Anyway, consciously experiencing the meaning of a word or sentence is not the same thing as consciously perceiving, or imagining an object. The phenomenal experience we have in the former case is different from the phenomenal experience we have in the latter one. When consciously perceiving an object, we have a qualitative experience that differs radically from the experience we have when we are conscious of the meaning of a word. If a friend tells us: "I have bought a car", we can understand perfectly what he means without having to consciously perceive or imagine the car he has bought, its colour, size, etc. It may happen that after hearing such a sentence we imagine the car, but our comprehension of the sentence is not strictly dependent on imagining the car. Meanings are experienced differently from perceptions and images: the former do not necessarily have the same rich, clear, concrete qualities of the latter. Whereas perceptual and imaginal experiences are characterized by rich qualitative properties, such as colours, textures, size, location, and so on, meanings are not. Compared to images and perceptions, meanings are, so to say, immediately perceptible: to understand the meaning of a word or sentence, it is not necessary for us to mentally represent them by means of images or other more concrete sensory modalities.

What characterizes the conscious experience of a meaning can be considered a simple feeling in comparison with the qualitative richness and complexity of perceptual and imaginal experiences. However, such a simple feeling conceals a huge and complex knowledge: each meaning is like a door ready to be opened onto an entire net of relations, images, sounds, emotions, and so on. After having understood the meaning of a word or sentence, it is possible for us – if we have enough time at our disposal to do so - to have other kinds of conscious experiences connected or associated with such a word or sentence. After hearing the word "cat", we can, for instance, imagine, think about, have an idea of, or perceive a cat. The subjective, conscious experience of the meaning of the word "cat" enables us - provided we have the necessary time - to go beyond the experience of the pure, strict mental meaning of the word, and have different conscious experiences, such as imagining or thinking extensively about a cat. The "simple" consciousness of the meaning of a word thus reveals a deeper and more articulated reality than what may appear at a first glance.

What are the features that make all meanings share a common conscious form, and that distinguishes them from images and perceptions? What is it that makes us experience and recognize meanings as meanings, images as images, and perceptions as perceptions, without mistaking one for the other? Intuitively, the basic difference between, on the one hand, meanings and, on the other hand, images and perceptions lies in the two following factors:

a) the absence in meanings of any qualitative property peculiar to sense-organs or the somatosensory system: we can understand the meaning of the word "yellow" perfectly well, without having to actually perceive or imagine the colour;
b) meanings do not refer or apply to just one thing, occurrence or event, but to a whole set of things, occurrences or events. The meaning of the word "horse" applies to all sorts of horses, independently of their sex, race, age, and so on; likewise, the word "and" applies to different contexts, independently of the entities or events that it connects[4].

Images and perceptions, on the contrary, do possess such qualitative properties; furthermore, each image or perception refers to just one specific thing, event or occurrence.

But how can we be conscious of something that has no such qualitative, sensory form? How can a similar form of consciousness, context- and object-independent and lacking all the features of what is usually perceived through our senses, exist? According to Baars (1988), the language of consciousness is based on a perceptive, imaginal, spatio-temporal *lingua franca*: this implies that whenever we think about, or have an idea, a concept or a notion of, something, we can do this only through images, sounds, colours, sensations, emotions. What cannot be perceived or felt cannot be thought about or thought of either: however abstract a thought may be, it must be composed of perceptible, sensible elements in order to be consciously experienced. However, as we have seen, it seems undeniable that we do have conscious experiences of meanings, notwithstanding that such experiences do not have the qualitative and phenomenal properties belonging to images and perceptions originated by our sense-organs or somatosensory system[5]. How, then, can the peculiar

[4] Apparently, proper names seem to be an exception to this rule, since they refer to only one specific individual. However, if we consider the fact that what we usually see as an individual undergoes continuous physical, cultural and psychological transformations, we will realize that the individual can also be seen as a collection of single and unique entities, each one being different from the others. The name "Pablo Picasso", for instance, refers both to the young artist who painted the pictures of the Blue Period and to the mature artist who created the works of the Cubist Period. Therefore, in this respect, proper names can be considered equal to all other words.

[5] In Marchetti (2001), I had not sufficiently studied in depth the matter, and my position was substantially similar to Baars': I too believed that the only form consciousness could have, was that peculiar to, and originated by, the sense organs and the somatosensory system. This belief was due to a superficial investigation from my side. Actually, as we have seen, this position turns out to be false at a closer examination.

kind of quality and the context- and object-independent character of this form of consciousness be accounted for?

In my view, a solution can be found if we consider the way in which meanings take form. But this leads us to the second kind of problem posed by the foundations of Attentional Semantics: the identification of the code that embeds the attentional instructions conveyed by words. In the following section, I will analyze how meaning forms, and what its main elements are.

2.2. Meaning as attentional instruction

2.2.1 The essential components of meanings: the attentional operations

As we have seen, two fundamental features distinguish meanings from images and perceptions: the absence of the qualitative properties characteristic of the sense-organs and the somatosensory system, and the fact of representing, and being applied to, a whole class of objects or events. Therefore, in order for meanings to form, it is essential that the subject selects and combines the invariable elements that, independently of any individual, specific image, perception or experience, compose the meaning of each word: that is, the invariable elements that are at the core, and are responsible for the production, of any instance of such image, perception or experience. These are exactly the elements that make the meaning of, say, the word "horse" identify something that is and remains so regardless of its age, race, dimension, the angle from, and the period in, which it is observed, and so on.

Obviously, as we have seen, these elements cannot have any of the qualitative characteristics derived from the sense-organs or the somatosensory system: they must be, so to say, "abstract". Actually, these elements are not perceptible representations like images, movies, sounds, smells or photos, but operations: precisely, they are the *attentional operations* that the subject must perform if it wants to understand the meaning of what has been said, if it wants to express a certain meaning, or if it wants to produce the images, perceptions or experiences corresponding to such a meaning. These attentional operations represent the skeleton that supports and allows any conversion or actualization of the meaning into a sensible, perceptible form, whether an image, a perception, or whatever. There are many instances of, say, a "horse", many perceptible forms that correspond to the word "horse"; nevertheless, only some kinds of operations are indispensable for the subject's seeing, imagining or perceiving a horse, and these are the attentional operations the subject has to carry out if it wants to get a perceptible form of a horse. In fact, to see a horse, the subject must at least direct its attention to its own eyes, focus on the scene, move its attention to scan the scene,

discard what lies in the background, retain the foreground, combine the results of the single attentional operations - colours, forms, smells, etc. -, and so on. This is the kind of essential operations the subject must perform when seeing a horse. As such, they do not possess in themselves any perceptible quality characteristic of the sense-organs or the somatosensory system, even if, when performed, they can produce qualitative, perceptible results[6].

The subject gets to identify such attentional operations while learning words by focusing its attention on, and retaining in its memory, those aspects it has been said to pay attention to. The subject learns most of the words during its childhood and adolescence thanks - but not only - to what its parents, relatives and teachers teach it, showing, describing and exemplifying - first by means of gestures, and then by means of other words - the objects to which they apply, the situations and events in which the words are used, how they relate to each other, and so on. By doing so, the adults attract, pilot and direct the subject's attention, making it examine, isolate, combine and retain only those attentional operations that are essential to the formation of the meaning. An example of how adults attract and pilot the subject's attention while using words is given by Ceccato (1968, p. 38):

> L' "o" mostra nel modo più chiaro una struttura attenzionale. Bisogna che l'attenzione, dopo essere stata applicata ad una cosa, passi ad un'altra, abbandonando la prima. "Vuoi il cioccolatino o la caramella?", etc., diciamo al bambino. Intanto gli sottraiamo alla vista l'una delle due cose; ed egli impara. (The "or" shows an attentional structure in the most patent way. It is necessary that the attention, after being engaged on an object, is disengaged from it and addressed to a new object. While asking the child: "Do you want the chocolate or the sweet?", etc., we remove one of the objects from his view, and he learns).

The subject can also learn the meaning of a word by simply reading the definitions given by dictionaries, or through the verbal explanations given to it by other subjects. In this case, the subject identifies the attentional operations that form the meaning of the new words by means of the meanings it already knows. The known words pilot the subject's attention, helping it in identifying the essential attentional operations that constitute the meaning of the unknown words. Also this way of learning words can thus be explained in terms of an attentional activity of identification of the attentional operations forming each meaning.

Therefore, learning the meaning of a word can be described as a meta-attentional activity: a working of attention on the attentional operations that have to be performed in order to produce that meaning. Such working includes not only the focusing of attention on the relevant attentional operations that constitute the meaning, but also the combination of such operations into a single

[6] The observation of the existence of imageless, not made up of sensory material conscious experiences is certainly not new. The polemic between the psychologists of the Würzburg group and those of the Cornell group at the beginning of the last century gives clear evidence of the importance of such observation (see Humphrey, 1951). In my view, what is

new whole, and the storing of the new whole in memory. This new whole formed by the meta-attentional activity produces, as any other attentional activity, a conscious experience: the conscious experience of the meaning. However, unlike the other attentional activities, this new whole produces a conscious experience that has a new form: the context- and object-independent and qualitatively peculiar form of meanings.

As the psychological literature on attention shows, and as anyone can personally and directly ascertain on oneself, attention can be variously piloted to perform several kinds of operations. This is a list of the most common ones:

- it can be oriented, an operation this that can in turn be divided in three elementary operations:
    - engaging on a target,
    - disengaging from it,
    - and then shifting to a new target (Posner, 1980, 1994, Posner and Cohen, 1984);
- it can be focused at variable levels of size, being set either widely across a display of objects or narrowly to the size of a single object (Jonides, 1983);
- it can be focused at variable levels of intensity (La Berge, 1983);
- it can be sustained or maintained for variable, though limited, amounts of time (La Berge, 1995);
- it can be addressed to an object or feature A, and then suspended momentarily from it, but in such a way as to keep or maintain it, as it were, in the background for a certain time, while simultaneously operating on a new object or feature B. It thus makes it possible to perform several kinds of operation such as comparing A and B, referring A to B, constructing A using B as a model, evaluating A on the basis of B, and so on[7].
- each single attentional operation can be variously combined with other attentional operations, forming an orderly, albeit complex, sequence of attentional operations (the complexity of the sequence can vary both for the quantity and the type of operations involved);
- a sequence of attentional operations can be integrated into a new single item to be stored in memory, a phenomenon known in psychology as *chunking* (Miller, 1956).

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new is the explanation of the context- and object-independent quality of the consciousness of meanings in terms of attentional operations.

The meta-attentional activity the subject performs when learning the meaning of a word consists precisely in determining which of these operations are necessary to produce that meaning, how they must be used, the sequence in which they must occur, how they have to be combined, and so on. It must be noticed anyway that this list of operations does not exhaust all the possible aspects the subject has to pay attention to if it wants to learn the meaning of words. To this list we must add, for example, also those features of attention that cannot be voluntarily controlled by the subject, and that are independent of its will: instances of these features are given by Mach (1886) when he speaks of the organic consumption of attention in waking hours, which would be at the base of the sensation of time, and by Ribot (1889) when he points out the intrinsically intermittent and rhythmical character of attention[8].

As I have said, the kind of phenomenal experience we have when monitoring our attentional operations is different from the phenomenal experience we have when perceiving something through our senses, or forming a mental image of something: for instance, the former does not certainly possess the rich qualities of the latter. Nevertheless, it has its own perceptible quality, however poor it may seem. When controlling our attention, we clearly feel this quality: we feel that we can pilot our attention at will through the various parts of our body, move it freely from one side to another, set it widely across a large region or narrowly to a small point, and so on. The piloting of attention can obviously lead us to be conscious of the products resulting from applying our attention to our sense organs or to our somatosensory system. If, for instance, we move our attention from where it is to the tips of our toes, most probably we will feel the physical contact with the socks or the shoes. However, this feeling is consequent upon moving our attention, and does not coincide, and must not be confused, with the feeling of moving attention itself: moving our attention to or from a sense organ is one thing, perceiving through that sense organ is another.

2.2.2. The meta-attentional activity

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[7] As shown by Treisman and Gelade (1980) and Treisman (1982), attention has the fundamental function of combining and integrating the features or properties of objects. It is precisely this function that allows subjects to experience coloured shapes as opposed to pure shapeless colours or pure colourless shapes.

[8] In my view, an author who assigning a basic role to attention in concept formation comes very close to my view of how meanings form is Barsalou (1999). He puts forward a perceptual theory of knowledge with the aim of giving a functional account of how the brain can implement a conceptual system using sensory-motor mechanisms. At the core of his theory there is the concept of "perceptual symbol": a perceptual symbol is a schematic representation of the neural activation that arises during perception. The integration of many perceptual symbols leads to the formation of a "frame", which in turn constitutes the core of a "simulator" or concept. The point is that, according to Barsalou, perceptual symbols form thanks to two fundamental properties of selective attention: selective attention a) isolates information in perception, and b) stores the isolated information in long-term memory. Barsalou assigns then a fundamental role to attention in concept formation. Unfortunately, he does not proceed any further in his investigation into the way attention plays such a role.

The meta-attentional capacity is a basic ability that we human beings possess. As such, obviously, we use it not only to learn meanings of words but also to perform numerous other kinds of activities: from the simpler ones, like those responding to requests such as: “Pay attention to what you are doing”, “Pay attention to what he says”, or: “Try to remember what you did yesterday”, to the more complex ones, like those involved in learning how to drive, or in accomplishing difficult jobs. If we want, for instance, to learn a difficult task or job, we have to rely, first of all, on our capacity to focus our attention on its most relevant features or steps, and, secondly, on our capacity to repeat or reproduce them. All these capacities entail the more basic ability to monitor and control our attentional operations. Indeed, only by being able to understand and decide how, where and when we have to move our attention, can we, for instance, drive a car correctly.

Despite the presence of the prefix “meta-”, I do not consider this ability as a secondary process occurring at a different level from, but simultaneous with, the primary process of attending. On the contrary, I consider it to occur at the same level as the analyzed process - that is, at the level of consciousness -, but a moment later than it. Indeed, it would be impossible for us to keep our attention focused on it (our attention) while it is operating, without destroying its very operations. Our consciousness arises from what we attentionally do. If we perform a certain attentional operation, we will be conscious of a certain thing; if we perform another attentional operation, we will be conscious of another thing. Identifying the attentional operations that are essential to perform a certain activity implies, initially, setting our mind focusing on those operations, and, subsequently, performing them. We can identify them because we become conscious of them, and we become conscious of them because we perform them. We get to identify in a similar way the essential physical movements that we have to make in order to perform a certain activity. First, we have to focus our attention on the limbs that have to perform those movements; then, we become conscious of the movements simply by making them. To feel our limbs or our attention moving, there is no need for us to be conscious that we are conscious of the movement, but only to make it.

Many authors sustain in their theories that the ability we human beings have in general to self-monitor and self-control our activities – whether attentional, perceptive, or else – requires the existence in our brain of a particular device, circuitry or process, such as Armstrong’s self-scanning, or Dennett’s print-out components, higher executive and Control components. The device or process would enable us to perform introspective acts, to observe our own thoughts and ideas, etc. According to these theories, introspection corresponds to a secondary process of self-monitoring or self-scanning occurring at the same time as, but at a different level from, the primary cognitive activities to be monitored. As shown by Lyons (1986), many objections can be put forward against the hypotheses based on the existence of two parallel and simultaneous processes. Probably, the

most famous one was that raised by Comte (1830-1842): given that the subject observing and the object observed are identical, how can observation take place? Brentano (1874) also argued that it is not possible for us to focus our attention directly on our mental processes, because, by so doing, we would divert from them the very attention that is necessary for their existence. Observing directly our mental processes would imply destroying them at the very moment in which the observation takes place, thus making it useless.

Different but no less heavy objections have been raised also against the explanations of introspection given by materialists, physicalists and functionalists: How do we know that our monitoring system really monitored what had to be monitored? Even supposing that the monitoring system really monitored what had to be monitored, how do we know that it monitored everything, and in the right way? I believe that all these objections can be ascribed principally to only one common cause: the intrinsic and unbridgeable dualism underlying the theories that explain introspection by resorting to the existence of two parallel and simultaneous processes. The dualism underling these theories may have different forms: mind and body, conscious and not conscious, the subjects observing and the object observed. However, all these forms can be reduced to a fundamental one: known and unknown (or, to be known). The theories based on this dualism tend to see introspection as an act of knowing that, by means of some sort of device or process, would make it possible to know what was not known, and to bring to consciousness what was not in consciousness. This act of knowing would be carried out through a process split in two different, but simultaneous levels: on the one hand, there would be the activity to be known or introspected, and, on the other, the activity of knowing or introspecting. Needless to say, the splitting of the process in two parallel, simultaneous levels reflects the dualistic nature of the various theories of introspection. All the attempts to explain introspection on this basis are bound to fail because of the unbridgeable rift originally created by the dualism. As Lyons' arguments show, there is no way of ascertaining if the subject introspected really what had to be introspected; there is, as well, no way of explaining how the subject can be both the observer and the object to be observed at the same time; and so on.

As this way of conceiving introspection poses unsolvable problems, Lyons (1986) discards any hypothesis of a secondary process of monitoring, parallel and simultaneous with the primary process to be introspected, and suggests seeing introspection as a way of building or constructing a model of our mental life by means of imagination and perceptual memory. According to Lyons, introspection is a process taking place at the same level as, but a moment later than, the processes to be introspected. According to him, memory and imagination would not so much make an exact copy of the original experience, as "replay" or reactivate it anew.

Indeed, there seem to be enough reasons to believe that introspection is a kind of replaying by means of memory and imagination. If we consider what we do when, for instance, we have to learn a new activity, we see that usually, firstly, we address our attention to its main relevant steps, fixing it on them; secondly, we try to repeat them one by one; thirdly, we try to coordinate these steps. The last two operations can really be seen as ways of replaying or reactivating those steps by means of memory and imagination. The case in which we try to remember what we did in the past shows as well how much introspecting resembles replaying: indeed, whenever we try to remember something, we can be said to have replayed or reactivated it in and by our consciousness.

To account for the introspective ability, however, I think that we must not rely only on memory and imagination, as instead Lyons does. While completely agreeing with him on the fact that introspection does not consist of a secondary process of monitoring, parallel and simultaneous with the primary process to be introspected, I think however that we have to take a more fundamental psychological ability into account, namely attention. Despite explicitly referring to the human being's attentional capacity several times, Lyons does not seem to assign it the importance it really has in our replaying or reconstructing our cognitive activities. Attention is necessary for both memory and imagination: to remember or to imagine something we have to focus our attention on it in a certain way. Remembering and imagining are the result of a specific way of focusing and using attention. Evidence is given by the fact that the same thing – for instance, an event that happened to us during our childhood - can be seen either as an "image" or as a "recollection", depending on how we attentionally construct it. To imagine something, we have to focus our attention on the sensory information stored in our memory, whereas if we want to remember something, we do not only have to focus our attention on the stored information, but also attentionally categorize it as a past experience as opposed to a present one[9]. Attention plays then a more fundamental role than memory and imagination, and as such deserves a higher consideration.

Any specific way of using attention gives rise to a specific "mental construct" or "piece of reality". If we use it in a certain way, we will say that we have remembered something; if we use it in another way, we will say that we will have imagined something; if we use it in another different way, we will say that we have thought about something; and so on. Likewise, if we use attention in a certain way, we can say that we have seen a "man"; if we use it in another way, we can say that we have seen a "friend"; if we use it in another different way, we can say that we have seen an "enemy". When, in order to learn the meaning for instance of the word "horse", we try to identify and select the essential elements or attentional operations that, independently of any specific occurrence, characterise it, as a matter of fact we are giving birth to a certain mental construct,

[9] On the notion of "recollections" as products of attentional activity, see Ceccato and Zonta (1980).

namely, the mental construct known as “the meaning of the word horse”. Obviously, this piece of reality differs from the other ones where horses are obtained by using attention in a different manner, such as the horse we effectively saw when we went to the country, or the horses represented in a picture by Manet. Nonetheless, it shares with them and with any other piece of reality the common property of being originated by the same mechanism, that is, the working of attention.

Conceiving memory and recollections (but also all the other mental constructs) as products of the way in which the subject uses its attention, patently implies being very far from, and refuting, the traditional view of the mind based on the metaphor of the computer. According to this metaphor, recollections are the products of a system, termed “memory”, designated to store information representing objects and events of the world, and allow its retrieval. The information would be codified in the language of the computer, and the representations would more or less faithfully reflect the essential features of such objects and events.

The limits of this representational notion of memory and recollections have been widely shown in Rosenfield’s (1988), Edelman’s (1989), and Edelman and Tononi’s (2000) works. To be properly stored and retrieved in such a kind of memory, information should be coherent, properly codified, and not be ambiguous. However, since the signals coming from the world are ambiguous, context-dependent, and not previously codified, a representational notion of memory turns out to be inadequate. To cope with these signals, the animal or human subject must be able to continuously categorize them, both when perceiving and memorizing them, and refer these categorizations to its past experiences. According to Edelman and Tononi, only a Darwinist theory of mind, implying a non-representational, dynamic, and adaptive view of perception and memory, would be able to supply a proper explanation of how the world is continuously recategorized by the subject.

In my view, however, also Edelman and Tononi’s theory presents a major fault. While being more adequate to explain the recategorization process than the representational theory, it does not seem able to explain how it is possible for the subject to see and conceive what is going on in its consciousness – for instance, an object related to its childhood - as a “recollection” rather than an “image”, a “thought”, a “vision” or something else. In fact, the subject can say not only that it is “remembering” that object, but also “imagining” it, “thinking” it, etc. This possibility depends mainly on the way in which the subject attentionally constructs the object, and it implies not only a different labelling of the object, but also a different way of perceiving, seeing, and conceiving it.

On the contrary, Edelman and Tononi’s theory, considering what happens in the subject’s consciousness only and always as permanently intertwined with memory, sees everything occurring in the subject’s consciousness as unavoidably determined by its memory, and not, instead, as

something that, at every new time, the subject can determine, categorize, think about, imagine, perceive, and so on, in always new ways. This is mainly due to the fact that, despite incorporating the notion that information is categorized and synthesized by the subject based on individual experience, and that such syntheses are constantly changing as the organism adapts to the changing world around it, the Darwinist theory does not embody the fundamental notions that human beings are able to use and control their attention at their will, and that it is precisely this capacity that enables, and has enabled, them to build the world where they live. We human beings are certainly the result of an evolutionary process: but we are also the result of our own choices and decisions.

2.2.3. A particular kind of words

I conclude this section with some remarks on the function of some special words. As we have seen, each word conveys a specific instruction for attention. This instruction represents the meaning of the word. When the subject hears or reads the word, it is induced to repeat the set of attentional operations constituting the meaning, thus becoming conscious of it. However, the repetition of such a set of attentional operations brings with it not only the conscious experience of the meaning, but also the unconscious processing by the schema of self of what has been consciously experienced. As a consequence, the unconscious processing by the schema of self may, in turn, lead the subject to perform some further actions, whether conscious or unconscious, which can be of various kinds: physical, psychical, linguistic, barely mental, and so on. Let us suppose that we hear the word "horse". We can just perform a conscious activity: understanding the meaning of the word; or we can perform a series of conscious-unconscious-conscious mental actions: understanding the meaning of the word, and then imagining a black, running horse. We can also perform a series of actions some of which can be physical: for instance, if someone tells us: "Do me a favour and turn the music down while I'm on the phone, will you?", we will physically perform the action of turning the music down. The same can be said of other kinds of activities: if we read: "3 + 2 = …", we will perform a mathematical activity leading to the result "5"; if a friend tells us that he is "sad", and he explains why and how it happened that he got to be sad, and we fully understand his situation because we too have experienced it, most probably we will share his same feeling, thus modifying our psychological state; if someone asks us: "Do you remember what happened yesterday at five o' clock?", we will try to recall to our mind the events we lived yesterday, thus exerting a specific mental faculty.

In theory, as we can see, any conscious experience of a meaning may generate a series of subsequent operations: in practice, the fact that the conscious experience actually generates such a

series of subsequent operations, and that the series of operations are such-and-such, depends on a variety of factors: the specific instruction conveyed by the meaning, the kind of context, what the meaning could imply for us, our will or predisposition to do or not to do what we are told to do, and so on. Nevertheless, some words convey to mind such special kinds of attentional instructions that very rarely are we able to escape from their power. These are the words that convey a syntactic instruction, as for instance conjunctions, prepositions and relative pronouns: when hearing them, we are led not only to immediately understand what they mean, but also to automatically perform the syntactic instruction their meaning conveys. These words play a fundamental role: that of relating or connecting two or more words, or two or more parts of the speech, thus making thought possible.

As highlighted by Ceccato (1969, 1972) and Ceccato and Zonta (1980), thought is based on a combinatorial structure that allows us to join, relate and connect in various ways meanings, images, perceptions, ideas, emotions, other thoughts, and so on; thanks to its combinatorial structure, it can be developed along infinite, different lines, or towards infinite, different directions and dimensions. Conjunctions, prepositions, personal pronouns and the like[10] have precisely the function of specifying the way in which two or more words have to be combined, how one word relates to the other, and so on. Consider for instance the function of the conjunction "and" as opposed to the function of the preposition "with", by comparing the sentence "I have seen Mark and Elisabeth" with "I have seen Mark with Elisabeth". While the former sentence gives rise primarily to the image of the two people who have been seen, without specifying whether they have to be imagined together, as both present at the same time, or one after the other, as seen each of them at different times, the latter one has the effect of leading us to see or imagine Mark in the company of Elisabeth (to the point that it could make us feel a little surprised that the two were together, since we knew they did not get on well together, or since this seems to confirm the unbelievable gossip that they are having an affair).

Thoughts are not the same as images, meanings and perceptions; thoughts have different qualities and characteristics from them. First, even if thoughts may be composed of images, meanings and perceptions, they may also be composed of emotions, feelings, and other thoughts. Second, their combinatorial structure let all these components be variously and differently combined. Third, the combination of their components can develop into endless chains, and towards different dimensions. Conversely, images, meanings and perceptions have certain properties that thoughts have not.

[10] Words are not the only means human beings have developed to convey syntactic instructions: equally important are other means, such as punctuation, the order in which words are put (consider for instance the importance of word order in the adjective-noun, or subject-verb construction), and so on.

Images represent not only explicit information, but also implicit information, that is information that is represented and processed independently of the subject's will or intention, whereas thoughts can only represent information explicitly, that is, in a way intentionally chosen by the subject. For example, if we try to imagine a pond, such as that shown in Fig. 1, we will implicitly represent all the objects and relations between the objects of the scene, even if it is not our intention to do so. On the contrary, if we think about a pond, we will explicitly direct our attention only toward certain objects or features at a time, intentionally considering only certain relations or characteristics and leaving aside the others[11].

Meanings are by their very nature closed entities, whereas thoughts, as we have seen, can be expanded at will. Moreover, meanings do not have the same phenomenal qualities as images and perceptions; on the contrary, thoughts may be characterized by those qualities, inasmuch as images and perceptions compose thoughts.

Perceptions, as images, represent not only explicit information but also implicit information. Differently from images, however, they are determined by the application of attention to a sensory organ, whereas images are determined by sensory information stored in memory.

3. Concluding remarks

We can now summarize what has been said about the process by which a word pilots the subject's attention. The process begins with the conscious perception of the physical side of the word. The information provided by this perception is sent to the schema of self that, after processing it, makes the organ of attention perform the operations constituting the meaning of the word. When the organ of attention has performed such operations, the subject becomes conscious of the meaning of the word. The conscious experience of the meaning is in turn unconsciously processed by the schema of self: which may imply additional conscious and unconscious processing, thus making the subject have further conscious experiences, such as images, thoughts, etc. To be fully accomplished, this last step requires that the subject has enough time at its disposal. As everyone knows, this is not always possible in normal speech: usually, we become conscious only of the meanings of the words, and only seldom is there enough time left for us to physically imagine, think extensively about, or recall the events of our past life that are related to their content.

Each word, therefore, gives rise to a series of conscious-unconscious processing, which can be sketched as in Fig. 2.

[11] A distinction between images and thoughts is proposed in similar terms by Ferretti (1996).

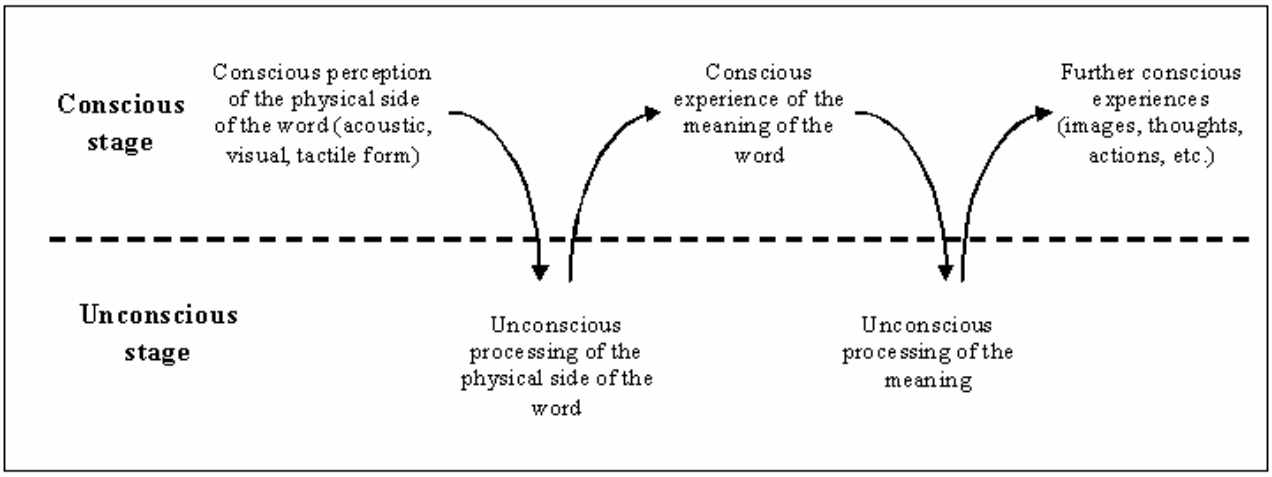

Fig. 2 The conscious-unconscious processing of words

It must be observed that the physical side of words can also be unconsciously perceived and semantically processed. The psychological literature gives full evidence of implicit perceptions: examples range from "subliminal perceptions" (Marcel, 1983), to blindsight (Weiskrantz, 1986), visual neglect (Bisiach, Luzzatti, and Perani, 1979), and hypnotically induced instances of blindness (Kihlstrom, Barnhardt, and Tataryn, 1992). The best known procedure used by psychologists to test implicit perception is priming. In this procedure, a stimulus - referred to as the *prime* - that is under threshold or shown under conditions that make its conscious perception unlikely is presented to a subject. Following this, the subject is shown a set of stimuli that are either compatible or incompatible with the prime. The subject has to consciously perceive them and give some response. Psychologists have found that the prime, despite not being consciously perceived, is nevertheless deeply processed by the subject's mind: in fact, it can either facilitate or hinder the subject's response, depending on whether it is compatible or not with the stimuli that have been consciously perceived.

Can this evidence fit in with my model of consciousness? I believe that it can, on condition that we think of attention as a form of energy, namely the organism's nervous energy, which can be modulated in intensity, and allocated in varying amounts. In my model, there cannot be explicit, conscious perception prior to the adequate engagement of attention. We cannot consciously perceive stimuli if we do not pay sufficient attention to them. However, if we pay what psychologists call low-level attention or "preliminary attention" (Velmans, 1991) to them, our schema of self can unconsciously process them, giving rise to the phenomena of implicit perception.

These phenomena, however, despite being well ascertained and documented, and revealing an astonishing as well as surprising aspect of our mental life, do not represent its core feature. Certainly, they are interesting and cannot be ignored, but they are marginal and secondary if compared with what consciousness has enabled and enables us to do and achieve.

In this article, we have considered the process by which a word or a sentence pilots the subject's attention mainly from the listener's or reader's point of view. Obviously, also the speaker's or writer's one should be taken into account. Intuitively, the process of producing words and sentences should entail the same steps as those involved in the process of reading and listening, but in the reverse order. A rough outline of the process could be the following: conscious experience of the meaning of the word > unconscious processing of the meaning of the word > production of the physical side of the word > conscious perception of the physical side of the word. Indeed, there are some instances that would seem to confirm this hypothesis, as when we experience the tip-of-the-tongue state: we have something in mind to say, we know exactly what we want to say, but we have forgotten the corresponding word or words. This state clearly exemplifies at least two things: a) how the consciousness of the meaning of a word does not correspond, and is not equal, to the consciousness of its physical side, and b) how the former precedes the latter during the production phase of words.

This intuition, however, seems sometimes to be challenged by all those instances in which we have the impression that we can utter or write words or sentences without having to be previously conscious of their meaning. These instances seem to demonstrate that we are able to express thoughts, ideas and intentions without being conscious of the meanings of the words we use. While I recognize that it is possible in principle to utter words as well as other kinds of sound without being conscious of their meanings, I cannot admit that this is a true communicative act, where a subject utters words because it has the intention to express its own ideas, thought, or feelings. It would be rather an example of the subject's capacity to perform actions in general, without any intention to express specific meanings, like an automaton performing mechanical actions.

Perhaps we have the impression that we can utter words without having to be previously conscious of their meaning because we are so used to the actions of speaking and writing that we can perform them in a very short time and in an almost automatic way; or perhaps because the qualitative experience of the physical side of the words is so strong in comparison with the feeble experience of the meaning that the latter goes unnoticed. Anyhow, when speaking or writing, we *do* have to be conscious of the meaning of the words we use. Should that not be the case, we would continuously be at the mercy of words, powerless to express even the simplest intention, idea, thought or concept. Should we not be able to govern words, we would be equal to zombies,

completely enslaved by our unconscious processes. We would become conscious of the meaning of the words we utter only after having uttered them. In such a case, we could discover that they do not express at all what we really intended to say. We would then have to make new utterances, in the hope of reformulating our thoughts and ideas with the correct words, but with the only certainty of our powerlessness to control the process.

Indeed, it may sometimes happen that the words we have used are inadequate to express what we wanted to say, or that we have to rely on them in order to better understand, and give a rational form to, our unexpressed feelings. After all, we can feel something, and yet being unable to understand it until we express it with our own words: as Forster (1962, p. 108) puts it: "How can I tell what I think till I see what I say?". Nevertheless, we are able, in the former case, to correct ourselves, and in the latter one, to judge if what we have said expresses adequately our feelings. In both cases, the capacity we have to examine what we have said, and to find if necessary the proper words, testifies to the fact that we do control the process of word production, and consequently that we have to be conscious of the meanings of the words before uttering them.

A final remark on the originality and peculiarities of the proposals outlined here that make Attentional Semantics differ from similar kinds of semantics. As we have seen, the essential components of meaning are attentional operations. The meaning of each word differs from the meanings of the other words because it conveys a specific attentional instruction: each meaning is composed of a specific series of attentional operations, which distinguishes it from the other meanings. Attention can perform several kinds of operations: it can be oriented, it can be focused at variable levels of size and intensity, it can be sustained for variable, though limited, amounts of time, etc. It is the specific aim of Attentional Semantics to analyze meanings in terms of attentional operations: Attentional Semantics should be able to identify which attentional operations compose each meaning, and how they combine.

Such a kind of semantics is not new: it was originally introduced and developed by Ceccato (1969) and Ceccato and Zonta (1980) in the last century. His example was followed by other authors, who gathered under the *Scuola Operativa Italiana* (*SOI*): among these, Vaccarino (1981, 1997, 2000) is undoubtedly the one who most deserves to be mentioned, above all for the rigorous and systematic approach he adopted. Therefore my way of intending semantics can certainly be considered as following in the footsteps of this tradition of research. However, my proposal differs from the previous ones for the following two main reasons.

Firstly, it tries to analyze meanings in the broader context of consciousness studies. Even if Ceccato and the other authors of the *SOI* occasionally deal with the qualitative and phenomenal aspects of consciousness, they do not systematically investigate them, how they originate, how they

can be explained, how they relate to the other mental phenomena, the importance they have for the human being's behaviour, and so on, nor is it their primary concern to do so anyway. Their approach to mind, neglecting or overlooking the qualitative features of conscious experience, leads them to analyze meanings as abstract entities separated from the phenomenal dimensions we live in: an upshot that is clearly evident in Vaccarino's semantic analyses. My main concern, on the contrary, is that of giving an account of the mind from the angle that best characterizes it and is most accessible to us, that is, our consciousness experience. From this perspective, the study of meanings necessarily has to start from the role they play in our conscious life: it has to explain how the conscious experience of meaning occurs, what determines it, and what it determines. This aim unavoidably leads to analyzing meanings in terms of the various attentional operations that are effectively carried out by an organism:

1. provided with a source of energy - the attentional one - capable of controlling and piloting the working of its organs;
2. that applies its attentional energy to its organs according to the partly acquired and partly innate hierarchy of principles, goals and rules specified in its schema of self, at the top of which there is the fundamental principle of life: "operate in order to continue to operate";
3. that, through the application of its attentional energy and the consequent modification of the state of this very energy, consciously experiences what it does;
4. that, by continuously applying its attentional energy, becomes a self-conscious subject capable of delimiting and controlling itself, its operations, movements, intentions, and actions;
5. that lives in a world populated by other living beings and subjects having different bodies, histories, psychologies, and so on.

As such, attention must be considered as working not so much in an empty context or environment, but in a physical, psychical, and social one: only by considering it in such a way can we hope to be able to account for the various phenomenal dimensions we experience. This necessity brings us to the next difference between my proposal and those put forward by the *SOI*.

Secondly, Attentional Semantics analyzes meanings in terms of the various kinds of operations that attention can perform (it can be oriented, focused at variable levels of size and intensity, it can be sustained for variable amounts of time, etc.), while the *SOI* analyzes them only in terms of few basic attentional operations: for instance, Ceccato's analyses are based on the "attentional state" (*S*), whereas Vaccarino's ones are based on the moments of "active attention" and "interrupted

attention". Even though the strategy of limiting the attentional activity to a few basic operations has the apparent advantage of simplifying the analyses, it presents nonetheless the inconvenience of neglecting all the other kinds of attentional operations that the subject must perform when perceiving objects and events, and that contribute to constituting their meaning. This strategy leads the *SOI* to overlook the fact that attention does operate in several ways within a body having different organs working in different ways, and that it is variously piloted by a subject having its own history and living in a society where other subjects live and interact. It thus proves to be inadequate to explain how perceptive constructs form (Marchetti, 1993), and to account for all the phenomenal dimensions we experience. Indeed, Ceccato himself expressed his dissatisfaction with the limitations imposed by this strategy when he tried to compensate for it by increasing the ways of relating the attentional states. (Ceccato, 1987).

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