

## How Vision Collaborates with Thought to bring Information into the Mind

Inesa Sahakyan

University of Pepignan, France

### Abstract

“To gaze is to think” notes Salvador Dalí. The artist’s observation is illustrative of the tradition of representing perception as analogical with thinking. Analysing perception, Arnheim, for example, claims that there is no difference between a percept and a concept inasmuch as “perception consists in fitting stimulus material with templates,” also called “visual concepts” (Arnheim 1997 [1969]: 27-28). The question that concerns us here is – how can the same visual pattern yield different concepts for different interpreters? In an attempt to answer this question the paper examines the complex dynamics involved in the perception of one of the most controversial works in the history of art – Mona Lisa by Leonardo da Vinci.

To account for divergent interpretations of an image, we introduce a dichotomy of immediate and dynamical propositions of perception, a distinction inspired by the Peircean semiotic theory. Immediate propositions (IPs) of perception consist in the attribution of qualities to the perceived object as they are immediately present in the field of vision, as opposed to dynamical propositions (DPs) which bear on the qualities of the given object not necessarily perceived at the instance of perception but rather attributed to it in the past experience. By examining some various ways in which Leonardo's image has been interpreted, we demonstrate how experience of prior perceptions interferes with the present perception to construct the meaning of a visual pattern.

This paper falls within what is considered as the new paradigm of cognitive semiotics inasmuch as it deals with cognitive issues such as visual perception, the processing of visual information and the construction of meaning while taking a semiotic approach, notably, inspired by Charles Sanders Peirce. Our key endeavour consists in determining how the process of visual perception is accomplished. For a thorough consideration of this issue, it was divided into distinct questions as follows: what is information; how is it perceived; what are the constituent elements of perception; what is the role of thought in perception; and what exactly does the collaboration of vision and thought in the process of visual perception consist in? We throw a look at the functioning of the senses, and in particular the sense of vision, so as to determine the role of the senses, as well as the nature of their interaction with the mind in the process of perception.

**Keywords:** vision, mind, thought, information processing, visual perception, meaning

## 1. Introduction

“To gaze is to think” notes Salvador Dalí, and one of landmark books on visual perception published in 1969 by Rudolf Arnheim is entitled *Visual Thinking*. However, the tendency to represent perception as thinking can be traced back to the 17th century, to Descartes’ definition of perception as the “inspection of the mind”:

But what is the piece of wax that can be perceived only by the [understanding or] mind? It is certainly the same which I see, touch, imagine; and, in fine, it is the same which, from the beginning, I believed it to be. But (and this it is of moment to observe) the perception of it is neither an act of sight, of touch, nor of imagination, and never was either of these, though it might formerly seem so, but is simply *an intuition (inspectio) of the mind*, which may be imperfect and confused, as it formerly was, or very clear and distinct, as it is at present, according as the attention is more or less directed to the elements which it contains, and of which it is composed [emphasis mine]. (Descartes 1974 [1641]: 48, trans. Veitch 1901)

Two things should be noted in reference to the above quotation: first, by qualifying perception as “clear” or “confused and imperfect”, Descartes in fact refers to the immediate perception and the memory record of prior perception, respectively. The second important point put forward by Descartes in the above is the inner, in particular, the mental nature of perception, inasmuch as perception is conceived of as being merely an “inspection of the mind”. Descartes’ position is illustrative of the tradition of regarding perception as thinking.

Ironically, the reasons that led Descartes and Arnheim to define perception as thinking are quite opposed to one another. In particular, Descartes’ tendency to assimilate perception

to thinking is determined by the fact that he despises the senses and attributes the mind the ability to reproduce the activity of the senses. According to this position, feeling is nothing but thinking. Arnheim, on the contrary, claims that vision itself is intelligent and its activity is thereby comparable to thinking. He notes “A review of what is known about perception, and especially about sight made me realize that the remarkable mechanisms by which the senses understand the environment are all but identical with the operations described by the psychology of thinking” (Arnheim 1997 [1969]: V, Preface).

Arnheim refutes what he calls “the harmful dichotomy” between thinking and perceiving so as to distinguish between “abstract” from “concrete” things, respectively: “the crudest misuse of the two terms, then, is that of saying ‘concrete’ when ‘perceivable’ is intended, and ‘abstract’ to describe what is not accessible to the senses” (Arnheim 1997 [1969]: 155). Thus, according to Arnheim, thinking is an essential ingredient of perception. Moreover, since without thinking there can be no perception, perception is assimilated to thinking. Thought, doubtless, is indispensable for perception and constitutes an essential part of it. Nonetheless, in what follows we tend to demonstrate that perception cannot be assimilated to thinking despite their intimate relation, as, in fact, as Peirce explains “direct perception is antecedent to thought” (CP1 2.84).

The following enquiry raised by Peirce in reference to perception is of key interest as it points to the problematic addressed in the present paper:

For example, you look at something and say, ‘It is red’. Well, I ask you what justification you have for such a judgment. You reply, ‘I *saw* it was red’. Not at all. You saw nothing in the least like that. You saw an image. There was no

subject or predicate in it. It was just one unseparated image, not resembling a proposition in the smallest particular. (CP 1.538)

Indeed, in the process of perception we form judgments concerning the objects of our experience, which appear to us as mere unified images (visual, auditory, olfactory or other). What is of interest to us here is how such images furnished to us by our senses yield propositional judgments. To address this question we analyse the elements of perception and examine the mechanisms underlying the functioning of perception.

The role of the mind and senses in furnishing us with knowledge of the outer world has been a matter of theoretical debate and controversy throughout the history of philosophy. In particular, this issue has made a gulf between two philosophical traditions – the rationalism and empiricism. The purpose of the present study is to contribute to the comprehension of the workings of the mind and senses (and in particular, the sense of vision) so as to have a better understanding of the operation of each, as well as their co-operation, if any, in the process of perception. Our argument is developed in the light of the phenomenological account of perception developed by Peirce on the one hand, and on the other – the neurological account of vision suggested by Zeki.

## **2. The Mind, Brain and the Thought**

While considering the notion of the mind, we have to take note of the assimilation sometimes erroneously granted between the mind and the brain. Exploring the grounds for the distinction to be drawn between the mind and the brain, Steven Pinker claims that “the mind is not the brain but what the brain does” and not even everything it does such as “metabolizing fat and giving off heat” (Pinker 1997: 21). Instead, what the author refers to as

mind is in particular the information processing activity of the brain: “The mind is what the brain does; specifically, the brain processes information” (Pinker 1997: 21). Interestingly, the message that we intend to elicit in regard to Pinker’s definition of the mind as the information processing activity of the brain is indirectly revealed through the French translation of Pinker’s text. In particular, while the French word “esprit” [mind] is employed to translate the term “mind” in the title of the book (thus, the original title *How the Mind Works* is translated into French as *Comment fonctionne l’esprit*), the translator (M.-F. Desjeux) chooses to employ the term “pensée” [thought] rather than “esprit” [mind] to interpret the term “mind” as far as the activity of the brain is concerned. Hence, the original proposition “The mind is what the brain does; specifically, the brain processes information” (Pinker 1997: 21) is interpreted as: “la pensée, c’est ce que fait le cerveau, en particulier il traite l’information” (Pinker 2000[1997]: 29). Far from being of a purely linguistic interest, the interpreter’s preference given to the word “pensée” [thought] and not “esprit” [mind] here is revealing of the misinterpretation of the mind as an activity of the brain by Pinker. Ironically, while such a choice of the translator creates a conceptual divergence between the original text and the translation (thus giving rise to a possible criticism as far as the translation is concerned), as we hope to demonstrate below, it expresses more faithfully the essence of the notions of mind and thought.

We refute Pinker’s conception of the mind as the information processing activity of the brain. Our claim is that even though information processing is the fundamental activity of the mind, yet it does not constitute the mind itself. We argue that the mind is neither the brain nor its activity, rather the congenital tendency of the brain, which consists in positive qualities of feeling (in the Peircean sense of the term). It is this very tendency of the brain called mind, which renders possible the information processing activity. Furthermore, in logical terms the

information processing should be properly referred to as thinking, as it is accomplished by the operation of thought.

Our argument in drawing a clear-cut distinction between the mind as a faculty of the brain and thought as the activity of the mind is based on the phenomenological categories of Peirce. In view of these categories, the mind is firstness as it is a state of consciousness comprised of qualities of feeling; as such it constitutes the mere possibility or capacity of thinking (cf. CP 1.537) and not the very activity of thought. Furthermore, the brain (of a particular person as an individual manifestation of the general idea of the brain) belongs to the category of secondness as it is an actual existent, a biological organ capable of producing immediate physical effects upon at least one of our senses (thus, in laboratory conditions we can see the brain through the sense of vision). As secondness, the brain involves the mind – firstness. Finally, thought, as the activity of the mind, is thirdness as it is a logical operation of mediation based on general laws. Thus, the mind, the brain and the thought represent the categories of firstness, secondness and thirdness, correspondingly.

### **3. Vision and the Senses**

The human being (except pathologies) is endowed with five distinct senses – vision, audition, olfaction, taste and touch, which enable him to obtain information concerning his environment through five distinct modes of sensation correspondingly – visual, auditory, olfactory, gustatory and tactile. Distinct as they are, the purpose of each of the senses is to furnish the mind with information concerning the objects of the environment. Nonetheless, in the entire sensory system of a human being there is one sense that stands out in its efficiency of providing information, namely, vision. The dominance of vision over other senses was underlined by different authors (cf. Arnheim 1997 [1969]; Berger 1972; Zeki 1999). Zeki, for

instance, notes: “Vision is not of course the only sense through which we can acquire that knowledge [knowledge about the world]. Other senses do just the same thing. *Vision just happens to be the most efficient mechanism for acquiring knowledge and it extends our capacity to do so almost infinitely.* Moreover, there are certain kinds of knowledge, such as the expression on a face or the colour of a surface that can only be acquired through it [emphasis mine]” (Zeki 1999: 4).

### **3.1 What Vision is Not**

To begin with, it is important to discard what was a misleading view of vision until recently, namely, the conception of vision as a passive process in which the retina of the eye would register the information of the visual field. Even though vision was for long granted a dominant role over the other senses in terms of its efficiency to acquire information concerning the outside world, two completely distinct attitudes have marked the history of our knowledge of vision. In particular, for ages, vision was regarded primarily as a passive process, the one in which the image of the visual world is first impressed on the retina, then analysed by the mind. However, with the technological advent more sophisticated tools and techniques are now at scientists’ and researchers’ disposal, thus providing them with the opportunity to have a more prominent insight into the functioning of vision. Hence, comparatively recent research studies (Zeki 1999; Pinker 1997) suggest a totally distinct perspective on vision – that of an active process in which the eye is considered to be in constant collaboration with the brain in the very process of creating images of the outer world. Thus, following the advent of technologies that led to more recent discoveries about the functioning of the brain and vision “we now view it [vision] as an active process in which the brain, in its quest for knowledge about the visual world, discards, selects and, by



comparing the selected information to its stored record, generates the visual image in the brain” (Zeki 1999: 21).

To account for the erroneous conception of the eye as the seeing organ, Zeki puts forward the proposition that this is due to the fact that it is the eye that is visible from the overall anatomy of vision. In his book, *The Inner Vision*, he devotes a chapter, entitled *The myth of the ‘seeing eye’*, to refute what he considers as “the totally erroneous view that an image of the visual world is ‘impressed’ upon the retina and then transferred to be ‘received’ by the ‘seeing’ cortex, there to be de-coded and analyzed”<sup>2</sup> (Zeki 1999: 13). Zeki explains that:

It is only relatively recently that we have come to realise that, far from an image of the visual world being ‘impressed’ upon the retina of the eye, the latter is merely a vital initial stage in a very elaborate machinery designed to see, extending from it to the so-called ‘higher areas’ of the brain; it acts as an essential filter of visual signals and registers transformations in the intensity of light, or in the wavelength of light between one part of our field of view and another, and then transmits these registered transformations to the cerebral cortex. (Zeki 1999: 14)

Recent research results furnish evidence that much of the visual apparatus is situated in the brain and not in the eye itself. Accordingly, the organ of the eye alone does not see, and the image of the visual world is not impressed on the retina, but is created in co-operation with the mind: “Complicated though the anatomy of the retina is, it just does not contain the powerful machinery that is needed to discard the unnecessary information and select only what is necessary to represent the constant and essential features of objects. Much of that machinery, indeed its major part, is vested in the cortex” (Zeki 1999: 14).

Furthermore, considering the process of visual perception, Zeki points to the long-standing and erroneous tradition of regarding vision as a unity of two separate processes – seeing and understanding. According to this position “the ‘seeing’ part of vision was [thought of as] a passive process while the ‘understanding’ of what was seen was an ill-defined active process” (Zeki 1999: 20). However, nowadays, evidence provided by neurology grounds the view that the functioning of vision is closely aided by the mind and that information on distinct attributes of the visual scene (e.g. colour, form, motion) is received, stored and processed by different areas of the brain. “We thus no longer think of two cortical zones, one for seeing and one for understanding what is seen, but for several visual systems acting in parallel, the activity in each leading to both seeing and understanding a particular attribute of the visual scene” (Zeki 1999: 63). Hence, the intimate relation of the mind and vision becomes evident in visual perception, where the visual image, furnished by the sense of vision, in order to be “processed” has to be interpreted by the mind. The fact that the functioning of vision is accomplished in collaboration with the mind is further confirmed by our capacity to understand visual patterns that are incomplete or distorted. A further evidence of the active cooperation of the mind and vision in the process of perception is our ability to perceive a complete image of the outside world despite the blind spot on the retina. Finally, an interesting and striking evidence of the close collaboration of the mind and vision is the fact that even though the retinal image is upside-down we manage to see the world right-side up.

### **3.2 What Vision Is**

Today, not only do we know that the contribution of the brain is requisite for the functioning of vision, but also which area of the brain in particular is involved in visual

processes. Chief among the new facts is the discovery that “there are many visual areas in the brain, not one as was previously imagined; each group of areas is specialised to look at a different attribute of the visual scene, such as form, colour and motion” (Zeki 1999: 59). The functioning of vision therefore is specialised as it is assisted by distinct areas of the brain depending on different visual qualities to be processed. Those areas are functionally specialised as each area is responsible for processing and perceiving different attributes of the visual scene such as form, colour and motion (cf. Zeki 1999: 60).

A further evidence of the functional specialisation of the visual brain is furnished by the temporal hierarchy that demarks separate perception systems in vision: “In fact, recent experiments that have measured the *relative* times that it takes to perceive colour, form and motion show that these three attributes are not perceived at the same time, that colour is perceived before form which is perceived before motion, the lead time of colour over motion being about 60-80 milliseconds” (Zeki 1999: 66).

While considering the function of vision, it is important to note that “we see objects and surfaces from different angles and distances and in different lighting conditions” (Zeki 1999: 5). The mind therefore is constantly challenged by the changing information provided by the senses, for each piece of information concerning a phenomenon contains distinct characteristics proper to a particular replica. The variety of characteristics of replicas is due to the fact that “the brain never sees the objects and surfaces that make up the visual world around us from a single point or in a standard lighting condition; instead objects are viewed at different distances, from different angles and in different lighting conditions and yet they maintain their identity” (Zeki 1999: 51).

The intricate mechanism underlying the functioning of vision examined above accounts for its efficiency in furnishing the mind with information concerning the objects of experience. The efficiency of vision consists in its capacity to furnish visual information, which contains details concerning the attributes of the visual field within the shortest periods of time. Zeki claims that:

By any standard, the visual brain is a remarkably efficient organ. It is capable of providing, within a fraction of a second, a visual image in which all the attributes of the scene – form, colour, motion, depth and much else besides – are seen in precise spatial and temporal registration. It is an organ that is capable of recognizing an object from a single view and of uniting many different views into a single object. (Zeki 1999: 58)

Taken into consideration the research evidence discussed above on the temporal hierarchy of visual perception, which claims that different attributes of the visual field are not perceived at the same time, and, furthermore, in view of the functional specialisation of the visual brain, we are led to the conclusion that the visual image is not directly impressed on the retina but is progressively constructed (even though such a progression takes place within milliseconds). We here touch upon the following question: how is the relation between distinct attributes of the visual image established? Otherwise, how does the brain integrate separate attributes of the visual scene into a single unified image?

Here it is interesting to consider another point concerning the physiology of vision put forward by Zeki, which furnishes us with an important insight into the enquiry raised above. Examining the function of vision, Zeki notes that in the process of visual perception “adjacent points in the retina connect to adjacent points in area V1. Through these

‘point-to-point’ connections a map of the retina is re-created in V1” (Zeki 1999: 17). The visual scene is represented diagrammatically in the brain through point to point connections between different attributes of the visual scene. Hence the relations between visual qualities are diagrammatically represented in the brain. The fibres from the retina terminate at the back of the brain, namely, in the primary visual cortex (otherwise known as area V1, cf. Zeki 1999: 15). This evidence suggests that the object of experience present in the field of vision is represented in the brain, and that, what is of particular interest, the mode of representation involved is iconic as the object of experience is represented through resemblance.

The above data concerning the function of vision furnish us with enough evidence to address the above enquiry concerning the way the brain constructs a unified image based on separate qualities. We are thus led to the conclusion that the construction of a unified image based on distinct attributes present in the receptive field is rendered possible by the capacity of the brain to create a map by connecting the adjacent points in the retina to adjacent points in the visual area of the brain. As far as the operation of the mind is concerned, the creation of such a map is due to the faculty of the mind to represent. Based on the map of the visual field re-created by the brain, the mind represents the objects of the experience through the iconic mode of representation, and in particular, through diagrams. The attributes present in the visual field are first recreated as a map based on the relations they have to each other, this map is further represented by the mind diagrammatically taking into account the relations between different qualities present in the map within the visual brain. Furthermore, the mode of resemblance involved is that of diagrams since what the two signs (the visual sign and the mental representation) share is in fact the resemblance of relations among their elements.

In summary, two critical facts concerning the function of vision should be taken note of. Firstly, there exist several visual areas in the brain, that is, special parts of the cerebral cortex each concerned with the processing and perception of a distinct attribute of the visual scene. Secondly, adjacent points in the retina connect to adjacent points in area V1, and through such point-to-point connections a map of the retina is re-created in V1 area of the brain. This is not a straightforward map like a photographic plate, it is a map that emphasizes particular parts and certain attributes of the visual field (cf. Zeki 1999: 17).

## **4. Information**

### **4.1 Defining Information**

Information makes an inseparable part of our lives. Nonetheless, in spite of the ubiquity of information in our everyday experience, when it comes to providing a clear-cut definition of it, the task proves to be rather thorny. The difficulty of this exercise is in a way accounted for in the very definition of the phenomenon of information suggested by Fred Dretske (2000). In an article devoted to the analysis of knowledge and information, Dretske defines information as an objective commodity, the sort of thing that can be delivered to, processed by, and transmitted from instruments, gauges, computers and neurons. It is something that can be in the optic array, on the printed page, carried by a temporal configuration or electrical pulses, and stored on a magnetic disk, and it exists there whether or not anyone appreciates this fact or knows how to extract it. It is something that was in this world before we got here. It was [...] the raw material out of which minds were manufactured. (Dretske 2000: 107-108)

The above definition is noteworthy in that it points to the versatile nature of information as an objective commodity, something that can be processed and communicated through media as different as computers, neurons and printed pages. Thus, the difficulty of formulating a definition of information lies above all in finding a common ground among phenomena covered by the notion of information, as distinct as the electric pulse and an image – inasmuch as both act as media for representing and communicating information. The endeavour therefore consists in finding a definition that would unify and be applicable to every single of the manifold manifestations of the phenomenon of information.

The most well known conception of information known today is the mathematical theory of information, which constitutes the basis of the computational theory of mind. However, in the pursuit of the accomplishment of the feat of defining information, we have chosen Peirce's extensive theory of information as being more in line with the semiotic perspective adopted by this study. It is important to note that Peirce did not hold the same perspective on information and the informative value of signs throughout his long-standing career. In particular, two distinct perspectives can be pointed out. The first perspective developed during the period of 1867-1893 is known as the doctrine of logical quantity, while the second one, which marks the final period of his research writings (1903) can be referred to as the theory of interpretants as it focuses on the very operation of the sign and the way its interpretant represents it.

Doubtless, Peirce's later (c.1903) theory of information based on the operation of the sign is more revealing of the final stage of the development of his thought and is thereby more valuable in terms of his research contribution; nevertheless, his doctrine of logical quantity (1867-1893) is particularly interesting as it provides an insight into Peirce's

conception of information as a unity of form (qualities) and matter (actual existents). This earlier theory of information deserves our attention here for, as will be demonstrated, it is helpful in throwing light into the co-operation of the mind and the senses in obtaining information.

## **4.2 Information as the Unity of Form and Matter**

As its name suggests, the doctrine of logical quantity conceives of information as a logical quantity and employs the notions of “breadth” and “depth”<sup>3</sup> to explore it. The depth represents the total number of qualities predicable of a subject, while the breadth – the collective total of subjects of which some qualities are predicable. In this perspective information is conceived of as a unity of form and matter. Now, by “form” it is meant the set of qualities giving form to, or embodying, that is, constituting the physical body of an object. While “matter” refers to the actual existent, the so called “hard fact” or the object of our experience, which embodies a certain set of qualities.

Thus, for instance, the informed breadth of the term “red” (be it a symbol, such as the word red, or an icon – the colour red), would cover such real things as, for instance, an apple, rose, blood, tomato, just to mention a few relevant things. In other words, anything that is reasonably believed to be red would constitute the informed breadth of the term “red”. While the informed breadth of “red” in the current state of information does not cover an aubergine, or a snowflake falling down from the sky, or anything else that is not logically thought of as being red, this state of information can change upon the discovery of a red aubergine by scientists. Till then, however, the thing known as “aubergine” would not constitute the informed breadth of the term “red”. The informed breadth of a term is the awareness of



possible instances, or actual existents, containing the qualities corresponding to the given term.

By the informed depth of a term, it is meant all the real characters which can be predicated of it (with logical truth, on the whole) in a supposed state of information (cf. CP 2.408). The informed depth of an apple, then, constitutes but is not restricted to the following characters: red, green, yellow, round, sweet, smooth, sour, firm and juicy. By contrast, the following characters do not constitute the informed depth of the term “apple” in a supposed state of information: black, transparent, square or flat.

Already in his paper *On a New List of Categories* published in May 1867 Peirce employs the concepts of breadth and depth to account for different modes of reference of a symbol to its object as follows:

“A symbol, in its reference to its object, has a triple reference:

First, Its direct reference to its object, or the real things which it represents;

Second, Its reference to its ground through its object, or the common characters of those objects;

Third, Its reference to its interpretant through its object, or all the facts known about its object.

What are thus referred to, so far as they are known, are:

First, The informed *breadth* of the symbol;

Second, The informed *depth* of the symbol;

Third, The sum of synthetical propositions in which the symbol is subject or predicate, or the *information* concerning the symbol.” (CP 2.418)

This quotation is remarkable as it puts forward an idea central to Peirce's theory of information, namely, that information is the "sum of synthetical propositions". The propositions constituting information are formed through predication of qualities of actual existents. The attribution of qualities to actual existents, otherwise, the predication constitutes the ground for information.

In a comment made in 1893 on the original text of the doctrine of logical quantity, Peirce states "as in metaphysics, information is the connection of form and matter, so it may in logic appropriately mean the measure of predication" (CP 2.418, Footnote). Thus, according to the doctrine of logical quantities of depth and breadth, information would be the third quantity resulting from the connection of form (the informed depth, or the real characteristics which can be predicated of it) and matter (the informed breadth, or the real things of which the term is predictable). It could be stated that, within a proposition, it is the subject that corresponds to the breadth of a term as it indicates the real thing or things of which the term is predicable. In like manner, the predicate of a proposition corresponds to the depth of a term as it involves the characters or qualities conceivable of the term. The informed breadth constitutes the subject of a proposition, while the informed depth – its predicate, the measure of the predication amounts to information.

Given that information is a set of propositions, the smallest piece of information is a single proposition. Now, by proposition we mean the predication of a particular quality (or set of qualities) to an actual existent object. A piece of information thus bears on actual existents and thereby has a particular nature. Accordingly, actual existents as particular manifestations of general types can be characterized by multiplicity and a great variety.

### 4.3 Dicisign as a Truly Informational Sign

As presented above, in the Peircean first attempt to analyse information, the latter is considered to amount to the “measure of predication”, or the sum of synthetical propositions in which the symbol is a subject or a predicate. This view of information puts forward the idea that the proposition constitutes the smallest unit of information. This is one of the important implications of this theory, which Peirce equally explores in his later theory of information through the idea of a dicisign. By definition, a dicisign is a proposition or quasi-proposition (cf. CP 2.250) that consists in the unity of a subject (represented by an index) and a predicate (represented by an icon). In this view, dicisigns are regarded as truly informational signs.

A dicisign is also termed “double” (cf. CP 2.309) as it is composed of two parts – one describing something (through an icon), and the other indicating the actual existence of the described thing (through an index) (cf. CP 2.311). The double syntax of a dicisign constitutes its very essence for this feature figures among the necessary characteristics of the dicisign. Thus, Peirce explains that the correct comprehension of the dicisign implies the consideration of the following:

First: It must, in order to be understood, be considered as containing two parts. Of these, the one, *which may be called the Subject*, is or represents an Index of a Second existing independently of its being represented, while the other, *which may be called the Predicate*, is or represents an Icon of a Firstness [or quality or essence]. Second: These two parts must be represented as connected; and that in such a way that if the Dicisign has any Object, it [the Dicisign] must be an Index of a Secondness subsisting between the Real Object represented

in one represented part of the Dicisign to be indicated and a Firstness represented in the other represented part of the Dicisign to be Iconized. (CP 2.312)

By definition, dicisign, is a proposition or quasi-proposition (CP 2.250) that consists in the unity of a subject (index) and a predicate (icon): “every proposition contains a *Subject* and a *Predicate*, the former representing (or being) an Index of the Primary Object, or Correlate of the relation represented, the latter representing (or being) an Icon of the Dicisign in some respect” (CP 2.316). Peirce explains that “every subject partakes of the nature of an index, in that its function is the characteristic function of an index, that of forcing the attention upon its object” (CP 2.357).

As far as semiotics is concerned, any iconic sign is a rheme. In his *Exact Logic* (c.1892) Peirce beautifully defines the rheme as a “chemical atom or radical with unsaturated bonds” (CP 3.421). Indeed, even though a rheme does not itself convey information, it is the basic constituent, the “atom” of all information and renders its communication possible. Qualities constitute the “body” of all phenomena. Likewise, information about a phenomenon involves its characteristics and this is where the rheme comes forward carrying in it a certain “qualitative possibility”.

As we remarked, a rheme does not represent its object as an actual existent. By contrast, the actual existence of the represented object is a distinctive feature of a dicisign:

A *Dicent Sign* is a Sign, which, for its Interpretant, is a Sign of actual existence. It cannot, therefore, be an Icon, which affords no ground for an interpretation of it as referring

to actual existence. A Dicisign necessarily involves, as a part of it, a Rheme, to describe the fact which it is interpreted as indicating. But this is a peculiar kind of Rheme; and while it is essential to the Dicisign, it by no means constitutes it. (CP 2.251)

And given that the only sign whose object is necessarily an actual existent is the index, “a Dicisign necessarily represents itself to be a genuine Index, and to be nothing more” (CP 2.310).

The above discussion leads us to the conclusion that information is the collective total of propositions bearing on actual existents having certain qualities. In this view, what is actually brought into the mind in the process of perception is actually a set of propositions bearing on some physical attributes or qualities predicated of particular objects of the physical world. The question that comes forward here and which constitutes the central issue of our further discussion is the following – how does the mind obtain information?

## **5. Activities of the Mind and Senses**

“Nihil est in intellectu quod non prius fuerit in sensu” [nothing is in the mind which was not previously in the senses]. – Aristotle, *De Anima*.

Clearly, Descartes’ reflections on the activities of the mind and senses canvassed in his *Méditations métaphysiques* (1974 [1641]) are of particular interest here inasmuch as his ideas have played a fundamental role in the conception of the long-standing philosophical tradition of considering reason as the “highest faculty” of the mind in contradistinction with

feeling, as the activity of the senses – the “lower faculties”. In his reflections on the activities of the mind and senses Descartes notes:

In fine, I am the same being who perceives, that is, who apprehends certain objects as by the organs of sense, since, in truth, I see light, hear a noise, and feel heat. But it will be said that these presentations are false, and that I am dreaming. Let it be so. At all events it is certain that I seem to see light, hear a noise, and feel heat; this cannot be false, and this is what in me is properly called *perceiving* (*sentir*), *which is nothing else than thinking* [emphasis mine]. (Descartes, 1974 [1641]: 44-45, trans. Veitch 1901)

As this quotation suggests, Descartes ascribes to thought the dominant role and the capacity to reproduce the activities of the senses: “to feel is nothing but to think”. He claims that it is the mind that conceives of knowledge of the material world that surrounds us, while the senses merely attribute multiplicity and variety to the objects of our knowledge. For Descartes, feelings merge with thought; moreover, he qualifies feeling as thought and claims that thought is the highest activity that can reproduce the lowest activity of feeling.

A recent study providing a critical overview of Descartes’ position is presented by Antonio Damasio, a professor of psychology, neurosciences and neurology. In his book *Descartes’ Error: Emotion, Reason, and the Human Brain* (1994), Damasio demonstrates that emotions are indispensable for the validity of reasoning. He explains that recent experimental data in the field of neuropsychology refute the traditional opposition drawn in philosophy between emotions and reason.

Contrary to Descartes, Peirce draws a clear-cut distinction between feeling and thought as two distinct categories of phenomena. Whereas for Descartes thought can perform the function of feeling and, therefore, the ideas of feeling and thought can be merged, for Peirce, both feeling as firstness and sensation as secondness are completely independent of thought, which represents the category of thirdness. Here is how Peirce describes the pure state of feeling which in its very definition should be free from any thought:

[In feeling] there must be some determination or suchness, otherwise we shall think nothing at all. But it must not be an abstract suchness, for that has reference to a special suchness. It must be a special suchness with some degree of determination, not, however, thought as more or less. There is to be no comparison. So that it is a suchness *sui generis*. Imagine me to make and in a slumberous condition to have a vague, unobjectified, still less unsubjectified, sense of redness, or of salt taste, or of an ache, or of grief or joy, or of a prolonged musical note. That would be, as nearly as possible, a purely monadic state of feeling. (CP 1.303)

Pointing to the gulf between the activities of the mind and senses, Peirce notes: “I could not hope to describe what I see, feel, and hear, just as I see, feel, and hear it. Not only could I not set it down on paper, but I could have no kind of thought adequate to it or any way like it” (CP 1.414). This quotation is illustrative of the clear-cut distinction Peirce draws between sensation and thought. In like manner, Zeki states “it is interesting to consider that we are often at a loss to find adequate words to express the beauty of a painting or its expressive power; it is often able to communicate to us visually what words are unable to do” (Zeki 1999: 9).

And Zeki enquires into the reasons why language, the uniquely human quality, fails relative to vision when it comes to communicating the impression of the senses. He accounts for the incapacity of language to communicate what vision senses by:

the greater perfection of the visual system, which has evolved over many more millions of years than the linguistic system; it is able to detect a great deal in a fraction of a second – the state of mind of a person, the colour of a surface, the identity of a constantly changing object. A small inflection here, a spot of paint there, can make the difference between a sad or a happy face because the brain evolved a quick and highly efficient system of visual recognition. By contrast, language is a relatively recent evolutionary acquisition, and it has yet to catch up with and match the visual system in its capacity to extract essentials so efficiently. (Zeki 1999: 9)

Our position, however, is that the “incapacity” of language to communicate in the exact manner the impression of the senses is not due to its lower degree of development, but to its distinct nature. That is, this difference is not that of degree of the evolutionary development as Zeki claims, rather a difference of nature that is revealed in distinct categories of experience to which visual perception and linguistic representation belong. The essence of visual perception consists in an act of sensation, following the immediate physical reaction of the senses to the stimuli of the external world and is of the nature of brute force. Whereas language is a system of representation, and its nature consists in a mediation between the object of representation and the idea related to that object. Furthermore, the difference consists in distinct modes of representation. While language is a symbolic mode of representation as it stands for its object by virtue of convention, visual perception is iconic inasmuch as the impression of the senses resembles the physical effect produced by the object



upon the senses. Consequently, as no element of secondness can be transformed into thirdness, no period of evolution will transform a symbolic mode of representation into the brute force of perception.

A conclusion that is to be drawn from the above discussion is that the activities of the senses and mind cannot be assimilated. The activity of the senses – sensation – involves the second mode of consciousness, that is, volition, which consists in a double awareness of the self and the other. Whereas, the activity of the mind – thought – involves cognition, which is the third mode of awareness. Sensation is not thought, even though thought involves the category of being which constitutes sensation.

To conclude, distinct as the activities of the senses and the mind are, both are requisite to the acquisition and processing of information. As we intend to demonstrate further, these processes are rendered possible only through an intimate co-operation of the mind and senses.

## **5.1 Sensation, Thinking and Perception**

The process by which the mind obtains information through the senses concerning the outside world is known as perception. The physiology of perception consists in the reaction of the senses to the physical stimuli present in the environment; this physical reaction is also referred to as sensation. Peirce accounts for the kind of reaction involved in perception as necessarily presupposing an opposition between two elements – the ego and the non-ego. Furthermore, he points to the idea of externality as the fundamental feature of perception. As a result of the opposition of the self and the non-self involved in perception, the consciousness of the self undergoes a prominent modification. For a better understanding of

the modification of consciousness involved in perception, Peirce compares and contrasts it to the kind of consciousness involved in action. He explains that both in action and perception (as a reaction) there is a relation between two elements, however, if “our modification of other things is more prominent than their reaction on us” in case of action, in reaction and thereby in perception “their effect on us is overwhelmingly greater than our effect on them” (CP 1.324). Hence, contrary to action, perception is the reaction of the consciousness confronted with the other as a result of which the other modifies prominently the consciousness of the self.

It is important to note that there is something “passive”, or rather, uncontrollable and brutal about the reaction of the self involved in perception which lies in “a sense of powerlessness before the overwhelming force of perception” (CP 1.334). This sense of powerlessness becomes especially evident in a context in which there is a shock following a particularly unexpected experience to which the self tries to oppose. And this shock and the effort of the self to oppose to the perception are revealed in “the inertia of the mind, which tends to remain in the state in which it is” (CP 1.334). Peirce also points to the degree of unexpectedness more or less present in perception: “every perception is more or less unexpected” (CP 1.332).

Central to the notion of perception is its “irresistible” nature. Perception directly imposes itself upon us and there is no means of modifying or annulling our perception of phenomena as direct perception is subject neither to will, nor effort. And this force with which perception resists our will serves as a demarcation line between the existent world and an imaginary one: “When anything strikes upon the senses, the mind’s train of thought is always interrupted; for if it were not, nothing would distinguish the new observation from a

fancy” (CP 1.431). In perception an actual existent produces immediate physical effects upon our senses and thereby forces itself upon us as an actual existent, as a fact. We cannot doubt its occurrence and are therefore forced to acknowledge its existence as a “hard fact”. In contradistinction with dreaming and imagination, a fundamental virtue of perception lies in the fact that the information furnished to us by the senses is interpreted by the mind as an evidence of an actual existent. The following example borrowed from Peirce is illustrative of the irresistible force of an actual fact in perception and is therefore worth being quoted here:

A man may walk down Wall Street debating within himself the existence of an external world; but if in his brown study he jostles up against somebody who angrily draws off and knocks him down, the sceptic [sic] is unlikely to carry his scepticism [sic] so far as to doubt whether anything beside the ego was concerned in that phenomenon. The resistance shows him that something independent of him is there. (CP 1. 431)

In perception the external world resists upon the mind through the senses, forcing the evidence of its existence upon our immediate consciousness. We are thus directly forced to acknowledge or become aware of a fact. Peirce points to the fact that the objects of perception represent themselves to be true, even though this is not always the case: “Ordinary ideas of perception, which Descartes thought were most horribly confused, have nevertheless something in them that very nearly warrants their truth, if it does not quite so. ‘Seeing is believing,’ says the instinct of man” (CP 5.593).

To conclude, the best way to comprehend the intricate relation between perception and thinking is perhaps to analyse these notions in the light of the phenomenological categories, which have the virtue of providing a prominent insight into the very essence of

phenomena. Earlier we examined the genuine categories according to which the activity of the senses (sensation) is secondness, while the activity of the mind (the thought) – thirdness. Perception resulting from the co-operation of the mind and the senses lies somewhere in between these two genuine categories and thereby belongs to the category of the so called “degenerate thirdness”. As its name suggests, degenerate thirdness is thirdness inasmuch as it is of the nature of thought. However, it cannot be considered genuine as it neither conveys nor embodies thought: “In the last degree of degeneracy of Thirdness, there is thought, but no conveyance or embodiment of thought at all. It is merely that a fact of which there must be, I suppose, something like knowledge is *apprehended* according to a possible idea. There is an *instigation* without any *prompting*” (CP 1.538). Perception therefore qualifies itself as degenerate thirdness as thought is not immediately present in it. Rather, as we shall see further, thought springs up in the course of perception.

In summary, perception initiates with sensation, the reaction of the senses to the physical stimuli of the outside world and it involves thinking as an essential ingredient of it. Even though thinking is an essential part of perception, it does not constitute perception entirely. For a better understanding of what exactly the role of thought in perception is, and why perception cannot be represented in analogy with thinking, in what follows we will examine the elements as well as the functioning of perception. The present study being concerned with visual perception, our analyses will bear on vision in particular.

## **5.2 The Elements of Perception**

Examining the process of perception, Peirce distinguishes two constituent elements – percepts and perceptual facts. For Peirce, percepts are the very first impressions of the senses

deprived of any endeavour and will and, thus, should properly be called “the evidence of the senses” (CP 2.141). However, the only information that can be derived from percepts is represented in the form of perceptual judgments, which actually consist in the intellect’s description of the evidence of the senses.

Vision, that is, the entire visual system involving the visual brain, results in a physical image – a diagrammatic representation of the visual scene in the brain. This purely physical image, which is the immediate impression of the sense of vision brutally forced upon the observer, corresponds to the very first element of perception, namely, the percept. Examining the nature of perception earlier, we took note of its brutal and irresistible character. The analysis of the elements of perception reveals that such a brutal character of perception is immediately present in its very first element – the percept, over which we are incapable of exercising any will as it is directly forced upon us. Peirce notes that “the direct percept, as it first appears, appears as forced upon us brutally” (CP 1.253). Direct percepts consist in the immediate and brutal effect of actual existents upon us, or more precisely, upon our senses. Actual existents being particular instances of general types, perception is deprived of any generality, as Peirce explains in the following: “It [the direct percept] has no generality [...] The percept brutally forces itself upon us; thus it appears under a physical guise. It is quite ungeneral, even antigeneral – in its character as percept” (CP 1.253). Thus, two primary features of a direct percept should be taken note of, first, its brutal and physical nature, and second – its being ungeneral.

Peirce draws a remarkable distinction between what we directly *perceive* and what we *think* we perceived, the former consists in percepts and constitutes our “direct knowledge,”

the knowledge which is directly forced upon us (CP 2.141). Thought has no power in changing or annulling direct percepts. Peirce explains that:

The knowledge which you are compelled to admit is that knowledge which is directly forced upon you, and which there is no criticizing, because it is directly forced upon you. For example, here I sit at my table with my inkstand and paper before me, my pen in my hand, my lamp at my side. It may be that all this is a dream. But if so, that such dream there is, is knowledge. (CP 1.414)

However, the direct knowledge is instantaneous as it is immediately followed by the interpretation given by the thought to percepts. Thus, after having described the objects as he perceived them in his environment, Peirce continues: “But hold: what I have written down is only an imperfect description of the percept that is forced upon me. I have endeavored to state it in words. In this there has been an endeavor, purpose – something not forced upon me but rather the product of reflection. I was not forced to this reflection” (CP 1.414). The interpretation involved in perception thus is merely the imperfect description of the direct percept.

Even though thought interferes with the activities of the senses, and proceeds with the description of what was sensed, thinking cannot be assimilated with perception since the difference between the two processes is that of nature and not of degree. Thought describes what the senses have experienced, and so Peirce explains “I could not hope to describe what I see, feel, and hear, just as I see, feel, and hear it. Not only could I not set it down on paper, but I could have no kind of thought adequate to it or any way like it” (CP 1.414). Thus, as far as the relation of thought to perception is concerned, thinking does not form an analogy with

perception. Perception originates with sensation and thought springs up in the course of it once percepts are brutally forced upon the observer.

However, it should be noted that not all of the percepts are interpreted by thought. This accounts for our partial awareness of the objects of our environment. That is, we are not conscious of everything that is immediately present in our environment. For instance, as far as vision is concerned, not all of the patterns of our visual field are properly perceived, i.e. seen by us. Whereas our sense of vision reacts to the visual patterns present in the field of vision, only the smallest portion of the measureless and overwhelming variety of percepts is interpreted by thought. As Peirce puts it:

hundreds of percepts have succeeded one another while I have been setting down these sentences. I recognize that there is a percept or flow of percepts very different from anything I can describe or think. What precisely that is I cannot even tell myself. It would be gone, long before I could tell myself many items; and those items would be quite unlike the percepts themselves. In this thought there would always be effort or endeavour. (CP 2.141)

Thus, percepts are fleeting and effortless items of our experience, while their description given by the thought – a product of effort and will. It is the element of effort, involved in any description, which differentiates our intellect's description of a flow of percepts from the direct percepts themselves. What is important to note here is that along with effort there comes the element of error, hence of possible correction or modification:

Whatever is the product of effort might be suppressed by effort, and therefore is subject to possible error. I am forced to content myself not with the fleeting percepts, but with the crude and possibly erroneous thoughts, or self-informations, of what the percepts were. The science of psychology assures me that the very percepts were mental constructions, not the first impressions of sense. But what the first impressions of sense may have been, I do not know except inferentially and most imperfectly. Practically, the knowledge with which I have to content myself, and have to call 'the evidence of my senses,' instead of being in truth the evidence of the senses, is only a sort of stenographic report of that evidence, possibly erroneous. (CP 2.141)

What distinguishes further percepts from perceptual facts is the possibility of the latter to be reviewed, compared, analysed and corrected:

perceptual facts are wholly unlike the percept, at best; and they may be downright untrue to the percept. But I have no means whatever of criticizing, correcting or re-comparing them, except that I can collect new perceptual facts relating to new percepts, and on that basis may infer that there must have been some error in the former reports, or on the other hand I may in this way persuade myself that the former reports were true. The perceptual facts are a very imperfect report of the percepts; but I cannot go behind that record. (CP 2.141)

Hence, while fleeting percepts pass in a flow, perceptual facts leave their trace in the form of records (thoughts), thus can later be referred to, consulted, analysed, modified, or re-established in comparison with new perceptual facts. A percept whether it has its cause or stimuli in the real world or not (in dreams, illusions, hallucinations), constitutes experience proper and is free from any judgment, erroneous or true. Percepts are whatever they are in



themselves and are not subject to our will or judgment. “It is these percepts alone upon which we can absolutely rely, and that not as representative of any underlying reality other than themselves” (CP 2.143). It should be noted that a percept cannot be dismissed at will. Even less can a person prevent himself from perceiving that which directly stares upon him.

The next constituent element of perception, which follows percepts is the perceptual judgment, at the accomplishment of which, as we will see, the differences between visual and any other modes of perception cease to exist. Or, to put it another way, the only point at which differences among data provided by distinct senses exists is at the level of direct percepts. Our argument is based on the assumption that the difference among the perceptual activities of distinct senses lies in the very first element of perception examined above – the percept, in so far as the difference between the characteristic features of data furnished by different sense organs comes to nothing once the perceptual fact is formed. Perceptual facts being our intellect’s description of the impression of the senses consist in thoughts. In this view, no matter which sense was at the origin of the sense-data, once the intellect’s report is given on it in the form of thoughts, the whole difference between data furnished by distinct senses comes to nothing. For instance, the visual percept of the round form once described by the thought as “round” is the same as the audio percept of the round form as it will be equally converted into the thought as “round”. Thus, the data perceived through different senses are jointly present in perceptual facts.

### 5.3 Perceptual judgments

Perceptual judgments are the direct dynamical interpretants of percepts and are the second constituent elements of perception. Perceptual judgments are the conclusions of the impression of the senses made by the thought in the form of facts.

A possible misconception in regard to the elements of perception that is important to discard concerns the idea of control. Doubtless, in the process of perception there is a possibility of control, but it should be noted that our ability to control the process of perception springs up only after the perceptual fact is formed. Peirce explains that:

Even after the percept is formed there is an operation which seems [...] to be quite uncontrollable. It is that of judging what it is that the person perceives. A judgment is an act of formation of a mental proposition combined with an adoption of it or act of assent to it. A percept on the other hand is an image or moving picture or other exhibition. The perceptual judgment, that is, the first judgment of a person as to what is before his senses, bears no more resemblance to the percept than the figure I am going to draw is like a man. II-II MAN I do not see that it is possible to exercise any control over that operation or to subject it to criticism. (CP 5.115)

Even though perceptual judgments result from the activity of the mind, they are beyond our control inasmuch as these are the products of the uncontrolled operations of thought. Indeed, the thinking process can be controlled or uncontrolled, Peirce refers to the former as thinking proper, while the latter is termed – reasoning. Considering the possibility

of some kind of criticism in an uncontrolled process of thought accompanying perceptual judgments, Peirce clarifies:

If we can criticize it at all, as far as I can see, that criticism would be limited to performing it again and seeing whether with closer attention, we get the same result. But when we so perform it again, paying now closer attention, the percept is presumably not such as it was before. I do not see what other means we have of knowing whether it is the same as it was before or not, except by comparing the former perceptual judgment and the later one. I should utterly distrust any other method of ascertaining what the character of the percept was. Consequently, until I am better advised, I shall consider the *perceptual judgment* to be utterly beyond control. Should I be wrong in this, the *Percept*, at all events, would seem to be so. (CP 5.115)

One possible conclusion to draw from these observations is that both elements of perception are beyond our control and thereby beyond any criticism. Previously, we noted that the essence of perception consists in its brutal, irresistible and compulsive nature, the above analysis of the elements of perception enabled us to understand where such compulsiveness and lack of control derives from. We now know that perceptual judgments are the interpretations of percepts given by the mind through the process of uncontrolled thinking. We determined the nature of such interpretations as being beyond any control and criticism. In what follows we shall seek to analyse perceptual judgments as the dynamical interpretants of percepts, this time with a new objective – to define their contents.

Any act of perception involves a judgment that a thing as it is perceived exists. “The perceptual judgment is a proposition of existence determined by the percept, which it

interprets” claims Peirce (CP 4.539). To explain this, he refers to the prominent element of all percepts examined above, namely, compulsion: “the perceiver is aware of being compelled to perceive what he perceives. Now existence means precisely the exercise of compulsion” (CP 4.541). Perception, thus, provides evidence for existence inasmuch as the act of perception is accomplished by the judgment of existence of the thing perceived.

As a proposition of existence, a perceptual judgment necessarily comprises a subject and a predicate. The predicate of propositions underlying perceptual judgments is represented by qualities present in the percept, while the subject – the actual existent to which the qualities are attributed. In this view, the process of perception is the attribution of qualities to the objects of experience.

In conclusion, two fundamental elements are to be distinguished in perception – percepts and perceptual judgments. Percepts of which we are conscious are the immediate objects of our knowledge. They have no generality and are forced upon us brutally through particular instances of general phenomena. Direct percepts constitute our direct knowledge, which can neither be changed, nor annulled by thought. Percepts are equally called the impressions, or the evidence of the senses. Direct knowledge comprised of percepts is instantaneous; it is immediately followed by the interpretation of the thought through formation of perceptual judgments.

Perceptual judgments are the direct dynamical interpretants of percepts, or facts of immediate perception. Once the perceptual fact is formed, the senses do no exercise any effect upon the data that they have produced. The perceptual fact is the smallest unit of

information furnished by the senses; its formation is completely beyond our control and is thereby free from any criticism.

All that we can derive from percepts are the perceptual facts, i.e. the intellect's imperfect description of the evidence of the senses. Perceptual facts are therefore a very imperfect report of percepts, but we cannot go beyond that record. Finally, perceptual judgments are the direct dynamical interpretants of percepts, are propositions of existence which serve as evidence in cognition. However, not all of our percepts are interpreted by thought.

The analysis of the elements comprising perception enables us to conclude that a further difference between perception and thinking is due to the nature of their contents. While thinking is a homogeneous process inasmuch as it is the operation of thought, perception is heterogeneous in involving elements of different nature, namely, percepts, i.e. the direct evidence of the senses belonging to the category of secondness and sensation, and perceptual judgments, that is, the imperfect description of the evidence of the senses by thought partaking of the category of mediation and thirdness.

Having determined the elements of perception, we shall now proceed with examining the mechanism underlying the functioning of perception so as to throw light on the way the mind and the senses collaborate to bring together the elements of perception and thereby accomplish the process of perception.

## **6. Collaboration of vision and thought**

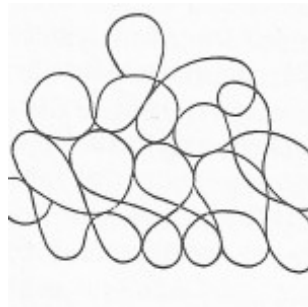
### **6.1 Perception as Predication**

Examining the function of perception Peirce introduces the notion of the so called “hypostatic abstraction” – the special mode of thought involved in perception, which transforms the most ordinary fact of perception, such as “it is light” into “there is light here”. Peirce explains that:

The percept is the reality. It is not in propositional form. But the most immediate judgment concerning it is abstract. It is therefore essentially unlike the reality, although it must be accepted as true to that reality. Its truth consists in the fact that it is impossible to correct it, and in the fact that it only professes to consider one aspect of the percept. (CP 5.568)

In the process of visual perception, the sense of vision in co-operation with the thought determines distinct properties of the object of perception (e.g. its colour, form, size, distance, brightness, or movement). That is, through a special mode of thought, namely, abstraction vision determines that the given object contains a certain set of qualities, and this is precisely the attribution of general qualities to a particular subject, otherwise termed predication. Hence, in the process of perception different qualities are predicated of the object of perception, which acts as the subject of perceptual propositions. The formation of a proposition being a judgment, visual perception thus amounts to the formation of a perceptual judgment.

Fundamental to the functioning of perception is that perceptual judgments contain general elements. Generals are requisite for perceptual judgments so that universal propositions could be deducible from them “in the manner in which the logic of relations shows that particular propositions usually, not to say invariably, allow universal propositions to be necessarily inferred from them” (CP 5.181). To illustrate this point, Peirce refers us to the following drawing (see Figure 1) borrowed from his father, Benjamin Peirce<sup>4</sup>.



*Figure 1. Benjamin Peirce, Serpentine Line (CP 5.183)*

In reference to this figure Peirce notes:

It consists in a serpentine line. But when it is completely drawn, it appears to be a stone wall. The point is that there are two ways of conceiving the matter. Both, I beg you to remark, are *general ways of classing the line*, general classes under which the line is subsumed. But the very decided preference of our perception for one mode of classing the percept shows that this classification is contained in the perceptual judgment. (CP 5.183)

An interesting aspect of our perception of objects consists in the fact that “we perceive, or seem to perceive, objects differently from how they really are, accommodating them to their manifest intention” (CP 5.185). The best example perhaps which clearly demonstrates the truth of this proposition and can be easily observed in daily life is our failure to detect the spelling mistakes in the process of reading. Thus, as Peirce notes “Proofreaders get high salaries because ordinary people miss seeing misprints, their eyes correcting them” (CP 5.185). Or, a further example of the fact that our perception is interpretative is given in reference to the political discourse: “Some politicians think it a clever thing to convey an idea which they carefully abstain from stating in words. The result is that a reporter is ready to swear quite sincerely that a politician said something to him which the politician was most careful not to say” (CP 5.185).

Further evidence of the interpretative nature of perception lies in the fact that, as we found above, the information furnished to us by our senses in the initial stage of the process of perception is purely iconic inasmuch as our direct percepts are but images with no subject nor predicate in them. As such percepts are rhematic. Accordingly, they do not convey any information; rather information can be obtained from them. Otherwise, it is up to the observer to derive information from percepts by forming propositional judgments, which are associated with each other through abductive inference.

## **6.2 Thought and vision in service to the brain**

To gain a better insight into the nature of the cooperation of the activities of the sense of vision and the mind, it is of considerable use to take into account the purpose of the cognitive activity of the brain. The purpose of the brain in obtaining information concerning



the phenomena of the environment is to know that environment and adapt the human conduct to it in consequent experiences. Hence, it could be stated that the ultimate purpose of the information processing function of the mind is knowledge formation.

As Zeki explains in the following, the primary function of the brain is to grasp the essential and constant features of fleeting objects: “Essentially, this is what the brain does continually – seizing from the continually changing information reaching it the most fundamental, distilling from the successive views the essential character of objects and situations” (Zeki 1999: 11). In this view, percepts as the immediate impression of the senses provoked by particular instances are particular in nature, and thereby of little use in future. In order to render the perceived information useful for cognition, the mind needs to reduce the multiplicity of perceived instances to uniformity. In other words, it needs to organise the numerous particular instances under some general categories or groups, also referred to as *concepts*.

The question that comes forward here is the following – how does the mind determine which characters are essential for the object so as to distill and store them? How does the mind choose between characters that are representative of an object and those that are accidental and thereby unworthy of being distilled?

To address the above enquiry, we should distinguish immediate perception from the process in which the perceived information is analysed and compared with the record of information obtained through past experiences by an area in the brain referred to as “association cortex”. The latter allows the mind to compare the perceived information with information stored in the mind through prior visual experiences and thus identify and

categorise an object. The faculty of the mind to compare information furnished by the senses at distinct moments in time is developed through experience, unlike the faculty of immediate perception which is considered as innate. This statement is grounded by the scientific evidence that puts forward the fact that the area of the brain responsible for visual perception “has a mature anatomy at birth, as if it is ready to receive the visual ‘impressions’ formed on the retina, whereas the ‘association’ cortex matures at different stages after birth, as if its development depends upon the acquisition of visual experience” (Zeki 1999: 18-19).

Hence, we shall put forward the proposition that the brain is able to determine the essential characters of objects only through a comparative analysis of at least two replicas of the given phenomenon. Thus, first the brain would distill most of the qualities of an object upon its first occurrence, then it will compare this set of stored qualities with those present in consequent occurrences. The qualities that would occur constantly would be distilled as necessary qualities of the given phenomenon.

However, not all the qualities of the first replica will be stored. Considering our information processing faculty, Zeki explains that “in order to represent the real world, the brain [...] must discount (‘sacrifice’) a great deal of the information reaching it [...], information which is not essential to its [...] aim of representing the true character of objects” (Zeki 1999: 10). Such information that does not contribute to our cognition of the essence of phenomena is carried by accidental qualities (e.g. degree of lighting, distance of perception, etc.). Those qualities will first be discarded unless they appear as constant upon consequent manifestations of the given phenomenon. Thus, for instance, the information concerning the moment of the day in which the moon is perceived, will be stored as an essential quality of the phenomenon “moon”, while the same kind of information concerning the instance of a

mug will not be stored by the mind as essential as it will not manifest as a permanent quality of the phenomenon “mug”. That is, unlike the moon, the darkness of the sky is not essential for the phenomenon “mug”. Through experience and the cooperation of the sense of vision and the analytical operation of thought, the brain learns to make a difference between the necessary and accidental qualities of particular instances: only necessary qualities are distilled, while accidental ones are discounted.

The above account on the nature of the cooperation between vision and thought brings us closer to the analysis of the mode and the role of thought in perception. As demonstrated above, the function of the brain of grasping the essential and constant features of objects of perception is accomplished through the operation of the mind based on the information furnished by vision. The capacity of the brain to determine the fundamental characters of a perceived phenomenon and distill them is due to the natural tendency of the mind to generalise and categorise, a tendency that underlies our cognitive processes. Peirce refers to generalisation as “the most important operation of the mind” (cf. CP 1.82, c.1896).

Zeki explains that the “functional specialization in visual cortex is one strategy that the brain uses *to extract the constant and essential features of objects and surfaces* [emphasis mine]” (Zeki 1999: 81). In an account on the brain’s quest for essentials challenged by constantly changing information concerning the objects of experience, Zeki underlines the difficulty of the brain in addressing this cognitive task (cf. Zeki, 1999: 5).

Our knowledge of phenomena which bears on their essential and constant characteristics would therefore be impossible without the co-operation of the mind in analysing and categorising the information furnished by the senses. Once furnished with the

information concerning particular objects of our experience, the mind has to treat this information so as to render it “worthwhile”. And by worthwhile we here mean useful for the primary purpose of the mind to cognise its environment so as to adapt the human conduct to the requirements of that environment.

The mind is constantly challenged with the overwhelming information provided by the senses concerning distinct characteristics of a great variety and multiplicity of manifestations of phenomena that produce immediate physical effects upon our sensory system. Such a large amount of fleeting and changing information is reduced by the mind into categories according to the essential and permanent qualities of objects of experience. The mind accomplishes this cognitive feat in co-operation with the senses. As far as vision is concerned, three separate but interlinked processes underlying the cognitive co-operation of the mind and vision are pointed out by Zeki.

Firstly, the mind has “to select from the vast and ever-changing information reaching it [through vision] only that which is necessary for it to be able to identify the constant, essential properties of objects and surfaces”. That is, in the process of visual perception the mind has to focus on the information that enables it to recognise the identity or the general type in a particular manifestation by determining the set of necessary qualities that constitutes the identity of the given phenomenon. Secondly, “to discount and sacrifice all the information that is not of interest to it in obtaining that knowledge”, the “uninteresting” information being carried by accidental qualities of an object; and finally, “to compare the selected information with its stored record of past visual information, and thus identify and categorize an object or a scene” (Zeki 1999: 6). This final process can be thought of as superposing two copies of images (resulting the first from the immediate visual perception and the second, recorded

through past visual experience) and selecting a single image based on the outline resulting from the coinciding points (i.e. qualities) of the two images. The resultant single “image” would be categorised as the general type of the two individual replicas, which will be verified, completed and corrected, if necessary, upon further replicas of the same general type.

We noticed that even within the functioning of a single system of sensation, in this case vision, there is a functional specialization of distinct components constituting the general system, and their overall functioning is rendered possible through an intimate collaboration between different components. Furthermore, on a still larger scale, the co-operation between the senses and the mind results in perception – the cognitive process in which the information concerning the objects of our experience recorded by the senses is delivered to the mind to be treated through mental operation – the thought.

## **7. Perceptual dynamics: immediate vs. dynamical propositions of perception**

As agreed, perception is the interpretation given by the thought to the impression of the senses. Being of the interpretative nature, perception of one and the same object might naturally yield different interpretations. A question that is of concern to us at this point is the following – how can the same retinal imprint lead to or yield different interpretations or meanings? In order to answer this question, we need to have a closer look upon how meaning is derived from an image. To account for the dynamics involved in different interpretations of the same visual pattern in the process of perception we shall here introduce a dichotomy of immediate and dynamical propositions of perception, a distinction which was inspired by the Peircean theory of interpretants.

Examining the constituent elements of the sign relation, Peirce suggests drawing a distinction between immediate, dynamical and final interpretants of the sign. The immediate interpretant is the first, and sometimes the only interpretant of the sign, which consists in the right understanding of the sign; otherwise, it is the proper significate effect of the sign. The dynamical interpretant is the second interpretant of the sign, which lies at the very heart of the continuous and infinite action of the sign (semiosis) and consists in the reaction instigated by the sign. The third kind of the interpretant of the sign is referred to as final or ultimate “because it is that which *would finally* be decided to be the true interpretation if consideration of the matter were carried so far that an ultimate opinion were reached” (CP 8.184).

The dichotomy of immediate and dynamical propositions inspired by a similar distinction among the interpretants of the sign can be justified by a resemblance between the role of a proposition within an act of perception and that of the interpretant in the sign relation. As was demonstrated above, perception is the formation of a proposition about an individual subject containing certain qualities. That is, the proposition formed in the process of perception actually concludes the perceptual act. Put it otherwise, proposition is the conclusion of the process of perception. In his *Prolegomena to Apology or Pragmaticism*, Peirce notes that “though an Interpretant is not necessarily a Conclusion, yet a Conclusion is necessarily an Interpretant” (CP 4.540). In this view, proposition as the conclusion of the act of perception is its interpretant and can therefore be analysed as such.

Immediate propositions (IPs) are formed based on the information immediately carried by the visual pattern, which constitutes the direct object of perception – a particular replica of a general type. Contrary to this, dynamical propositions (DPs) bear on the information not necessarily present in the interpreter’s field of vision; rather they are

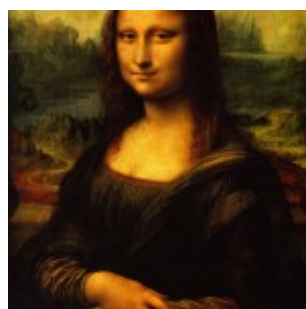
instigated by prior experience of a distinct replica of the same phenomenon. Therefore, IPs formed in the process of perception of a particular replica of a certain general phenomenon become part of the global dynamical object of the given phenomenon (the general idea associated with it). DPs, as any other judgments, are associated with each other through the laws of inference.

Both dynamical and immediate propositions constitute two distinct dimensions of information concerning a certain phenomenon, namely – present and past (represented). DPs bear on the actual facts concerning a phenomenon experienced in the past, whereas the IPs concern the facts immediately present in the direct perception. Accordingly, the scope of DPs concerning a phenomenon is larger than that of IPs as the former is in constant evolution inasmuch as it progressively integrates the information carried by all the IPs formed about replicas of the given phenomenon upon their occurrences throughout our past experience. Dynamical propositions formed about the immediate object of perception constitute the general idea we have of the given phenomenon and act as the dynamical object of the sign (DO). The scope of the dynamical object of the sign will determine the number of DPs formed about the immediate object. In case the interpreter has no or a restricted awareness of the DO, the perception of an object will be restricted to the IPs that will be formed based on the information immediately present in the direct perception.

The immediate perception consists in propositions formed about the objects of immediate perception as they are directly present in the field of vision. Immediate perception consists in the attribution of qualities to individual subjects as they occur at the moment of perception. DPs constitute our dynamical perception of an object. The latter is determined by our prior experience of one or more replicas of the phenomenon concerned and therefore consists in

the attribution of qualities to subjects not merely as they are immediately present in the act of perception, but all the attributes manifested through distinct prior replicas of the given phenomenon. Dynamical perception involves propositions about the object of perception not as it is present in the field of perception, but as our previous experience of perceptions represents it to us.

The above distinction drawn between the immediate and dynamical perceptions enables us to account for different interpretations that one and the same visual pattern may yield. Differences of perception hardly concern the immediate perception, which being determined by physical conditions in which the visual stimulus affects the sense of vision hardly leads to any differences, provided observers have a normally developed sense of vision. The actual divergence occurs on the level of the dynamical perception, the character and the scope of which is determined by personal collateral experience, which varies largely from interpreter to interpreter. For a better comprehension of the different scopes of information furnished by the immediate and dynamical propositions of perception let us examine the complex dynamics involved in the perception of one of the most controversial images in the history of art – Mona Lisa by Leonardo da Vinci.



*Figure 2. Leonardo da Vinci, Mona Lisa, 1502.*



### **Immediate propositions:**

Against a mountainous background a young woman (of white race) is sitting on a wooden chair with arms. She has her arms folded and her torso turned to the right toward the viewer. Her head is almost facing us and she is looking further to one side. Her right hand is resting on her left wrist, and her left arm on the chair arm. She is wearing a dark green dress with a pleated bodice. She is wearing a veil over her slightly tousled hair. She is smiling.

### **Dynamical propositions:**

Mona Lisa, whose maiden name was Gherardini, was the wife of Francesco del Giocondo who has ordered the painting to Leonardo for the occasion of the birth of their third child in 1502 and the acquisition of a house (the official hypothesis provided by the Art Historians of Louvre).

Mona Lisa is a man, a young apprentice of Leonardo named Salai (his real name was Gian Giacomo Caprotti). The name of the portrait “Lisa” derives from Salai (hypothesis published in *Le Point*, February 02, 2011).

All the dynamical propositions stated above about the visual pattern are formed based on our awareness or knowledge of the dynamical object of perception and therefore involve predication of attributes that are not immediately contained in the object of perception but are predicated of it based on our prior experience of replicas of the given phenomenon. This accounts for different interpretations one and the same visual pattern may yield

## **8. Conclusions**

Information is obtained through our collateral experience, in particular, through the immediate physical effect of actual existents upon our senses. Therefore, “we experience” stands for “our senses are affected by”. In our sensory system vision is of primary importance as it is the sense which is the most efficient inasmuch as it is capable of furnishing us with the largest amount of information within the shortest fraction of time. Information furnished by vision, or the visual information is represented through iconic indices. Signs constituting visual information are iconic inasmuch as the image of an actual existent reproduced through the visual system resembles the represented object. Furthermore, these images are indexical in so far as they represent the objects of experience through contiguity: the visual image is generated in the brain after the retina of the eye is physically affected by the object of experience.

Perception initiates with sensation, the reaction of the senses to the physical stimuli of the outside world and it involves thinking as an essential ingredient of it. Thinking is the activity of the mind that accomplishes the process of perception. Partaking of the nature of sensation, perception involves a mode of double consciousness, which manifests itself through a simultaneous awareness of the self and the non-self. Unlike action, perception is a reaction and as such entails a considerable modification of the consciousness of the self, i.e.

the entire phenomenal manifestation of the mind. As a result of this physical reaction the senses transmit to the mind, the sense-data, or the evidence of the senses.

As far as the sense of vision is concerned, it initiates with the reaction of the visual cells of the brain to the attributes of the visual scene. Such a reaction results in a diagrammatic representation re-produced in the brain through the resemblance with the represented object present in the field of vision. This image resulting from the brute reaction of our sense of vision to the actual existent present in the visual scene is our direct percept. The percept is the first constituent element of perception, which is formed through a compulsive reaction of the senses and is thereby not subject to modification. The collective total of our direct precepts represents our direct knowledge, that is, knowledge that is directly imposed upon us and which we can neither annul nor modify.

As an iconic image, the percept is rhematic, i.e. it does not convey any information to us; rather information can be obtained from it. This is done through the activity of the mind – the thought, which springs up in the process of perception immediately after the percept is formed. The role of thought in perception consists in describing the impression or the evidence of the senses. The smallest unit of information being the dicisign, or proposition, the operation of thought in perception takes a propositional form. In particular, through the propositional function of the mind the qualities recorded by the senses are attributed to particular subjects and a number of propositional judgments are formed concerning the field of vision.

When it comes to propositions formed concerning a percept, the immediate and dynamical propositions of perception should be distinguished. Immediate propositions (IPs)

of perception consist in the attribution of qualities to the perceived object as they are immediately present in the field of vision, as opposed to dynamical propositions (DPs) which bear on the qualities of the given object not necessarily perceived at the instance of perception but rather attributed to it in the past experience. IPs constitute the information concerning the object of perception (i.e. the particular instance of a general type), while DPs – our knowledge of the phenomenon concerned. Therefore, the dynamics involved in different interpretations of the same visual pattern is generated by the complex interaction between the information and knowledge in an act of perception.

## 9. Notes

1. The chief published collection of Peirce's writings is the *Collected Papers of Charles Sanders Peirce* (CP), and in referring to these volumes, we have adopted the established method of reference used by all Peirce scholars. Thus, CP 5.446 means volume 5, paragraph 446 of the *Collected Papers*. Where relevant, the date of the text would be given (e.g. CP 4.508, c. 1902).
2. Zeki employs the quotes to indicate that the terms “impressed”, visual “impression” and “received” by the cortex are not his own terms but those commonly used by neurologists.
3. Before Peirce, the concepts of “extension” and “comprehension” were employed widely by the Port Royalist Logicians. The distinction, however, goes back to Aristotle and has since been employed by many different philosophers (Porphyry, the Greek commentator of Aristotle; Sir William Hamilton) who applied different terms to refer to these concepts. Thus, “external quantity” and “internal quantity” are the terms used by many early Kantians, “scope” and

“force” are proposed by DeMorgan. Peirce gives preference to the terms “breadth” and “depth”, for extension and comprehension, respectively, which were borrowed by Hamilton from certain Greek writers (CP 2.391-394).

4. Benjamin Peirce (1809-1880) was an American mathematician who taught at Harvard University for approximately 50 years. He made contributions to celestial mechanics, statistics, number theory, algebra, and the philosophy of mathematics.
5. The order of formation of distinct propositions will be determined by various factors, such as the physiology of the function of vision, conditions of visual perception, or the physical attributes of the object of perception. Thus, for instance, propositions concerning the colour of objects will be formed first. This equally holds for the objects represented in the centre of the visual pattern.
6. As far as this particular image is concerned, the dynamical propositions formed concerning it mostly bear on the identity of Mona Lisa. Hence, the dynamical propositions we include here represent two different hypotheses concerning the identity of Mona Lisa.

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