The link between the abstractive dimension of perception faculties in the avicennial doctrine and the model concept in physical science: mechanism of vision as an example

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ABSTRACT
This paper identifies the concept of model (mithāl) in the philosophical doctrines of Avicenna (ibnSīnā) and Al-Ghazali (al-Ghazzālī) and its link to the faculties of perceptions (Kiwā Moudrika) in their full meanings: diversities and amplitudes of abstraction degrees (Marātib al Taj'rid). According to a number of philosophers and thinkers such as Ibn Khaldoun, Locke, and Leibnitz, these faculties of perception are fundamental for the acquisition of scientific knowledge of the sensible universe. This present study focuses mainly on two of these faculties: Al-hiss al-mushtarak and Al-wahm which are found to be of a prime importance after a thorough examination. It is necessary; however, to draw the reader's attention in this summary to the fact that these two faculties have an accurate and specific signification. They have no equivalent in the different contemporary epistemological approaches, and can undoubtedly enrich this field by giving fulfilling answers to certain topical issues. The concepts al-hiss al-mushtarak and Al-wahm can improve the understanding of the conceptual models that the results of research in the science of education yield.

KEYWORDS
Model, perception, abstraction, physics, Al-hiss al-mushtarak, Al-wahm, imagination

RÉSUMÉ
Nous nous proposons dans cet article de cerner le concept de modèle (mithāl) dans les doctrines philosophiques d'Avicenne (ibn Sīnā) et Al-Ghazali (al-Ghazzālī) et ce, au travers de ses liens avec les facultés de perceptions (Kiwā Moudrika) dans leurs pleines acceptions : diversités et amplitudes de degrés d'abstraction (Marātib al Taj'rid). Ces facultés de perceptions, selon nombre de philosophes et des penseurs sont en fondement de l'acquisition de la connaissance

scientifique de l'univers sensible. Citons à titre d'exemple Ibn khaldoun, Locke, Leibnitz. Notre étude sera essentiellement centrée sur deux de ces facultés : Al-hiss al-mushtarak et Al-wahm qui nous ont paru, revêtir selon nous, une importance toute primordiale. Nous nous devons cependant attirer l'attention du lecteur, même dès ce bref sommaire, que ces deux facultés ont une signification précise et particulière, qui n'a point d'équivalent dans les différentes approches épistémologiques contemporaines, ils peuvent en conséquence lui apporter incontestablement, un enrichissement susceptible de répondre à certains questionnements d'actualité. Les concepts al-hiss al-mushtarak et Al-wahm peuvent améliorer la compréhension des modèles conceptuels donnés par les résultats de recherches en science de l'éducation.

MOTS-CLÉS
Modèle, perception, abstraction, science, Al-hiss al-mushtarak, Al-wahm, imagination

INTRODUCTION

Nowadays, the use of "model" word has become very common in the language of science. Paul Valery, in his time, declared, "*We only think with models*" (Le Moigne, 1993), this statement has never been truer than today. This term is used in all disciplinary fields, yet it does not have the same status, or even the same meaning. Its signification oscillates, according to the case, between the platonic one (ideality, abstract norm, and feasible idea), and that of practical origin (a simplified concrete representation of a complex reality). The contemporary sciences seem to cope well with this polysemy. They make models a methodological tool constituting their investigative approach and their mode of exposure. Thus, it can be said that there is a well-established relationship between the models or more exactly the modeling and the knowledge that we have of the real world. Can we say that modeling is at the confluence of all the sciences, i.e., from mathematics -where a theory of models is elaborated- to the economic and social sciences?

Furthermore, addressing a scientific problem is expressed in the framework of its modelling which is the appreciable character of the scientific spirit, "*A study that cannot rely on a model is sometimes regarded as unscientific, a problem that cannot lead to modelling is a problem that escapes science*" (Nouvel, 2002). We observe even the interference of models between various disciplines; That is to say the use of the same models for distinct phenomena, therefore defining any science can be ambiguous.

Physics like any other discipline is structured by different models that describe our vision of the outside world. In these sciences, models have a very specific feature, only because they have for a long time offered to other sciences, as those of nature first and those of man and society then, an example with the rigor of their approach and the logical coherence of their concepts. Although the drifts of this physicalism have been rightly pointed out by fact that physical models have had a function of securing knowledge as declared by S. Bachelard (1979).

We have to emphasize on the fact that although the notion of a model is not recent, there is no precise definition of this concept, only disparate statements. It is defined by its qualifications and mode of use in science as: a judgment, a point of view, an architecture, a reduced object, a materialization of the statements of science in a concrete object, a simplifying scheme and an overall construction (Jaulin, 2004). It is clarified as well by its role as: a domain of object which gives an interpretation of an axiomatic (Cohen-Tannoudji, 1999), or a material - or mental - system that simulates the natural starting situation, or an analogical law of a real being (Thom, 2004).

We shall, thus, attempt to clarify the term « model » (mithāl) in order to identify the richness of its semantics, likewise bring out a fundamental epistemological aspect of the edification of the sciences by models. This can be achieved through associating it with the faculties of perceptions (Kiwā Moudrika) in their full meanings: diversities and amplitudes of degrees of abstraction (Marātib al Taj'rid).

During our historical study of the evolution of the "model" concept in the physical sciences, we have chosen as an example the historical development of explanatory models of the mechanism of vision. Our comments on its link with the perception faculties are argued by the use of research results on the analogy of these explanatory models and the alternative conceptions of children. Over the past 50 years, the analysis of students' mental representations of the mechanism of vision, has been the subject of extensive research based on various experimental procedures. Important results have been achieved by putting children in different types of environments and different situations (Ramadas & Driver, 1989; Selley, 1996; Dedes, 2005; Kokologiannaki & Ravanis, 2012, 2013).

THE SENSORY PERCEPTION AND THE ABSTRACT MODEL

The various perceptions are the origin of all possible knowledge «*having ideas, and perception, being the same thing*» (Locke, 1690/2000).

The empirical sciences that we qualify as the science of usual, begin with sensory perceptions as they were emanated from the outside world through the senses, in other words, the human being is devoid of any exterior information; he receives knowledge from the outside world through his five senses. We cannot imagine a human being deprived of all his five senses; in this case, his mental life will never progress.

These external perceptions are consigned to internal percipient which perceive others that are imperceptible by the senses. These various perceptions are still ordered systematically to reveal the unknown. In other words, there are two sources from which we receive all ideas, therefore; all our knowledge: The external perception which is sensation, and the internal perception. We reach this end through the act of thinking, "*The human being cannot be independent of his thought. The latter does not have one second of interruption; its agitation is faster than a blink. Through this thought, sciences are born*" (Ibn Khaldun, 1967).

For example, we make an analysis of proposed models related to the conception of light. A phenomenon which is connected to "vision", the most powerful sense, which plays a fundamental role in the acquisition of human knowledge. In order to examine the modes of production of scientific knowledge, and to derive a theory of the construction of knowledge by models emphasizing on their degrees of abstraction, and their relationship with the faculties of perception (Table).

TABLE

Chronological table of the history of the conception of light (Galili, 2004; Maitte, 2015)

Scientist	Date	Proposed model
Pythagoras	-570/-480	Proposed the extramission theory - emissions of the internal fire from the eyes to the object
Euclid	-330/-270	
Empedocles	-490/-430	Proposed the intromission theory - emissions of external fire from the object to the eyes
Democritus	-460/-370	

Plato	-428/-348	Suggested the meeting of the internal fire emanating by the observer with external fire given off by the observed objects.
Aristotle	-384/-322	Suggested the color of the object to cause a special compression in the medium between the object and the observer. Light causes the medium (air, glass, water) to be transparent and allows the mentioned compression to reach the observer and proceed within the eye to the soul, providing the act of vision
Al Hazen	965/1039	claimed that light possesses its own existence which is independent of the eye and the object
Descartes	1596/1650	Gave the first formulation of what is now known as Snell's law of refraction, and proposes that light is the result of friction between vortices that generate the light which spreads with infinite speed.
Fermat	1601/1665	Proposed the principle of least time.
Isaac Newton	1642/1727	Thought that light is made of particles which he referred to as corpuscles that spread at a high speed.
Christian Huygens	1629/1695	Proposed the wave nature of light.
Louis Malus	1775/1812	Confirmed the wave nature of light, and discovered the polarization of light.
Thomas Young	1793/1829	Confirmed the wave nature of light through the interference.
James C. Maxwell	1831/1879	Established that light itself is just a special case of an electromagnetic disturbance in the form of waves.
Hendrik Antoon Lorentz	1853/1928	Interpreted the Michelson-Morley experiment, (1852/1931 the United States) And confirmed the impossibility of the existence of the Ether.
Heinrich Hertz	1857/1894	Discovered The photoelectric effect in 1887.
Max Planck	1858/1947	Introduced the quantum theory
Albert Einstein	1879/1955	Suggested the idea that light exists as tiny packets, or particles, which he called photons, which have an energy that equals to a quantum (hν) that propagates at the speed of light
Louis de Broglie	1892/1987	Proposed the dual nature of light. Light could behave simultaneously like a wave and a particle.

As a result of analysis of various models associated with the reality of the vision, and the nature of light, we observe that:

- These models are structured on the basis of the direct perception of the sense of vision (observation of light, fire, sun, and rainbow,…) or through experimental devices (images are formed by lenses, prisms, spherical mirrors, diffraction fringes, the decomposition of the white light, telescope, spectroscope, and extremely sensitive instruments...) which we consider as extensions of this sense.
- These models are expressed by units which are more abstract such as: Light rays, speed, rectilinear propagation, index of refraction, flux, wave, corpuscle, principle of least time, polarization, electromagnetic field, spectral density, frequency, wavelength, energy, quantification, Planck's constant, continuity and discontinuity.

- These models are different and sometimes contradictory although they represent the conception of the same phenomenon.
- All judgments which are associated with these models are partial judgments. Pythagoras model does not explain why we cannot see at night. The Newton model does not explain Young's interference, and double refraction. Michelson Morley experiment denies the existence of ether wind, that is the foundation of the undulatory model; this latter does not explain the photoelectric effect, and the duality of light seems paradoxical i.e the same thing can have two different natures.

The empirical sciences are structured by passing from sensory data to the construction of more abstract models that are more distant from the tangible world. While structuring our models, generally we start with facts, by increasing gradually to abstract stages more distant from tangible world where the human faculties of perception play a major role in the construction of these models.

The human being perceives the sensible realities through senses, and the abstract realities through thought, in other words, any sensible reality is conditioned by the existence of sense-perception while abstract realities are conditioned by the existence of mental apprehension. Therefore, the scientist will move from his sensory observations which rely on sensory perceptions to the structure of different conceptions of the external world which are called models.

Our comments on the dominance of sensory perception, abstraction, the conception of disparate models and the issuance of partial judgments become relevant if we observe the remarkable similarities of the explanatory models of vision with those of alternative conceptions of children.

Many recent studies in the science of education of vision based on various experimental procedures have confirmed this analogy. The results give a category of children (5-15 years old) who found a difficulty to identify the systematic relation between the eyes, light and object; as well as, completely deny the independent existence of light as a physical entity (Andersson & Karrqvist, 1983; Ravanis, 1999).

Other comparative studies between the first historical models and representations of children, concerning the process of vision, give several categories of children whose interpretation is focused on the interaction between the eye, the light, and the objects. Among these studies, Selley was the first who has formulated nine different mechanisms of children's interpretations (Ramadas & Driver, 1989; Selley, 1996; Dedes, 2005; Kokologiannaki & Ravanis, 2012, 2013).

The results of these studies lead us to say in this context:

- Children think the same way as early scientists which articulate the main role of sensory perception. This kind of perception-dominated thinking, being the starting point in the reasoning of both children and early scientists, does not obviously help to develop concrete images of the role of light in the mechanism of vision (Dedes, 2005). So other perceptions are needed which gradually rise into abstraction.
- Children abstract a category of abstraction when they speak of "something" that moves between the eye and the object, or a movement that starts with the eyes, using terms like: transmission retransmission, image, at the same time, brain, ray, illumination, lighting of space.

- Children make different and sometimes contradictory judgments for the same phenomenon, such as the evocation of a mechanism for day vision and then its rejection for the vision of the night (Kokologiannaki & Ravanis, 2012).

THE EXTERNAL PERCEPTION

The objects of nature can be perceived with different sensory modalities. Through the five senses, we apprehend perceptively the external world: the vision, audition, touch, taste, and smell. Therefore, light is the physical phenomenon that acts on the eye, the sound on the ear, and the temperature on the sense of tact... "*Sensations are the source of most of the ideas we have. There is nothing in the intellect that was not previously in the senses*" (Locke, 1690/2000). External perception is accomplished by the interaction of the sensory apparatus with the perceived object; as a result, it appears as a power which removes the image of the conceivable on the perceptual apparatus. The image of the perceived object is printed on this apparatus. The eye perceives a visual image; the ear, a sound image and touch, a tactile image; thus, the five senses receive an image and not the material. This external perception is defined as the acquisition of an image by the sense exempted of its material. For Aristotle, the sensible organ receives the sensible forms which are their images but not their material, just as the wax receives the imprint of the ring without iron or gold of which it is composed.

For now, we perceive the first image[1] which is imprinted on the human being. This abstract image (of matter) represents the imprint or model of external reality, and sensation is just a faculty which models this perception since there is an interaction between the sense and the sensible where the first accepts the image of the other.

Sensibility is not limited to relations that involve an excitation from the external environment and the intervention of the senses, to clarify; it manifests in the internal relations between deep organs which their vegetative autonomy are put in some way out of the control of consciousness. In addition, the parts of the musculoskeletal system: muscle, tendons, ligaments, bones, and articulation have sensibility, and for this, they are endowed with receptors suitable to the mechanical excitants.

Whence, the model is imposed by the interaction between human being and the outside world, and our brain is fed by these different models. These models can go through major modifications, before being available to the brain, since our senses capture, filter, and code into signals. There is a sequence of models, because the external object is excitable, and it has its own energy of excitation, and sensation is a phenomenon of internal excitability which often science fails to observe. These excitations are transformed into chemical reactions and then into electricity or electrical impulses which are transmitted between the neurons constituting the language or the model of the nervous system.

Discussing the theory of matter and the theory of the mind, Henri Bergson was only faced with images: "*the afferent nerves are images, the brain is an image, the disturbance travelling through the sensory nerves and propagated in the brain is an image too*" (Bergson, 1911).

[1] In the article by Meriem Sebti we find an explanation of the concept of image « The image as a lining of the real, which represents something, and takes the place of something absent. This characterization of the image as a double and a material entity which is formed in the powers-organ as by reification is part of the antique and medieval conception of the image. The image, in the epistemic horizon of antiquity and the Middle Ages, is never conceived, in fact, only in relation to what it represents» (Sebti, 2005)

The characteristics of our sensory apparatus impose that the perceived model is:

1. **Incomplete** due to the limit of our receptors. A considerable amount of information is lost. This deficit can be enriched by the invention of sophisticated instruments.
2. **Fragmentary** and **elementary** due to the autonomy of each sense. "*Each of our senses never knows what other senses know, never what is common to all senses, as equal or unequal, one and several, and, in brief, the unique world that we believe we know through these senses…*" (Chartier, 1902). The unified and global image of an external object, therefore; requires another perceptive power.
3. **Instant** and **immediate** due to the necessity of the presence of the perceptible on one hand, and of the perceptive apparatus on the other hand. In case one of them is absent, the perception ceases.
4. **Abstract of matter** but accompanied by attributes or belongings of the sensible such as: quantity, form, movement, intensity, location in space, and distance. What we consider as the first degree of abstraction is only the absence of matter.
5. Sometimes **mistaken**. The eye sees what is big as small, what is mobile as immobile; there are various examples of optical illusions.

All these images coming from the senses constitute the foundation of knowledge, but this knowledge is partial and insufficient. The external faculties of perception have a limit that should not be overcome and yield the function to other perceptible faculties which interact with these primitive images.

The external perception, therefore; cannot construct knowledge, it is necessary that the models which are already acquired to be united in another perceptive faculty which discerns, synthesizes, combines, joins, and safeguards them in the absence of sensible.

The external faculties of perception abstracted a category of abstraction by modeling the images of the object in the senses. IbnSīnā and Al-Ghazzālī call abstraction as the disjunction or detachment of the image from the sensible, "*perception is the act of getting or removing the model of the object reality. It is not the external image that establishes itself in the percipient; in fact it is but the model*" (Ghazali, 1981).

THE INTERNAL PERCEPTION

The internal perception is an ascent of external perception. Its subject is the abstract images that are obtained from the five senses and accompanied by its attributes.

This article is confined to explain in detail the abstraction of two perceptive faculties which, according to our verdict, play a major and a broader role in the edifice of scientific knowledge, especially in physics, which is an empirical science based on observation and experience instead of reasoning alone.

1. **Al-hiss al-mushtarak**[2]: (Or phantasia is derived from a Greek word that means imagination.) It is located, by Avicenna, in the first cavity of the brain in the frontal lobe (Avicenna, 1988).
2. **Al-wahm**[3]: located behind the central cerebral cavity.

[2] The linguistic interpretation of "Al-hiss al-mushtarak" is the "common sense"; yet its two terminologies have no semantic link. Our concept has the meaning of the center of the faculties' external perception.

Al-hiss al-mushtarak

According to Avicenna and al-Ghazzālī, al-hiss al-mushtarak is the internal sense in which all the sensations from the external senses are gathered. It is the center of the five senses. Al-hiss al-mushtarak groups the images of identical perceptions, such as two images received by each of the two eyes, or two sounds detected by each of the two ears. Further, it also assembles the different perceptions such as image and sound, sound and tact, image, smell and tact ... of a given sensation. (Avicenna, 1988), accordingly, it is the center of the faculties' external perception.

Through al-hiss al-mushtarak, we perceive that this motion corresponds to this object, and this fall is of that ball with a specific color and particular sound on the ground. So, it plays a unifying role in gathering the external perceptions. Without al-hiss al-mushtarak, linking the various phenomena would be infeasible. Al-hiss al-mushtarak is a faculty whose role is only the perception of images emanating from the external senses. It neither acts on nor preserves these images.

Al-hiss al-mushtarak is a faculty which governs the five senses by directing, orienting or guiding them. Inside this faculty, all perceptions are correlated.

Example:

1. It appears that a rotating or falling dot have a circular form or a straight line. The imprint of the mobile is fixed in al-hiss al-mushtarak thereby before this image is erased, a new image appears. Without al-hiss al-mushtarak, neither the straight line nor the circle will be perceived.
2. In Ibn al Haytham's "Multicolored spinning top" experiment or Newton's disc experiment, we see that the multicolored disc is white. Indeed, al-hiss al-mushtarak unifies these colors.
3. Optical illusions are generally due to the aggregation of a set of figures. When al-hiss al-mushtarak unifies these figures, it forms others and compels the eye to perceive them (Figure 1).

The experience of the physicist Stratton at the end of the nineteenth century (Tiry, 1994) demonstrates clearly the power of this faculty and its mastery of the five senses. He created glasses on which he had fixed prisms giving an inverted vision of the world (upside-down) so that the sky was below, the water coming out of the tap rose upwards … etc. On the third day of the experiment, despite wearing glasses reversing the sight, the perceived world has returned to the right way up.

This experiment of inversion was reproduced by Kohler (1964). The latter permanently carried a device composed of a mirror which reflects the objects located at the bottom and makes them appear inverted at the top. In such case, this inversion was corrected in very short lapse of time, then permanently after nine days. Afterwards when Kohler removed the glasses, he first saw the world upside down before perceiving it as it is in its normal orientation (Rigal, 2003). These are real views and not imagination. Al-hiss al-mushtarak, which governs the external senses, obliges the eye to perceive the world in its original state.

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[3] The name of this faculty is found in the Avicennial doctrine of perception, pronounced in Arabic “Qowa-al-wahmia" (Avicenna, 1988). It was taken up by other Muslim scholars as al-Ghazzālī, Averroès, Ibn Al-Arabi and Al Fârâbî. There is no correlation between this concept and the word "illusion" in the comparable language. “Illusion” gives a negative aspect and dispossesses al-wahm of its positive quality as explained in subsection 4.2.

FIGURE 1

Optical illusions, al-hiss al-mushtarak unifies the incomplete black circles forming the apex of the triangle that appears concretely brighter than the paper. Figure 2a shows clearly a more radiant triangle while figure 2b appears with curvilinear sides

The results of educational research on children's representations of the mechanism of vision give a significant percentage of students who describe this process as a motion that starts from the eyes. Most scientific publications claim that the active role of the eye is the dominant interpretive mechanism on children's thinking (Dedes, 2005). The results of Ravanis' studies on the ideas of Greek students (aged 12 to 13) who had already attended an optics course on the mechanism of vision give a clear idea, however they tend to attribute an energetic role to the eye (Ravanis, 2000).

This phenomenon gives us some indications about the importance of al-hiss al-mushtarak and its governance of the five senses. Between the eye, the object, the light, and the reflection - fundamental factors of vision - the eye is bordering on al-hiss al-mushtarak through which the link between the eye and the mechanism of the vision arises first.

On the other hand, the results of the researches mention that the thinking of children evolves with age. It passes from simple to more complicated forms of representations (Guesne, 1984).

This evolution is explained by the liberation of subjects from the perceptions of al-hiss al-mushtarak which is the center and the governor of the faculties of external perception. It is similar to the transformation of scientific conceptions into the history of science, often characterized by its distance from perceptions.

The images unified by this faculty express an abstract form from matter. They do not exist in the sensible reality. They conserve all the peculiarities of the sensible object, yet these images cease once the sensible is absent from the external senses. Therefore, these images constitute a new model which is more exhaustive and interesting for building scientific knowledge. It is true that this new model (the image) is an abstract from matter however; it is always linked to sensible attributes.

Al-wahm

This faculty is mentioned by various Arab-Muslim scholars, such as Avicenna in his treatises devoted to the soul.

Al-wahm[4] is called in Latin Estimativa; however, we couldn't find the equivalent of this concept in English, that is why we preserved it in its original language which is Arabic.

We can perceive partial senses besides partial sensible objects that neither of our senses nor al-hiss al-mushtarak can perceive, such as: courage, fear, generosity, and sympathy...

Al-wahm is a bodily faculty located in the middle cavity of the brain and «... *which perceives the partial senses related to the partial sensible. This faculty stimulates the sheep to flee from the wolf the first time when he perceives it, while show affection towards a child*…» (Avicenna, 1988).

As a matter of fact, the senses which are perceived by this faculty are partial and exist in the partial sensible in a way they are linked directly to objects or by analogy. Hence, the hostility which is perceived by the sheep from the wolf is partial. Partial perception means the link between the sense and the existence of objects that directly concerns it. The perception of sense does not require the complete existence of the object i.e. only a specific part of it. The aggression perceived by the sheep is not associated with the overall concept of the wolf; indeed, it is linked to its appearance, its image or anything related to it. The feeling of aggression increases and decreases according to the plurality or the limited number of the wolves as well their remoteness and rapprochement…

The faculty of al-wahm has a function other than perception. It is considered as the foundation of the edifice of scientific knowledge. al-wahm is the source of all judgments and opinions which can be either true , for instance it cannot judge an object existing in two different places, or it can give other unjustifiable or unexplainable judgments (false) , for example, our conception of the vacuum between atoms. If the vacuum "absolute" exists, how is it perceived? What does the existence of vacuum mean? And what are its characteristics? Vacuum does not exist outside; it has a mental ontology in the faculty of al-wahm.

Although the judgments of al-wahm come from sensations, it can sometimes disapprove an accurate judgment on it. Al-wahm does not accept the infinite indivisibility of matter, instead it limits it. This faculty does not admit to locate a body and its movement, smell, color and shape ... in the same space; however, it adopts the separation by placing a veil between them. (Ghazali, 1981).

Since this faculty is closer to sensible, its judgments are partial. Consequently, it can be uncertain and temporary. Al-wahm makes incompatible judgments for the same observed data, in other words, it is the origin of the existence of different and disparate conceptions for the same phenomenon. It is, thus, the place of various ontologies which become relative among scientists of the same discipline. "*Physical theory is underdetermined even by all possible observations… Physical theories can be at odds with each other and yet compatible with all possible data even in the broadest sense. In a word, they can be logically incompatible and empirically equivalent*" (Quine, 2015).

If one is faced with a problematic situation, it is the faculty of Al-wahm that emits at first its judgment. This direct and immediate judgment is partial, uncertain and relative.

Examples:

[4] H. Wolfson showed that the best translation to the word "Al-wahm" is "Aestimativa". In the classical period, the latin word "aestimare" meant to judge, think or believe. It was used by philosophers and theologians in the XII century. The word «aestimatio" expresses an inferior knowledge. For St Bernard of Clairvaux, aestimatio is a cognitive mode for the skeptics who don't have a reliable knowledge and tend to doubt everything. Wolfson in a series of publications, the internal senses (In Harvard theological Review. XXVII (1935) precises that the equivalence of al-wahm is aestimatio which means: an inferior knowledge to that obtained by reasoning (Wolfson, 1935).

In a study, that discusses the mental representations of Greek students (11 years old) on the mechanism of vision in day and night condition. The majority of subjects made inconsistent judgments for the same observable data. After mentioning a certain mechanism for the first condition of the day, they move to the inexistence of a mechanism for the second vision condition at night (Kokologiannaki & Ravanis, 2012).

During instructional interventions, one often observes the same child by using different notions for the same physical concept, depending on the circumstances or the experimental situation or even moving from one notion to another by interpreting the same phenomenon (Driver, Guesne & Tiberghien, 1985).

The faculty of al-wahm is the source of many ambiguous and incomprehensible judgments in physics. Is al-wahm preventing us from understanding the reality of the quantification theory given by Max Planck? Is it the obstacle which hinders us from passing the duality wave-corpuscle? Is al-wahm the reason that we cannot conceive realities found by mathematical relations such as energy and electromagnetic waves and quantum mechanics?

In answering the question "What is energy?" Feynman said: "*It is important to realize that in physics today, we have no knowledge of what energy is. We do not have a picture that energy comes in little blobs of a definite amount*" (Feynman, 1965). Does energy have another level of existence exceeding al-wahm's perception? When Feynman was asked to give an approximate description of electromagnetic waves, he answered: "*I am sorry; I can't do that for you. I don't know how, I have no picture of this electromagnetic field that is in any sense accurate... I cannot really make a picture that is even nearly like the true waves*" (Feynman, 1965).

Are these waves inconceivable, higher and more abstract that the faculty of al-wahm can neither conceive nor represent? For instance, the idea, humanity and animality ... necessitate another faculty of perception.

We perceive, hence, that al-wahm has passed to another degree of abstraction. Indeed, the obtained model is a sense which in its nature an abstract entity, yet it is always linked to its conceivable attributes.

CONCLUSION

The faculties of perception are ordered in a graduated chain. They begin with the simplest faculty contiguous to the matter, and ends by higher faculties more distant from it.

Under the guidance of al-hiss al-mushtarak, the five senses remove the image of the matter with its attributes; the image is partially removed. In fact it requires the presence of the sensible for its perception, however, imagination liberates it completely from matter, and the presence of the sensible is no longer important for perception. The image and its attributes are maintained in their absence, this is why this removal is more robust, while the faculty of al-wahm passes to another higher degree of abstraction, since it acquires the senses which are in their essence of abstract entities. Abstraction at this level is extremely sturdy and vigorous, but the image remains always attached to its attributes.

The operation of abstraction is a natural activity for human beings. It begins with the external perception governed by al-hiss al-mushtarak, after this it comes the internal perception passing to a higher degree of abstraction where it is governed by the faculty of al-Wahm. This latter dominates and employ all the physical percipients.

Al-hiss al-mushtarak and the faculty of al-wahm have a constructive and a leading role in

the edifice of scientific knowledge. The former generates a unified image and grants it to the internal percipients which abstracts it more and more in different degrees until the faculty of al-wahm releases its judgment. These judgments are empirical based on external perceptions.

Thus, we conclude that a model is the conception of perceptual faculties according to their diversity and degrees of abstraction. So, we perceive models and interact with them. Our perceptions gradually rise in abstraction until it reaches the most complete model which will become for that the simplest. The model is everything we perceive, and "*perception is the act of getting or removing the model of the object reality. It is not the external image that establishes itself in the percipient; in fact it is but the model*" (Ghazali, 1981).

ACKNOWLEDGEMENTS

We would like to express our gratitude to Professor Abdelhamid Bentchikou and his team for the fruitful discussions we had with them about epistemology of physics. Our thanks also to Dr. Hannachi Zitouni, Dr. Sid Ali Rayane, H. Houda and H. Amina for their valuable support and advice.

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