https://doi.org/10.17163/soph.n33.2022.04

The bodily and extra-bodily extension of senses

La extensión corporal y extra-corporal de los sentidos

Babu Thaliath[*]
University of Konstanz, Konstanz, Germany
Jawaharlal Nehru University, New Delhi, India.
babu.thaliath@uni-konstanz.de
Orcid number: https://orcid.org/0000-0002-4557-7765

Abstract

The extension of senses remained an unresolved aporia throughout the history of the theory of perception. An appropriate example of the historical persistence of this aporia would be the priority-dispute between extramission and intromission theories of vision prevailing since the ancient philosophy of Plato, Aristotle, Plotinus and others. The resurgence or rehabilitation of the intromission theory of vision in the early Cartesian modernity strategically reversed the predominant position of the sense of touch, which had prevailed in the medieval scholastic philosophy, in favour of the sense of sight. Since then, the external extension of vision has remained an aporia, as problematized and discussed in the works of Descartes, Locke, Molyneux, Berkeley, Condillac, Helmholtz, Gibson, and others. The present treatise is an attempt to reconsider the aporicity of the bodily and extra-bodily extension of senses and resolve it by means of a methodological analogy between the bodily extension of sensations and the extra-bodily extension of the senses of sight and hearing. On the theoretical level, this investigation tries to establish a complementarity between philosophical and scientific epistemologies. This may lead to a scientific proof, on the basis of which the real extension of the bodily and extra-bodily senses could be dictated by a philosophical epistemology and confirmed by a scientific-experimental investigation.

Keywords

Epistemology; theory of perception; vision; intromission theory; extramission theory; auditory perception

Suggested citation: Thaliath, B. (2022). La extensión corporal y extra-corporal de los sentidos. *Sophia, colección de Filosofía de la Educación, 33*, pp. 109-136.

* Dr Babu Thaliath studied Civil Engineering (College of Engineering Trivandrum, Kerala) and German Philology (CGS, JNU) in India. He has a doctorate (PhD) in Philosophy from the Albert Ludwigs University of Freiburg and the University of Basel. He carried out various postdoctoral research projects in the area of Early Modern Mechanical Philosophy at the Humboldt University of Berlin and at the University of Cambridge. He is Professor of Philosophy and German Studies at the Centre of German Studies at Jawaharlal Nehru University in New Delhi. He currently holds the position of Research Associate (Senior Fellow) at the Zukunftskolleg of the University of Konstanz. He has published extensively in the areas of Theoretical Philosophy, Early Modern Philosophy of Science, Theory of Perception, and Aesthetics. Home page: https://www.babuthaliath.com

Resumen

La extensión de los sentidos siguió siendo una aporía no resuelta a lo largo de la historia de la teoría de la percepción. Un ejemplo apropiado de la persistencia histórica de esta aporía sería la disputa de prioridades entre las teorías de extramisión e intromisión que prevalecen desde la antigua filosofía de Platón, Aristóteles, Plotino y otros. El resurgimiento o rehabilitación de la teoría de la intromisión de la visión en la temprana modernidad cartesiana revirtió estratégicamente la posición predominante del sentido del tacto, que había prevalecido en la filosofía escolástica medieval, a favor del sentido de la vista. Desde entonces, la extensión externa de la visión ha permanecido como una aporía, problematizada y discutida en las obras de Descartes, Locke, Molyneux, Berkeley, Condillac, Helmholtz, Gibson y otros. El presente tratado es un intento de reconsiderar la aporicidad imperante de la extensión corporal y extra-corporal de los sentidos y resolverla mediante una analogía metodológica entre la extensión corporal de sensaciones y la extensión extra-corporal de los sentidos de la vista y el oído. En el plano teórico, esta investigación intenta establecer una complementariedad entre las epistemologías filosóficas y científicas. Esto puede conducir a una prueba científica, sobre la base de la cual la extensión real de los sentidos corporales y extra-corporales podría ser dictada por una epistemología filosófica y confirmada por una investigación científico-experimental.

Palabras clave

Epistemología, teoría de la percepción, visión, teoría de intromisión, teoría de extramisión, percepción auditiva.

Introduction

In comparison with the conceptual thinking, sensory perceptions are clearly endowed with spatial extension and temporal simultaneity. The individual sensory perceptions can be divided into two categories, namely the bodily extended sensibility, as represented in the sense of touch or taste, in the sensation of pain or cold, etc., and the extra-bodily extended sensibility, to which the sense of sight and hearing belong. In both categories, the bodily and extra-bodily extension of the senses poses a clear challenge to the prevailing modern epistemologies and theories of perception, as represented in the seminal works of Descartes, Locke, Molyneux, Berkeley, Condillac, Helmholtz, Gibson, and others. It remains an unresolved aporia, which also necessitates a fragmented disciplinary contextualization of its investigation. As a prevailing aporia the extension and objective localization of sensibility form a point of contention not only in the context of the philosophical theories of perception, but also in other areas of science such as psychology and neurobiology.

In the case of bodily sensibility, we clearly experience the bodily extension and localisation of mental sensations and their temporal simultaneity. The question now arises as to whether the bodily extension and the temporal simultaneity of sensory perceptions are accomplished solely by the mind, or also by the body, which takes part in bodily sensa-

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

tions through the nervous system that is spread all over the body. Here we are inevitably confronted with the problem of the possible interaction between mind and body in all cases of bodily sensibility. Such an interaction would furthermore point to the necessary complementarity between philosophical and scientific epistemologies, which alone can seemingly solve the persistent aporia of the extension of bodily sensibility.

However, it is difficult to imagine the interaction between mind and material bodies in the case of the external extension of senses such as sight and hearing, as the nervous system is confined to the human body and cannot extend externally in the surrounding free space. Nevertheless, *structural* analogies can be drawn between the bodily and the extra-bodily extension and simultaneity of sensory perceptions. This will prompt us to search for the possibility of whether the external extension and objective localization of the sense of sight and hearing is *analogous* to the bodily extension of the sense of touch or taste as well as the sensation of pain or cold. Such an analogy would reinforce, even justify, the complementarity between philosophical and scientific epistemologies in the study of the extension of the senses. This complementarity, which applies equally to the bodily and extra-bodily extension of the senses, would also call into question the apriority of spatial and temporal *forms* of sensibility, which are philosophically speculated or represented in the prevailing framework of the Kantian transcendentalism.

In the following a methodological analogy between the bodily and extra-bodily extension of the senses is explicated. Using this methodology, the intromission theory that has prevailed since the early modern era and which gave rise to almost all unresolved aporias in visual perception, is re-examined. In doing so, attempts are being made to legitimize the extramission theory of vision, which was already represented in antiquity and middle ages and later suppressed in modern times. The methodological analogy between the bodily and extra-bodily extension of the senses also presupposes the complementarity between the scientific and philosophical foundations of sensory perception. Such a complementarity would justify not only the extramission theory of vision, but also the real extension of all the senses.

The complementarity of philosophical and scientific theories of perception

The bodily and extra-bodily extension of senses refers to completely different modes of existence, namely the mind and the body. Since the

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

emergence of the Cartesian modern age, sensory perceptions as fundamental epistemological processes were generally ascribed to the perceiving subject; on the other hand, the connectivity of the senses with the body and the external extension of the sense of sight and hearing tend to be regarded by philosophy as aporias. The complete separation of subjective sensation from the object – an undertaking which is decisive and propaedeutic for modern epistemology – was hardly strived for in the traditional scholastic philosophy[1]. On the other hand, the complete separation of the sensory qualities from the object of perception and their appropriation by the perceiving subject, which Descartes achieved through his method of doubt and negation, became a propaedeutic to modern epistemology in general. Cartesian dualism, as most closely represented in its absolute differentiation between *res cogitans* and *res extensa*, was based on his method of negation, which was repeatedly used by many philosophers of the early modern period.

The body-soul dualism, introduced and established philosophically and systematically by Descartes, culminated in his radical idea: "The soul can also exist without a body" (Descartes, 1972, p. 67). This gave rise to two kinds of aporias in the context of early modern epistemology: If the soul as *res cogitans*, to which the sensory perceptions as well as the acts of the will belong as different modes of thinking (Descartes, 1972, p. 145), can exist completely separate from the material body and therefore prove to be immaterial and unextended, how can it cause bodily acts of will (volition) and extend in the body through sensory perceptions? Immediately after the appearance of Descartes' *Meditations*, Princess Elisabeth of Bohemia, a passionate Cartesian, polemicized against both of these problems in her first letter to Descartes on May 6, 1643.

> How can the soul of a man determine the spirits of his body so as to produce voluntary actions (given that the soul is only a thinking substance)? For it seems that all determination of movement is made by the pushing of a thing moved, either that it is pushed by the thing which moves it or it is affected by the quality or shape of the surface of that thing. For the first two conditions, touching is necessary, for the third extension. For touching, you exclude entirely the notion that you have of a soul; extension seems to be incompatible with an immaterial thing (Nye, 1999, pp. 9-10; Lauth, 2006, p. 189).

In his reply, Descartes admitted, as is well known, that he neglected the indispensable connection between the soul and the bodily acts of will and sense perceptions in favour of "thinking":

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

> There are two facts about the human soul on which depend all the things we can know of its nature. The first is that it thinks, the second is that it is united to the body and can act and be acted upon along with it. About the second I have said hardly anything; I have tried only to make the first well understood. For my principal aim was to prove the distinction between soul and body, and to this end only the first was useful, and the second might have been harmful. But because your Highness' vision is so clear that nothing can be concealed from her, I will try now to explain how I conceive the union of the soul and the body and how the soul has the power to move the body (Descartes, 1970, pp. 137-138; Ebbersmeyer, 2015, p. 29).

If "thinking" is immaterial and not extended in comparison with sense perceptions and volitional acts, it can only be abstract-conceptual thinking. However, certain modes of thinking determined by Descartes, such as memory or imagination, clearly include the factum of seeing, and the bodily acts of will includes the mechanical-material volition. The virtuality of imagination and memory refers to their immateriality— although they are spatially extended —but, as necessary references, the imagination and memory presuppose the real, material and spatially extended objects that are at some point directly looked at. The factum of sensibility —especially the sense of sight but also hearing— is indispensable here. This also points to another aporia that is still difficult to solve, namely the extra-bodily extension of senses.

The epistemological turning point in the early modern period, which was initiated by Descartes and established almost paradigmatically in the post-Cartesian philosophy from Locke to Kant, also marked the historical occasion for the emergence of natural sciences and their divergence from the philosophy of mind. The early modern emergence of natural sciences, especially mathematical sciences such as mechanics and optics, had its basis in the medieval-scholastic *philosophia naturalis*, i.e. ultimately in the overall framework of philosophy itself, as the seminal works of Anneliese Maier demonstrate. The historical transition from the medieval-scholastic *philosophia naturalis* to the early modern mechanical philosophy turned out to be one of the most important characteristics of Cartesianism. The two parts of Descartes' main work, *Les principes de la philosophie*, namely *On the principles of human knowledge* and *On the principles of physical things*, signalled the origin of the historical unfolding of a divergence between philosophy and natural sciences. The early modern mechanical philosophy arose first from mathematical sciences, namely classical mechanics and optics; it later evolved into material sci-

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

ences like chemistry. It is important to assume here that in the context of early modern mechanical philosophy, the philosophers and natural scientists —as "natural philosophers" such as Descartes, Gassendi, Newton, Locke, Galileo, Hooke, Boyle and others— formed a unique community.

The early modern divergence between philosophy —as the philosophy of mind— and natural sciences thus had its origin in philosophy itself, more precisely in the predominance of epistemology initiated by Descartes. As never before, epistemology began to show an ambiguity precisely in its referentiality, i.e. in the epistemic access to objects. While philosophical epistemology aimed primarily at an epistemic access to mind, body, which is completely separated from mind as a purely natural object, became the main referent within the framework of natural philosophy. This unfortunate epistemological divergence initially gave rise to the historical unfolding of a methodological divergence between philosophical and scientific ways of thinking. Thinking with natural objects – within the framework of natural science – now strictly excluded the undesirable factum of mind.

Is it legitimate to have two different epistemological methods and strategies in our philosophical endeavour to understand our self and the world of objects around us? The question is most likely to concern the body and the mind housed in the body itself, to which we seek a sufficient epistemic access both within the framework of philosophy and that of natural sciences. This ambiguity of epistemic access, which results in the disciplinary and contextual differentiation between philosophy and natural sciences, clearly concerns the previously discussed aporia of corporeal and extra-corporeal extension of sensibility. The bodily extension of the sense of touch, taste and smell, sensations of pain, cold and warmth, etc., are undoubtedly caused by the material body itself. But we ultimately attribute all of these sensations to a merely perceiving subject. How and to what extent are these purely subjective sensations based on the natural scientific – or physiological, neurobiological, etc. – processes in the body, especially in terms of their physical localisation and extension?

The indispensable nexus between purely bodily causes and processes and purely subjective sensations resulting from them is tacitly assumed in everyday life; in philosophy, on the other hand, an attempt is made to completely separate the material causes from their mental effects. Let us consider (hypothetically) the possible case of a strict Cartesian who is inclined to ascribe all bodily sensations or their origins and existence to the soul alone. One day he wakes up with an excruciating toothache, that he feels localized at the root of a particular tooth. Would

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

he —as a strict Cartesian— continue to think that his toothache, despite the clear localisation of the pain at the roots of the tooth —that is, in the body— is ultimately a purely subjective sensation and as such should be treated mentally? In this case he would first go to a psychologist with the conviction that his toothache can be treated and cured solely at the level of his mind. In another possible case, in which our philosopher-patient in addition to his conviction, that the sensations are purely subjective or originate solely from the subject, also believes in the neuronal processing of the pain sensation in the brain, he would go to a psychiatrist or a neurobiologist with the hope that his toothache can be completely relieved by treating a specific part of the brain that processes the neuronal input from the roots of the tooth into the sensation of toothache. In everyday life, however, he will immediately go to a dentist who would treat the toothache purely physiologically. The dentist would first locate the origin of the toothache precisely in the roots of a particular tooth and therefore only operate this tooth. The first step in this dental surgery would be a local anaesthesia, which temporarily eliminates the sensation of toothache. After that, the inflamed roots are removed. Local anaesthesia here also means the complete exclusion of the factum of the subject, i. e. mind and its sensation, and the restriction of the surgical treatment to the roots of the tooth, that is, to a specific part of the body. This example shows that most people in everyday life think the purely mental effect and its material cause together without any problems, and that every physiological diagnosis of pain in reality and its medical or surgical treatment are more dependent on the "scientific" basis of the treatment. He trusts the doctor who diagnoses the causal origin of the pain in a certain place in the body and tries to heal the inflamed area in the material body – in the gums or in the roots of the tooth. Such an integrated thinking of merely mental effects and natural scientific causation in the art of healing —in every medical treatment of the body— is here not just a normal social practice, but rather it points to a necessary unity of epistemologies, shown in this example as a uniform nexus between the subjective perception of the localization of pain in the body and its purely objective-physiological treatment. Both diagnoses correlate with each other. More precisely; there is a mutual complementarity between the mere perception-theoretical basis of the subjective sensation of pain and its purely physical or objective-physiological diagnosis and treatment.

In a broader sense, the epistemological complementarity discussed above consists of a mutual complementarity between primary and secondary qualities. Pain as a purely subjective sensation forms a secondary

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

quality, while the physical localization and simultaneity of the pain show its indispensable connection with the primary qualities —space and time. The fact that we feel the pain spatially or physically localized and in temporal simultaneity proves the necessary nexus between the secondary quality of the pain and its real extension in the primary qualities —i.e. in the spatial-material extension of the body and in the temporal simultaneity (between the origin of the physical cause of the pain and its reality as a mere mental sensation). This nexus is obviously built on the neuronal nervous system in the body. Ultimately, it is the nervous system spread throughout the body that enables mind to localize the pain physically and feel it simultaneously. This function of the nervous system is known to be based on the electrical phenomenon that underlies the nerves and their interconnectedness in the nervous system. The temporal simultaneity of our bodily sensations seems to depend solely on the electrical phenomenon in our neuronal nervous system; a purely biological or physiological, fluid mechanical phenomenon such as the blood circulation in the body, on the other hand, cannot give rise to simultaneity, but rather to a sensation that lags behind in time.

Neither the neuronal network of the nervous system spread throughout the body nor the underlying phenomenon of electricity —in the brain and in the nervous system— were discovered in the early modern period, i. e. at the time of Descartes and other post-Cartesian philosophers and scientists from the 15th to 19th centuries. Philosophers and scientists were already aware of the function of the brain and the whole body nervous system in sensory perceptions, as several works by Descartes (*Traité de l'homme* or *Les Passions de l'âme*) clearly demonstrate. But the electrical phenomenon as the basis of our nervous system, which ultimately facilitates the physical localization, extension and simultaneity of every (physical) sensory perception, remained an undiscovered fact of nature and physiology at that time. Electricity in the brain and in the entire neuronal nervous system also differentiates itself from the chemical or biochemical processes in the nervous system, in which it ontically forms a more or less uniform phenomenon. That is, the electricity as the basis of the nervous system remains almost invariable with different bodily sensations and as such forms a common basis for all forms of bodily sensations and their bodily extension and simultaneity. The entire bodily extension of the nervous system together with its neuronal processes enable us to analogize all bodily sensory perceptions with regard to their bodily extension and simultaneity. The bodily localizations of different sensory perceptions such as pain, taste, warmth or cold and their

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

temporal simultaneity therefore show a clear analogy based on the primary qualities of space and time. While the bodily sensations as merely subjective sensations of various secondary sensory qualities differ from one another completely, they all have more or less a general or analogous basis in their bodily extension and simultaneity, which form their basis of existence in primary qualities, space and time. The entire bodily extension of the neuronal nervous system —with a uniform basic phenomenon of electricity— underlies such an analogy of bodily sensibility.

In this way, in order to understand the bodily localization and extension of sensory perceptions in their entirety, we need to "think together" the merely mental origin of sensory perceptions —as secondary qualities— and their bodily extension and simultaneity in primary qualities of space and time through neuronal processes in the material body. That is, we ascribe purely qualitative sensations to the subject and their extension and simultaneity to the material body or to the physiological-neuronal processes in the body. Accordingly, the complete conception of bodily sensations presupposes a synthetic mode of thinking which includes and integrates the factum of the subject and that of the object or the objective-material body. The purely mental performance here seems to be limited to the generation of sensory perceptions as secondary qualities, whereas the primary qualitative extension and simultaneity of the sensory perceptions in the body basically come about purely objectively through the body itself —on the basis of the nervous system extended in it. It is well known that the Cartesians —hence modernity— defended themselves against this kind of *thinking together* with regard to the complete epistemic access to bodily sensations. With the example of phantom limb in meditations (in the sixth meditation) Descartes wanted to demonstrate that the physical localization of sensations is accomplished solely by the mind located in the brain. At this point, Descartes ascribes the primarily qualitative or spatio-temporal and corporeal-material extension of the sensory perceptions only to the mind. However, these and similar cases of sensible virtuality cannot exclude the reality of sensory perceptions, in which the material body and also external objects participate directly.

The extra-bodily extension of senses

The question now arises as to whether the analogy of bodily sensations discussed above, which is based on the actual extension of sensations in the body, applies to the extra-bodily sensations such as sight and hearing.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

So far we have discussed the localization of sensations in the body. Now we examine whether there is a clear analogy between the localization of bodily sensations, such as pain, taste or cold, in the body and the external localization of the sense of sight and hearing in external objects in the environment. Do we perceive the localisation of color or tone in an object outside the body in an analogous manner as the perception of bodily localisation and extension of pain or taste? In other words: Can our bodily and extra-bodily sensory perceptions be analogized with respect to their spatial extention and temporal simultaneity? Here we come across the unresolved aporias of the sense of sight, which were actually the outcome of the prevailing intromission theories of vision.

In our attempt to analogize the bodily extension of sensory perceptions such as pain or taste to the extra-bodily extension of the visual and auditory senses, we should first identify what can be the analogous physical input for the external sensations. A bodily infection can give rise to a sensation of pain that is localized in the same spot in the body, just as our various taste sensations are localized on the tongue that comes into contact with the food. The only physical input while seeing —apart from other "cues" such as the movements of the eyes or the pupils, which can be methodically negated (Author, 2017, 157ff) — is the retinal image in the eye; likewise, the vibration of the eardrums through air waves sent by the vibrating objects is the only bodily input in hearing. The intromission theories of vision have the retinal images in both eyes more or less as the most important bodily input in the process of vision. The retinal image, which objectively is a colorless image on the retinal plane —with zones of exposure and shades— is then converted into photoelectric signals by the photosensitive surface of the retina, which is called *photoelectric transduction.* These signals are then delivered to the brain through the optic nerves. The vision arises from the neuronal processes in the brain in which the photoelectric signals sent are processed. It is important to note here that the visual process from the creation of retinal image, which is actually the result of an external physical and geometrical-optical process, continues as a mere physiological-neuronal process that is fundamentally based on the electrical phenomenon. There is a clear modal and ontological difference between a purely optical input, i.e. the retinal image, and its conversion into photoelectric signals on the retina and their neuronal processing in the brain. There is an analogous difference in the hearing process, whose only physical input is the vibration of eardrums.

The claim made by the proponents of intromission theories, that vision arises from the neuronal processes in the brain, is ultimately tested

Sophia 33: 2022.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

against two categorically different aporias —ontological and epistemological. The ontological aporia consists of the fact that a purely material cause, namely the material processes in the body —from the photoelectric transduction on the retina to the neuronal processes in the brain— gives rise to a purely mental effect, namely the immediate three-dimensional visual image in which near objects appear approximately in the correct size, depth, position, perspective and with other secondary qualities such as color and brightness, and the non-bodily free space is *seen* directly. The complete ontological leap from a purely material causality to a purely mental reality of the sense of sight eludes our rational imagination and thus a sufficient justification of this causal nexus. The epistemological aporia of seeing here is the complete inappropriateness of the retinal image as the only reference in the process of vision (according to the intromission theories). In reality, all the necessary references are missing in the retinal image, without which the real visual image cannot arise, such as the reference to the correct size, position and depth of the appearances, to the immeasurable extent of the visual free space, to the upright position of the appearances, the real construction of the visual virtuality and the directly visible perspectivity of the visual space as well as the solidity of the appearances etc.

In comparison with the immense, immeasurable extent of the immediate visual space, the retinal image forms a very tiny image, which, however, cannot be seen in the process of vision. The fact that we do not see the retinal image[2], but only the real objects, also means that the retinal image cannot be assigned the perspective or the perspective structure of the direct visual image. Because perspectivity presupposes direct vision (Author, 2017, p. 94). At most, we could assume that the invisibility of the retinal image in the process of vision means that there is a unity of the eye with the immediate visual space, that the retinal image is only a necessary connection between the purely physiological-optical and the physical- and geometric-optical part of vision (Author, 2005, p. 209; Author, 2017, p. 96). According to this, actual seeing —with all its primary qualitative basic features such as the approximately correct perception of size, distance and position of objects, perception of the immense extension of free space, the perspectivity of vision and the visual virtuality— could actually happen in the real visual space itself, and not alone caused by the neuronal processes in the brain in the framework of physiological optics. The neuronal processes in the brain would ultimately constitute a merely supporting causality; they cannot form a completely independent generative causation.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

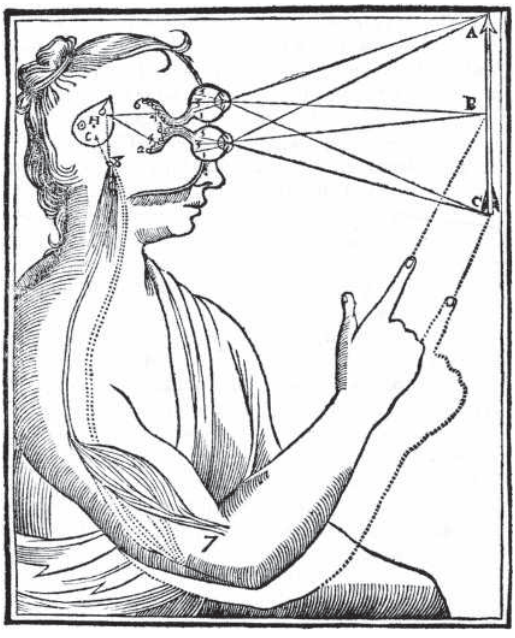
Among the above-mentioned aporias of the sense of sight, the visual perception of size, distance and position as well as the perception of the immeasurably extensive empty space are those that have been debated directly or indirectly in connection with the lack of references to these basic features of the visual space that are represented on the tiny retinal image. These aporias actually form the propaedeutic for George Berkeley's seminal work *An essay towards a new theory of vision*. Even if a very influential psychologist and scientist of optics like James Gibson in the first half of the 20th century refers to the complete lack of an input for visual distance perception on the retina, his remark also implies other missing references in the retinal image such as references to correct visual perception of the size of the appearances and the non-bodily free space:

> Das Problem der visuellen Wahrnehmung hat eine lange Geschichte. Jahrhundertelang verspürten Menschen das Verlangen nach einer Erklärung dafür, weshalb denn Dinge gesehen werden. Unter den vielen schwierigen Fragen, die das Problem beinhaltet, ist die älteste und umfassendste vielleicht diese: Wie kann man die Ergiebigkeit des Sehvermögens erklären in Anbetracht der Unzulänglichkeit des Bildes innerhalb des Auges? Das Sehen hängt von diesem Netzhautbild ab. Aber wie unangemessen erscheint es im Vergleich zu dem Ergebnis! Die sichtbare Szene hat räumliche Tiefe, Entfernung und Körperlichkeit; das Bild ist flach. Wie kann das Sehen auf den Bildern in den Augen beruhen und doch eine Szene hervorbringen, die sich bis zum Horizont erstreckt? Die physikalische Umwelt hat drei Dimensionen; das Licht projiziert sie auf eine lichtempfindliche zweidimensionale Oberfläche; sie wird dennoch in drei Dimensionen wahrgenommen. Wie kann die verlorene dritte Dimension in der Wahrnehmung zurückgewonnen werden? (Gibson, 1973, p. 18).

The depth of objects in the visual field and the free space that extends to the sky and the distant horizon are completely missing references in the retinal image. The image size of objects and their movements on the retinal image are very small compared to their correct sizes of appearance (because the diameter of the eye ball is about only 2.5 cm) and also reversed —both horizontally and vertically. The correct perception of size and position from these very inadequate and even incorrect references was and remains the subject of a long prevailing discourse in modern times. In his major works such as *Dioptrique* and *Traité de l'homme*, Descartes tried to explain this aporia of the visual sense on the basis of various models of the interaction of visual and tactile senses.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

Figure 1[3]



The inferential nexus between the sense of touch and the sense of sight was rejected by the post-Cartesian philosophers and scientists of optics. The famous Molyneux problem addresses the speculative complementarity between the sense of touch and sight. The answer from William Molyneux himself and from philosophers such as Locke and Berkeley excludes the possibility that the sense of touch can suggest the spatiality of the sense of sight.

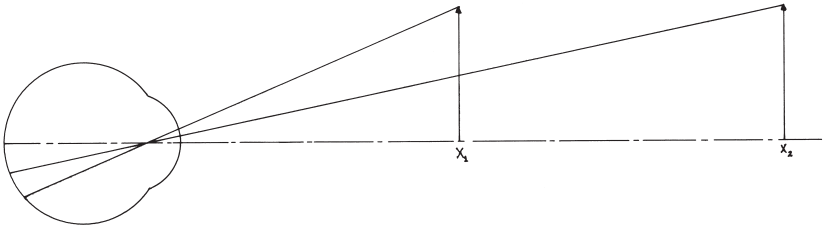
In addition, our physical sense of touch is limited to few smaller objects in our immediate surroundings, which we mostly grasp with our hands. It is hard to believe that our direct visual perception of gigantic architectural and natural objects such as skyscrapers, mountains, meadows or oceans can be suggested solely from this limited and inadequate physical-haptic perception of smaller objects. Even if we speculatively assume that the tiny appearances on the retinal image are subjectively enlarged by a certain factor of multiplication and that our immediate visual image is derived from this, the problem of missing references to the correct perception of size in the retinal image is hardly solved. Because in the retinal image, which is created according to the principles of geometric optics, the nearby smaller objects appear larger than the —above-

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

mentioned— huge but distant objects; this contradicts our immediate visual perception of size.

It is therefore a mere belief and not a well-founded knowledge that the brain *visually* develops the approximately correct and huge size of an appearance in direct vision from a very tiny image on the retina. On the other hand, neither psychological nor physiological reasons can be given as to how the tiny retinal image as the sole input —i.e. as the only reference— ultimately creates our immeasurably extensive visual space. The object size consistency in the visual perception, as problematized by Condillac, clearly shows how the images on the retinal image cannot be references to the immediate visual spatial perception of the object-sizes:

Figure 2



> "Locke's error, as Condillac clearly points out, was to think that we see the retinal image at all. If we *first* see the flat image and then later perceive, Locke's argument (and Helmholtz's) follows: some process of inference must have go on. But if we never see the image —and Condillac correctly points out that we are never conscious of so doing— then the 'inference' is gratuitous. We do not and cannot see the retinal image: we see objects in the outside world. The Lockean and Helmholtzian language of 'unconscious inference' is an undesirable relic of the 'camera' theory of vision.
>
> In some respects Condillac thought more clearly about this problem than many contemporary psychologists. Take the question of 'object consistency' for example. Condillac knew that 'If a man four feet away... steps backward to eight feet, the image of him on the retina is halved in size.' Because of this it has seemed even to some contemporary theorists to be a problem that objects do not shrink rapidly in size as they go away. Originally, the descriptive term 'object size consistency' was used to refer to the non-shrinkage phenomenon. Its use in that way is unexceptionable. But some people now use the term 'consistency' as if it applied to a *process* which set to work on the retinal image: they speak of consistency 'scaling things up' or 'scaling them down'. What exactly do they think is being altered in size by constancy? The size of objects? Obviously not. The retinal image? Still less so. The size of an image in

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

> the brain? Possibly: but for what purpose? A moment's thought shows the problems in treating constancy as a magnifying/minifying process. The cause of the fallacy is the belief that we see the retinal image.
>
> Condillac disposes of the fallacy. For one thing, he makes the very just remark that 'If perception is an inference involving a link between the idea of a man and a height of about five feet, either I should not see the man at all, or I should see him five feet tall' – whereas in fact objects seem to decrease insensibly in size as they move into the middle distance. He ends with the remark 'Nature determines that the sight of these objects should tell me how far the man is away; it is impossible that I should not have this impression every time I see them.' In other words, we see things as we do, not because we make inferences, but because we are as we are. As modern jargon would have it, the system is *hard-wired*" (Morgan, 1977, pp. 78-79).

Following conclusions can be drawn from Condillacs polemic against the inference theory of Locke and Helmholtz as well as from the object size consistency in visual size perception as problematised by him: 1. Since we cannot see the retinal image, there cannot be a direct inferential reference to the appearances of real objects on the retina. From this it can be concluded that there must be a direct reference to the real objects in the visual space. 2. The Object Size Consistency proves that even an indirect neuronal access to the images on the retina cannot be an appropriate reference for the immediate size perception. This is because, despite the halving of the retinal image of the object, its immediately perceptible size of appearance remains unchanged, as figure 2 shows. 3. The basic reference of real size perception cannot be an innate idea of the object. I.e. The referentiality of the correct visual size perception should be explained in the context of physiological-physical optics.

The problem of sufficient reference clearly emerges here. Neither the tiny image size on the retina nor a latent or innate idea of size (a priori) in the subject can be the correct and appropriate reference for direct vision. In addition, the optical phenomenon of *object size consistency* clearly indicates that the mind relies on actual objects themselves in a referential manner when directly perceiving the sizes of appearances. The constancy of visual size perception is therefore dependent on the constancy of the object size itself. In other words; the true reference for visual size perception in the optical phenomenon of *object size consistency* is not the retinal image that is not seen, but the real object in the field of vision itself (Author, 2017, p. 98ff).

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

The *object size consistency*, as problematized by Condillac, together with the subsequent problem of sufficient reference to the visual size perception form the most important aporia of the sense of sight, which cannot be solved on the part of the visually perceiving subject. This aporia alone is enough to invalidate the prevailing intromission theory of vision and thus to reverse it referentially. Because in the case of impossibility of solving a clearly identifiable aporia in terms of ideas or perception theory, we are necessarily dependent on the object of the aporia which alone can provide the solution.

A direct visual reference to the real object of appearance, which alone can resolve the aporia of visual size perception discussed above, also provides a sufficient explanation and justification of mind's direct access to the real objects while seeing. In this case, the eye should *optically touch* the real objects in the field of vision. This requires a real extra-bodily extension of the visual sense, which accordingly forms a clear analogy to the bodily extension of pain, taste and other (bodily) sensations. What would then be the scientific basis of the external extension or embodiment of the sense of sight?

If we extrapolate this case of the direct object reference in visual size perception to the analogous optical phenomena such as the visual distance perception of the objects and the visual perception of non-bodily free space, the need for a direct object reference while seeing becomes even clearer. Because neither the immeasurably extended free space nor the free spatial distances of objects is represented on the retina. The complete absence of these references in the retinal image indicates that we must have direct optical-haptic access to the real visual space in our visual perception of the free space and the free spatial distances of objects. With this necessary referential access the sense of sight should *really* extend out of the body, just like a pain sensation that extends in the *real* body.

The analogy between the bodily and the extra-bodily extension of sensibility —that is, between the bodily extension of sensations such as pain and the extra-bodily extension of the sense of sight or hearing— leads to the aporia of the true *mediality* of the extra-bodily sensory perceptions. What is the material-physical basis of *optical touch* while seeing and of *auditory touch* while hearing? The nervous system is only extended in the body; it does not extend to the external space. Before we get back to this point and elaborate on it, let us discuss some additional aporias in the visual space perception that support the real extra-bodily extension of the visual sense. They are, for example, the directly perceived geomet-

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

rical-optical structure of the visual space and the experience of visual virtuality with the dioptric phenomena of reflection and refraction.

Just like a photo, the retinal image is created through a geometrical-optical process; the perspectivity of our immediate visual space is therefore usually attributed to the geometrical-optical image on the retina (which also presupposes the eye-camera analogy that has prevailed since the early modern period). The perspective structure of seeing is basically created by the light rays, reflected from the objects and converging on the eye or the visual point of sight. In the perspective construction of a painting, the orthogonals converging on the vanishing point actually represent the real physical light rays in a light pyramid, which defines the structure of our visual space. However, the perspective structure of the visual space should arise in a real domain or within the real light pyramid itself. Because we see or directly experience all perspective deformations of the objects in the field of vision in accordance with the inner structure of the real light pyramid, in which all real objects are geometrically and optically arranged, or rather *designed* by the light rays reflected from the objects and converging on the eye. The previously discussed invisibility of the retinal image in the process of vision complements this basic idea that the perceptible perspective structure of our visual space comes about on a real level —or in the reality of the geometrical-optical light pyramid itself. The retinal image basically consists of only two-dimensional images— that is, of the exposed and shaded zones, boundary lines of the objects, etc., which are all colourless and non-perspective. Because both the perception of colours and brightness as well as the perspectivity of the objects seen require immediate spatial-perspective seeing[4]. Since the retinal image is not seen during the process of vision, one cannot conclude that the direct visual experience of the perspective structure of the visual space and its immeasurably huge extension are developed solely from the very tiny and basically non-perspective retinal image.

We usually regard the dioptric phenomena of reflection and refraction as appropriate examples of the purely subjective creation of visual image. In the case of dioptric virtuality of reflection and refraction, the objects appear in different sizes, distances and places, which only the visually perceiving subject seems to construct. However, the retinal image again lacks adequate references to the perception of size, distance and position of the virtual appearances in the field of vision. While the references to perception of distance and position are completely absent in the retinal image, the enlargement and reduction of the image sizes are not sufficient to adequately explain the sizes of virtual appearances. In vari-

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

ous geometrical-optical models, the visual perceptions of size, distance and position in the dioptric phenomena of reflection and refraction are geometrically-optically calculated in the *real visual space*.

Figure 3

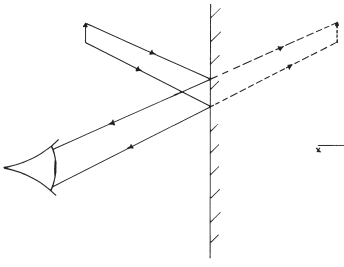


Figure 4

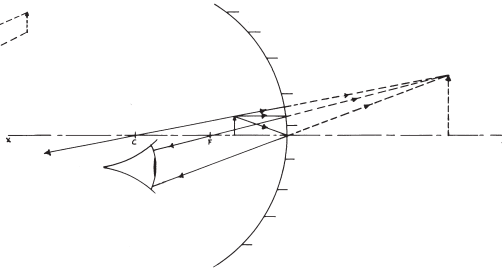


Figure 5

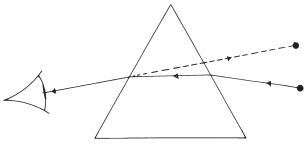
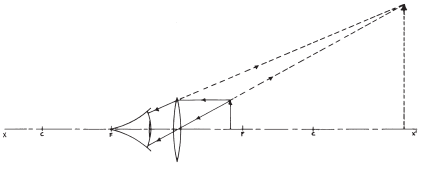


Figure 6



Figures 3, 4, 5 & 6 show the reflection by plane and concave mirrors and the refraction by a prism and a convex lens. If our eyes are included in these purely geometrical-optical processes, we see the virtual appearances precisely in the size, distance and position as we calculate or construct them geometrically and optically in the real visual space[5]. All of these virtual phenomena are represented by virtual lines (broken lines in Figures 3, 4, 5 & 6) which, in contrast to the light rays, are not subject to the physical-dioptric phenomena of reflection and refraction, and which as such form the linear extension of light rays, constructed geometrically and optically. This construction clearly occurs here in the real visual space (Author, 2017, p. 125ff). It is inconsistent to assume that the brain somehow precisely calculates through a geometrical-optical method the size of the virtual appearances as well as their distance and position solely from the retinal image, in which the references to the perceptions of the real size, distance and position of objects are missing, and projectively construct them in the real visual space. The dioptric reflection and refraction clearly demonstrate the necessity of the immediate extra-bodily

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

object-references (discussed above) while seeing. The fact that the visual objects here are virtual appearances explains and justifies the assumption that the geometrical-optical construction of virtual appearances experienced should occur in a real visual space.

The visual rays

The geometrical-optical construction of the dioptric virtualities in a real visual space also suggests the possibility of the real existence of certain visual rays that are not subject to dioptric reflection and refraction, and which thereby extend the geometric linearity of the light rays and exactly construct the virtual appearances in a real visual space. This geometrical-optical exactness of the dioptric virtualities actually justifies their *real* origin in a *real* visual space. The visual virtuality in reflection and refraction is therefore not only based on light rays, but obviously on a different type of linear visual rays, which in the normal case remain united with the light rays, but which during reflection and refraction by material media (prisms, lenses, mirrors, etc.) separate themselves from the reflecting and refracting light rays and construct the virtual appearances geometrically and optically in precise form, size, depth and proportion. It is evident here that the uninterrupted linearity of such rays, which are not subject to the dioptric phenomena of reflection and refraction, construct the virtuality that exactly conforms to its geometrical-optical design. Now we must endeavour to scientifically prove the real existence of visual rays, which has been identified speculatively but with necessity and certainty, so that their materiality, which is comparable to the rays of light, can be determined.

Such an investigation, which is presupposed in the context of the philosophical theory of perception and geometrical optics, but which at the same time goes beyond this scientific framework, is obviously accomplished in the field of physiology and physics. This necessary scientific investigation has hardly been attempted so far, because the intromission theory of vision has paradigmatically dominated for several centuries — especially since the Cartesian early modern era. The intromission theory only legitimises the receptive function of the light rays converging on the eye or the visual point of sight, allowing the retinal image to emerge as the sole bodily input in the process of vision. The union of the receptive light rays with the projective visual rays, on the other hand, imparts to the orthogonal light rays and thus the visual pyramid in its entirety an optical *feel* or *haptics*. The factum of visual rays, which alone enable the visual

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

sense to achieve its primary-qualitative or extra-bodily spatial extension and safeguard it, refers to the process of seeing in a unity of physiological, physical and geometrical optics, whereby the retinal image created by the light rays acts in principle as a mere connection between these different disciplinary domains of ophthalmic optics. In such unity of the process of vision, the correct focusing of light rays on the retina, which results in a sharp retinal image, is just as important as the optical haptics in the visual space discussed above, which arise from the union of receptive light rays and the projective visual rays. While the mind owes all secondary-qualitative basic features of the visual sense, such as colour, brightness, shaded transitions, etc., to the light rays that construct the retinal image, it is dependent on the projective visual rays and their union with the light rays for the external extension of the visual sense.

It is astonishing to see how the existence of the projective visual rays, which through their union with the orthogonal light rays create the optical haptics in the real visual space, solve at once all the aporias of visual sense (discussed above)! They are the following (Author, 2017, p. 182):

- Visual size perception
- Visual depth perception, perception of the solidity of the objects
- Visual perception of the free or intermediate space
- Visual perception of position (perception of the upright position of appearances)
- Perspective structure of the visual space
- Visual virtuality —of reflection and refraction— and its geometrical-optical structurality and regularity
- Visual perception of movements

Likewise, the existence of projective auditory waves can explain the extra-bodily objective localization of the sense of hearing. It is important to mention here that all these aporias originate from the scientific paradigmatic legitimization of the intromission theories of vision. The main reasons for this are on the one hand the limitation of the premises, that the intromission theories ultimately recognize only the retinal image as the most important input in the visual process, and on the other hand the missing references in the retinal image that are presupposed by the above-mentioned facts or characteristics of the visual perception of space, time and movements. The intromission theories of vision emerged already in antiquity in contrast with the prevailing extramission theories, as represented by Plato, Euclid, Plotinus and others. The predominance of the extramission theories historically extended to the Middle Ages.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

When the intromission theories resurfaced in the early modern period and with their phenomenal resurrection seemed to surpass the long prevailing extramission theories once and for all, this historical new beginning in the field of perceptual theory and the science of optics was clearly in tune with the emerging early modern Cartesian subjectivism. The Cartesian negation of secondary qualities in the object and their subjective appropriation caused a historically unfolding subjective apriorization of objective qualities. A certain culmination of this historical apriorization can be seen in Kant, who, within the framework of his propaedeutic doctrine of the transcendental aesthetics, also reduced the primary qualities of space and time —in favor of his philosophical transcendentalism— to mere a priori ideas of the subject.

The optical haptics, which the visual rays generate through their union with the light rays, resolves the aporias of visual size and distance perception discussed above (which also includes perception of spatio-temporal movements); it justifies the optical phenomenon of "object size consistency" by enabling the perceiving subject to have appropriate epistemic-referential access to the true referent, namely the visual object itself, and thereby synthesizes in direct vision the object sizes and their spatial distances with one another. Seeing therefore becomes an immediate optical touch at a certain distance[6]. Seeing, based on the union of light and visual rays, also establishes the direct optical perception of the free or intermediate space, which is not represented on the retina and therefore leaves no reference as a physical input. In their union with the light rays, the visual rays penetrate the entire visual space, as a result of which the optical haptic extends within the entire, perspective structured visual space. Accordingly, we directly touch visually the emptiness of the free space both in its clear proximity and immeasurable width, breadth and height. Subsequently, the correct perception of the position of static and moving objects in visual space, which leave contradicting references on the retina due to their geometrical-optical inversion in the eye, finds its simplest and entirely appropriate justification in the basic idea of an optical haptics in direct vision. That is why the inversion and reversal of appearances on the retina —in their static and movements— are not errors of nature, but a natural necessity that presupposes the geometrical-optical structure of the visual space. If we add or integrate the purely subjective development of secondary qualities such as color, brightness, shaded transitions etc. to the real extra-bodily extension of the visual sense, which comes about solely through a direct optical haptic, we recognize to our astonishment that eyes subjectively *paint* the objects that actually exist in the visual space —in

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

color and in a perspective structure. The colors of objects and their brightness and shades arise here in a *real* aesthetic synthesis between the domain of the subject, in which only the color and brightness sensations —as secondary qualities— arise, and the domain of the objects, in which spatial and spatiotemporal qualities are extended.

The establishment of intromission theories as a powerful historical paradigm prevents us from discovering a new and appropriate extramission theory and thereby solving all of the previously unresolved aporias of the visual sense at once. If the prevailing intromission theory gave rise to all the aporias discussed above, and, on the other hand, the immediate optical haptics that the projective visual rays develop in their union with the rays of light simply and at once resolves these aporias of the visual sense, why do not we bother to scientifically test the real existence of visual rays? During the time of Plato, Euclid, Plotinus and others in antiquity, who advocated the extramission theory of vision, and also during the time of the great proponents of intromission theory in the early modern period, the strong presence of the electrical phenomenon in the neuronal network in the brain and in the entire bodily nervous system was not known. The fact that the electrical phenomenon produces electromagnetic waves and emits them in free space was a great scientific discovery. However, only since the discovery of electromagnetism by Hans Christian Oersted and the subsequent emergence of field theories of Faraday and Maxwell the study and research of electromagnetic waves that can travel through free space emerged and developed in the 19th century. It was only with the emergence of neurobiology as an important discipline in the 20th century that people began to notice how the neuronal processes in our nervous system that produce sensory perceptions are based on electrical phenomenon in electrochemical and electromagnetic processes.

If our bodily nervous system is full of electricity and the neuronal network in the body is based on the electrical phenomenon, why cannot we assume that the strong presence of electricity in the body can produce extra-bodily emission of electromagnetic waves —as brain waves, visual rays, auditory waves etc? The human beings have perhaps a sensorium constructed by electromagnetic waves, which extend out of the body into the environment, and on the basis of which the subject can directly perceive the extra-bodily spatial and temporal extension of the sense of sight and hearing, as represented in the perspective structure of the visual space, the extension of objects and the visual free space, the movements of objects, the objective localization of the sense of hearing, the visual and auditory virtuality, etc. Here we try to show a clear analogy between the

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

bodily and extra-bodily extension of sensibility. Accordingly, we perceive the color of an object in our external visual space as well as the voices, noises and musical tones in our external auditory space as localized in the objects seen and heard, just as we feel the pain localized in an inflamed area of the body. Such an analogy between the bodily and extra-bodily sensibility sets an equally analogous procedural basis of our nervous system, which enables and guarantees the spatial extension and temporal simultaneity of sensibility. The fact that the neuronal transmission of electromagnetic signals constitutes this process-related basis of the brain and the network of the nervous system in the whole body is ultimately based on the electrical phenomenon, as discussed above. This points to the possibility that the electrical phenomena present in the brain and the entire bodily nervous system could extend beyond the body as electromagnetic waves and thereby fill our visual and auditory space entirely. The question now arises: Do such electromagnetic waves exist, that in a certain sense allow our bodily nervous system to expand outside of the body and, in their union and interaction with the receptive light rays and air waves, enable us to extend our visual and auditory senses as a whole? Is it that the fire coming from the eyes, which Plato speculatively imagined in *Timaeus*, and which in direct vision merges with the rays of light falling on the eye, will finally find its proper evidence and expression?

The intromission theory of visual perception is based on the process of photoelectric transduction, in which the retinal image, constructed by the light rays falling on the inner photoelectric plane of the retina, is converted into photoelectric signals. These photoelectric signals are then transmitted to the brain through the optic nerves. Here we imagine the process of photoelectric transduction and the transmission of photoelectric signals into the brain, where they are processed, clearly within the framework of a receptive processuality. At the same time, why couldn't we imagine a perceptual process in a projective framework in which the light rays falling on the retina create electromagnetic waves, which are then sent in the opposite direction or projectively outwards, forming a structural unity with the light rays falling, i.e., converging on the eye? Such a scientific speculation, which has not yet been adequately investigated, is evidently not recognized within the framework of the prevailing intromission theory of vision. Because this speculation causes the reduction of the neuronal processing of retinal images in brain, which is by far a completely generative cause within the framework of the intromission theory, to a merely accompanying or supporting cause of visual perception, which in reality is based on an extra-bodily geometrical-optical effectuation.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

The claim of neurobiology or neurophilosophy that the brain originally creates the bodily and extra-bodily extension of senses through neuronal states and processes is hardly supported from the outset by the reality of senses. Because the purely material processing of every sensory input in the brain can neither constitute a complete ontically different causation that ontologically effectuates the development of bodily and extra-bodily extension of mental sensations, nor can it epistemologically justify all the essential features of the spatial extension of sensory perceptions. As is evident in the discussion of the bodily sensations and —even more clearly— the extra-bodily sense of sight and hearing, the bodily and extra-bodily extension of senses (which include their temporal simultaneity) apparently develops on a *level of effect* itself than on the level of a purely neuronal causation in the brain. Because on the material, i.e. neuronal domain of causes in brain, the necessary epistemological references are either not adequately given or they are completely absent. Strictly speaking, the true and real references of bodily and extra-bodily extension of senses are only given on the *level of effectuation* or realization of the senses themselves. As the cases of the sensation of bodily localized pain or the extra-bodily visual perception of size, position and distance as well as the perception of the objective localization of auditory sense clearly show, the primary-qualitative reality of senses is constructed on their level of effectuation, i.e. in the real bodily and extra-bodily visual and auditory spaces. It is true that every characteristic of this construction on the level of effect —such as the perception of size, distance or position of a real or virtual phenomenon, the objective localization of hearing, the bodily localization of pain, etc.— can have a neuronal-causal state or process in the brain. But such purely neuronal causes are here, when it comes to the creation of the primary-qualitative characteristics of sensations, not entirely generative, but rather supportive and participatory, as discussed above. Strictly speaking, the purely neurobiological states and processes in the brain do not create the real bodily and extra-bodily extension of senses (apart from the virtuality of bodily sensations such as phantom pain or visual virtuality such as dreams, imagination, etc.), but rather they *support* the actual development or construction of the bodily and extra-bodily extension of senses and all their essential traits solely in the domain of effect —i.e. in the bodily and extra-bodily space— where alone their references are present. A more morphological unity between the reality of sensibility and its referential causality on the level of effect reduces the neuronal causation of sensibility to a mere accompanying and supporting causality; the purely generative causality

Sophia 33: 2022.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

of neuronal processes in brain, as it is paradigmatically conceived, is not negated here, but only partially recognized by ascribing to it a rather participatory function.

Conclusion

The connecting function of intuition (*Anschauung*), as emphasized by Kant, between a cognising subject and the object of perception and cognition[7] seems to require a decisive specification of the extension of senses in the pre-logical domain of sensibility. While the synthetic unity of apperception does not cross the boundaries of the Kantian transcendentalism and apriorism, a conceivable *synthetic unity of perception* would refer to a *real nexus* between the perceiving subject and the perceived object. In addition, the unity of perception necessitates the consideration of individual senses, which Kant strategically ignores in the context of his transcendentalism by subsuming all sensory perceptions under a general concept of sensible intuition (*empirische Anschauung*). Kant's almost dogmatic epistemological assertion that space and time are mere a priori notions (*Vorstellungen a priori*), suppressed or even philosophically and historically veiled the problem of spatial and temporal extension of sensibility that had been debated for centuries. This debate was best represented in the discourse on the visual perception of object's size, position and distance, the perspectivity of the visual space, etc., as problematized in the modern era by Descartes, Locke, Molyneux, Berkeley, Condillac, Diderot, Helmholtz and others. The historical apriorisation of the primary-qualitative extension of sensibility in the early modern age from Descartes to Kant, namely the spatiality and temporality of sensory perceptions, is an important factum that requires detailed research.

This treatise attempted to deal with the problem of spatial extension and temporal simultaneity of sensibility confined to a pre-logical domain of direct sensory perceptions. Such an investigation presupposes that the senses must not just be specified in their entirety —as sensibility— but also individually as visual, auditory, olfactory, gustatory and haptic sensory perceptions and analyzed as such. The analogy between bodily and extra-bodily sensory perceptions constitutes the methodological basis of the research. The bodily extension of sensibility, as represented in the sense of taste, pain, the feeling of cold, etc., is obviously based on an extra-mental phenomenon of electricity, which is inherent in body's neuronal network as well as in all the neuronal processes in the

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

brain and nervous system which is extended throughout the body. The fact that the primary-qualitative extension of bodily sensibility is based on this phenomenal medium seems to suggest that particularly in the area of sensibility and its spatial and temporal extension philosophical epistemology as methodology must necessarily correlate or establish a complementarity with a scientific epistemology. Such a unity of epistemologies allows us to compare the bodily extension of sensibility with the extra-bodily extension of senses, that is, the senses of sight and hearing. The most important result of this methodological analogy is the *real* extension of the sense of sight and hearing in a *real* space. The aporias of visual and auditory perceptions, which are manifested especially in the visual perception of size, distance and position of objects, as well as in the localisation of the sense of hearing in extra-bodily objects, seem to be reversed here, as they now —as purely objective aporias— *dictate* certain intuitions to the perceiving subject, which the subject by itself can hardly access. These intuitions are the *ontological* separation between the primary and secondary qualities of sensibility and the subsequent attribution of primary qualities, namely, the spatial extension and temporal simultaneity of senses, to the objective-phenomenal body and extra-bodily free spaces and objects. The primary-qualitative or spatio-temporal extension of the senses here resembles a skeleton of sensibility perceived in *reality*, which is irreducible, i.e., cannot be subjectively appropriated as an a priori notion, and on which secondary sensory qualities spread like flesh. The apodictic certainty of this intuition requires the scientific discovery of an objective extra-bodily phenomenal medium through which the extra-bodily senses can extend.

Notes

1 Instead of a strict separation between the existential sphere of sensibility and that of objects, medieval scholastic philosophy tended to blur the epistemological and existential demarcation between sensibility and corporeality, to which Anneliese Maier refers in one of her main works, *Zwei Untersuchungen zur nachscholastischen Philosophie*. Scholastic philosophy assumes the mental origin of secondary qualities such as color, but emphasizes their localisation in the object, that is, in the primary quality of physical-spatial extension. „für die Scholastik entstehen die qualitates secundae aus den primae im Objekt und nicht erst, wie für die späteren, im wahrnehmenden Subjekt. Ihre Realität wurde darum in der traditionellen Philosophie nie in Zweifel gezogen, und ebenso wenig die Abbildlichkeit der Qualitätsempfindungen. (Maier, 1968, p. 18).

2 "Johannes Kepler verwies auf die Falschheit der Theorien der Inferenz, die davon ausgehen, dass die visuelle Größen-, Lage- und Distanzwahrnehmung der Gegens-

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

tände durch die Inferenzen aus ihren Netzhautabbildungen entstehen (Author, 2017, p. 38): 'Kepler (1604) leaves to the natural philosopher the question of whether the retinal image is made to appear before the soul or tribunal of the faculty of vision by a spirit within the cerebral cavities, or the faculty of vision, like a magistrate sent by the soul, goes out from the council chamber of the brain to meet this image in the optic nerves and retina, as if it were descending to a lower court'" (Braunstein, 1976, p. 5).

3 In his work *Die Welt*, Descartes examines the involvement of the sense of touch in the sense of sight, i.e., in the visual perception of location, shape, distance, size, etc.: »Ich muß Ihnen aber noch sagen, was der Seele ermöglichen wird, Lage, Gestalt, Abstand, Größe und andere Qualitäten zu empfinden, die sich nicht auf einen Sinn im besonderen beziehen wie die, über die ich bislang gesprochen habe, sondern dem Tastsinn und dem Sehvermögen gemein- sam sind und in gewisser Weise sogar den anderen Sinnen« (Descartes, 2015, p. 241). Descartes then explains the involvement of the sense of touch in the sense of sight using various demonstrations, such as the following (Descartes, 2015, p. 287).

4 A good example would be the famous case of Cheselden's patient. Cheselden was a doctor at St. Thomas Hospital in London in the 18th century. For the first time in history, Cheselden removed the cataracts from the eyes of his patient, who was born blind, through eye surgery. When the patient began to see, he reported that at the very beginning he could not perceive either the perspective structure or the depth in a perspective image (Author, 2005, p. 236-240).

5 It is important to mention here that in the geometrical-optical construction of virtual phenomena, their size, position and distance are not calculated arithmetically. The virtual phenomena resulting from dioptric reflections and refractions can only be drawn geometrically and optically in their correct size, position and distance.

6 The fact that the object size consistency apparently disappears when the visual object is far away does not invalidate this relationship between the size and distance of appearances. Even if the objects appear small at greater distances, we experience them clearly in our direct vision in an optical synthesis of their size and distance. (Author, 2017, p. 100-102).

7 "Auf welche Art und durch welche Mittel sich auch immer eine Erkenntnis auf Gegenstände beziehen mag, so ist doch diejenige, wodurch sie sich auf dieselbe unmittelbar bezieht, und worauf alles Denken als Mittel abzweckt, die *Anschauung*" (Kant, 1998, p. 93).

References

BRAUNSTEIN, Myron L.
1976 *Depth Perception Through Motion*, New York: Academic Press.
DESCARTES, René
1972 *Meditationen*, Artur Buchenau (transl. & ed.), Hamburg: Felix Meiner Verlag.
1970 *Philosophical Letters*, Anthony Kenny (ed.), Oxford: Clarendon Press
2015 *Die Welt*, Christian Wohlers (transl. & ed.), Hamburg: Felix Meiner Verlag.
GIBSON, James J.
1973 *Die Wahrnehmung der visuellen Welt*, Vera Schumann (ed.), Beltz: Basel.
KANT, Immanuel
1998 *Kritik der reinen Vernunft*, Hamburg: Felix Meiner Verlag.

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.

LAUTH, Bernard
2006 *Descartes im Rückspiegel*, Paderborn: Mentis-Verlag.
MAIER, Anneliese
1968 *Zwei Untersuchungen zur nachscholastischen Philosophie*, Rom: Edizioni di storia e letteratura.
MORGAN, Michael J.
1977 *Molyneux's Question. Vision, Touch and the Philosophy of Perception*, Cambridge: Cambridge University Press.
NYE, Andrea
1999 *The Princess and the Philosopher. Letters of Elisabeth of the Palatine to René Descartes*. Lanham: Rowman & Littlefield Publishers.
THALIATH, Babu
2005 *Perspektivierung als Modalität der Symbolisierung. Erwin Panofskys Unternehmung zur Ausweitung und Präzisierung des Symbolisierungsprozesses in der Philosophie der symbolischen Formen von Ernst Cassirer*, Würzburg: Königshausen & Neumann.
2017 *Die Verkörperung der Sinnlichkeit*, Freiburg/München: Karl Alber Verlag.

Document reception date: July 9, 2020
Document review date: November 15, 2020
Document approval date: April 20, 2021
Document publication date: July 15, 2022

Print ISSN:1390-3861 / Electronic ISSN: 1390-8626, pp. 109-136.