

# Perceptual Judgement in Late Medieval Perspectivist Psychology<sup>1</sup>

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## 1. Introduction

Among the many issues of contention in contemporary debates on the philosophy of the mind and epistemology is the question of whether perception is permeated or penetrated by cognition, that is to say, whether the way we perceive the world is determined by the way we take (or expect or desire) the world to be. As a result, it has become a matter of increasing interest whether we can find historical antecedents to this debate, even if qualified by necessarily different conceptual frameworks. Scholars have noted in particular the influence of one particular author, Alhacen (al-Haytham, 965–1040), and his treatise on optics called in Latin *De aspectibus*, which initiated the tradition of geometrical optics.<sup>2</sup> In what follows I wish to examine his contribution and the contribution of (a selection) of later *perspectivi* on the role of perceptual judgements in visual perception, and argue that we find in this tradition of geometrical optics the same wavering between taking high level perceptual tasks as falling within a sensory level or module (and thus encapsulated

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  - 2 The most important literature on the topic includes Sabra, A. I., *Sensation and Inference in Alhacen's Theory of Visual Perception*. In: Machamer, P. K. – Turnbull, R. G., *Studies in Perception. Interrelations in the History of Philosophy and Science*. Columbus, Ohio State University Press 1978, pp. 160–185; Sabra, A. I., *The Optics of Ibn Al-Haytham. Books I–III: On Direct Vision*. London, Warburg Institute 1989 (2 vols.); Lindberg, D. C., *Theories of Vision. From Al-Kindi to Kepler*. Chicago, The University of Chicago Press 1976; Federici Vescovini, G., *Le Teorie della luce e della visione ottica dal IX al XV Secolo*. Perugia, Morlacchi Editore 2003; Smith, A. M., *From Sight to Light. The Passage from Ancient to Modern Optics*. Chicago, The University of Chicago Press 2005.

from cognitive influences) and the existence of high level cognitive effects on low level sensory operations. The aim of my paper is not to show the dependency of the contemporary debate on the medieval one, but rather to show the range of conceptual possibilities utilized when addressing the same sort of phenomena by historical sources. Although one can find in the literature detailed attempts to systematize the model and influence of perspectivist optics, some difficulties remain concerning the exact nature of this process, as has been recently noted:

As A. Mark Smith presents it [Alhacen's theory], the physical representation at the surface of the eye becomes the visual representation *in* the eye, which in turn becomes perceptual and finally conceptual in the ventricles of the brain. This process is a series of inferences or quasi-inferences, its precise status, and the degree of intellectual or conscious involvement in it, seems to me unclear.<sup>3</sup>

The aim of this paper is to help in clarifying this aspect of the theory. The difficulties arise mostly due to the fact that Alhacen has an instrumental approach to faculty psychology, in the sense that he is interested in providing an account of visual perception in terms of *functions and mechanisms*, rather than in terms of *faculties*. In that sense, he causes a problem to his medieval interpreters who operate (and try to understand him) under the framework of Avicennian faculty psychology.<sup>4</sup> The focus of my paper is therefore more on clarifying the nature of the functions that make perceptual experience possible according to authors in this tradition and less on how this fits that Avicennian framework.<sup>5</sup>

According to the general model of perspectivist optics, there are many ways to talk about vision, but only one that is properly scientific. The operation of sight is liable to a description on the basis of the model of mathematics, of which the science of geometry is a species. Vision is explained on the basis of radiant lines flowing from each point of the object, which are endowed with causal and representative power of the thing from which they radiate. In what follows, I will not focus on the details of this geometrical

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3 Ott, W., *Descartes, Malebranche, and the Crisis of Perception*. Cambridge, Cambridge University Press 2012, p. 28.

4 Tachau, K. H., *Vision and Certitude in the Age of Ockham: Optics, Epistemology and the Foundations of Semantics 1250–1345*. Leiden, Brill 1988, 9, makes exactly the same point.

5 To attempt this, as suggested by one of the referees, would be a completely different project, although this is already partially done in some of the literature on the topic (see footnote number 2 above).

model but rather take for granted that, whatever its precise form, it successfully provides an accurate account of how the eyes receive a point-to-point representation of the object seen. For Alhacen, this mode of transmission is not enough to explain how vision produces knowledge; instead, he claims that the result of a perfectly operating visual system needs to be *certified* or *certain* vision (*visus certificatus*), and for that to occur a more complex psychological picture needs to be presented.

## 2. Setting the stage

A primary concern of late medieval philosophy is how things are made available to perceivers in such a way that they are perceived in an accurate manner. Because things cannot be themselves immediately present to the senses, one needs to posit some form of representation that makes things available. Two issues follow from this: the first concerns the nature of these representations, in terms of their power to represent (what they represent), and the second their ontological status in the medium and in the senses, i.e., the kind of existence or being they have. Connected to this latter aspect, one must inquire what their causal role is, if any, *qua* material objects with respect to perceivers. The underlying assumption is that the way we perceive things and their properties in the world is related to the way these things are (metaphysically) constituted. That means that things are made available to us via a restricted range of properties to each sense modality, and that they must *click* – that is, there must be a correspondence between the kind of property, and its range of intensity, and the capacity to take in that property: too strong a light destroys the sense organ that is able to perceive light (or colour as the effect of light); too dim a light (or light at the wrong end of the spectrum) cannot be perceived.<sup>6</sup> From this description it seems that a subject endowed with specific cognitive abilities becomes acquainted with certain objective features or properties of things that are causally efficacious with respect to her perceptual apparatus.

A question follows about whether this is sufficient to explain how we come to have an internal representation that corresponds with the external thing it represents. As we will see from the explanatory model under consideration, that is not the case; rather, what a perceptual representation succeeds in representing depends on what powers are involved in the

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6 See, e.g., Blasius of Parma, *Quaestiones super Perspectiva Communi*. Ed. G. F. Vescovini – J. Biard. Paris, Librairie Philosophique J. Vrin 2009, p. 217: “Hanc conclusionem probavit unum argumentum de visione respectu cuius visibile erat quodammodo disproportionatum organo, sicut est lucidum intense et intense album.”

processing of the incoming sensory information. That is to say, if one holds an account of perception that involves the active production of representations of external things, is it possible to keep a modular view of the human soul in place to the extent that is often assumed to be the case? The answer to that question very much depends on the nature of those processing powers.

The question here is that philosophy is only foundational to the extent that it is able to provide an account of the acquisition of knowledge that survives the test of counter-examples, such as those related to sensory illusion in the case of sense perception. Although this is not the focus of the present text, it is found in the texts of the authors under examination; for instance, the third book of Alhacen's *De aspectibus* is devoted to explaining the different kinds of errors that occur in the different types of visual perception, which allows him to reflect on the objects proper to each modality as well as on the conditions that must be met for perception to take place. As a result, some late medieval authors seem to have become aware of the limitations of an account of cognition that allow us, as finite beings, to build accurate representations of the external world and its objects on the basis of (the processing of) incoming sensory information by our sensory faculties. And the problem seems not to be, as they tend to identify it, in the incoming information, but rather in the strictures of faculty psychology to cope with what is required of them: to build a complex representation from very sketchy and partial objects proper to each sense modality. Perspectivist optics tries to address these concerns by strengthening the process of producing and certifying the final product, the image of the external thing acquired by visual perception, by rational-like processes – namely by judgment and inference.<sup>7</sup>

### 3. Alhacen (c. 965–1040)

Elements of these two aspects under which perception and perceptual processes came to be understood in the medieval period are best represented by Alhacen, who claims that for any instance of direct visual perception to take place certain conditions must be met:<sup>8</sup>

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7 It is interesting to note that even in a key work on medieval epistemology, such as Tachau, *Vision and Certitude*, that inference appears only twice associated with sensation, once about Roger Bacon and once about William of Ockham.

8 Alhacen, *De aspectibus*. In: *Alhacen's Theory of Visual Perception*. Ed. and transl. A. Mark Smith. Philadelphia, American Philosophical Society 2001, III.3; see also II.4.6. On these requirements or conditions (as well as on Alhacen's theory of visual perception) see Lindberg, D. C., *Alhazen's Theory of Vision and Its Reception in the West*, *Isis* 58, 1967, No. 3, pp. 321–341.

1. The medium between object and sense must be continuously transparent and there must be light
2. The object must be opaque (i.e., solid)
3. The object must be of an appropriate (/sufficient) size
4. The object must be at a distance and facing (*oppositus*) the organ of sight
5. The forms of light and colour are issued forth from every point of the visible thing in all directions (colour as the result of the action of light)<sup>9</sup>
6. These forms propagate through the medium by imaginary radiated straight lines
7. These light rays must reach towards the centre of the eye and be perpendicular (*perpendiculares*) to the surface of the eye – only such a ray that is received at a right angle is further processed, whilst all others rays (*lineas declinantes*) are dismissed (refracted, thus weakened, and thus not “appropriately” detected by the automated processing mechanism); they contribute to the final image only in an indirect way.<sup>10</sup>
8. Any ray coming from a point on the object is received at one point on the surface of the eye only – so that there is a one-to-one correspondence between one point on the object’s surface and one point on the eye’s surface (II.3.47; III.7.13). At the same time, this allows for different things that are present at the same time in the visual field to be properly distinguished.

In this model of the transmission of visual rays, “vision occurs through a[n imaginary] pyramidal

figure with its base on the visible object, apex in the eye, and an axis running through the centre” (e.g., I.6.28). The visual information of these patterns of light and colour are transmitted to the

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9 Alhacen, *De aspectibus*, I.6.12. Alhacen defends an intra-mission theory of visual perception, that is to say that the rays come to the eyes from the object; he argues at length against the extra-mission theories of vision (according to which visual rays issue from the eyes) in *De aspectibus*, I.6.51–58. Thank you to one of the anonymous referees for insisting that I make this point clearer.

10 “Et erit ista forma perveniens ad istam partem glacialis ordinata in ea secundum lineas super quas pervenit ad ipsam que sunt perpendiculares ad ipsam et concurrentes apud centrum visus sicut ordinatio partium superficiæ rei vise”, Alhacen, *De aspectibus*, I.6.29. See also I.6.55–56, where he argues against the extramission theory of vision (i.e., the view according to which rays are issued from the eye to the visible object).

faculty designated as the “last sensor” or the “ultimate sentient power” (*ultimum sentiens*, I.6.75; II.2.4).

This mode of transmission of colour (and light) in non-intermingling straight lines, and the punctiform analysis of vision it supports, is not however a sufficient account of perception. Instead, Alhacen insists that the perception of an external thing – the form of a visible object – must include the discrimination of twenty further visual intentions (II.3.44): distance, spatial disposition, corporeity, shape, size, continuity, discontinuity, number, motion, rest, transparency, opacity, darkness, roughness, smoothness, shadow, beauty, ugliness, similarity, and difference, in addition to the above-mentioned light and colour. There are actually more, but those, he claims, can be subsumed under one of these twenty-two: think of an arrangement (of parts), which falls under spatial disposition; or weeping, which requires shape (of a face) and motion (of the tears). From this list one should conclude, as pointed out by A. I. Sabra (“Sensation and Inference”, 169) and Mark Smith (*Alhacen’s Theory of Visual Perception*, lxxxvii), that the form of the visible thing comprehends the two levels of explanation; that is, it includes not only the thing’s sensible properties like colour or light, but also properties or *intentiones* such as belonging to a kind (e.g., II.4.2). In a later remark, Alhacen points out that the form reaching the eye possesses all these kinds of properties, but that the processing of the different kinds takes place in different levels of the system (II.3.26) – not only different powers but powers of a different *kind*.

Whereas light and colour are received and processed by the visual power, the processing of these intentions requires the postulation of further cognitive powers. Perception in this fuller sense entails the capacity to compare forms to one another and to arrive at a judgement on that comparison together “with the sensation of the form that is seen” (II.3.16). In one clarifying example, Alhacen notes our capacity to perceive not only two individuals, but also *that two individuals are similar*. But the perception of “the similarity of the two individuals on the basis of the similarity of the two forms reaching from the form [of each of those individuals] to the eye” (II.3.3, p. 429) cannot be accomplished by sight *on its own*. Furthermore, we are also able to perceive the difference between two individual things, for example in the case of two shades of green (II.3.8). Now, similarity (or difference) is not a property of either of the things, but supervenes as it were in them – in the agreement (or disagreement) in some respects between the two: the “differentiation between two greens is not the actual sensation of green” (II.3.9, p. 430). But this is still perception by sight; or, better, it is a case of seeing (“it occurs in sight”) while not being “the sensation

of colour".<sup>11</sup> For this extra element or level, we need to bring in a different cognitive power that takes this similarity (or difference) that supervenes as it were on colour, rather than colour itself, as its object. Moreover, this "supervening" is not something unique about colour, but can be ascribed to any visual property (II.3.12). In the case of transparency (*diafonitas*), this visual property can only be perceived by comparison (*per comparationem*) and discrimination (*per distinctionem*). According to Alhacen, such an operation is accomplished by what he calls the power of discrimination, the *virtus distinctiva* (II.3.17). The important and original claim is that any instance of visual experience consists of both the perception of the form that is seen and the further act of discrimination, which is the perceptual judgement (II.3.16), e.g., of comparison. A basic distinction is then at play between:

- (i) perception at first sight (*comprehensio solo sensu*)
- (ii) perception by judgment (*comprehensio per distinctionem/cognitionem/scientiam*, II.3.14)

The distinction is between the perception of something based only on its immediate properties – colour and light in the case of vision, and on other visual properties that constitute the object perceived,<sup>12</sup> for instance intensity. According to the psycho-physiological account Alhacen presents later in the work (e.g., II.3.46), the sensitive power (*virtus sensitiva*) senses the sensible form everywhere in the body of the visual spirit, spread from the surface of the eyes to the common nerve where the final sensor (*ultimum sentiens*) is located. When that *ultimum sentiens* senses the sensible form, the power of discrimination or discriminative faculty (*virtus distinctiva*) discerns the visual properties that are in it (*intentiones que sunt in forma*). Although often these two powers – sensitive and discriminative – operate in tandem, it seems to me that they are distinct in being; thus, the operation of differentiation belongs to the power of discrimination only.<sup>13</sup> For instance, whereas

11 He is clear that "sight perceives similarity", II.3.4, 430. It requires comparison, meaning that it cannot be a simple brute sensation, but it is still sight operating in cooperation with the distinctive power. On Alhacen's theory, see Smith, A. M., What is the History of Medieval Optics Really About? *Proceedings of the American Philosophical Society*, 148, 2004, No. 2, pp. 180–194; Smith, A. M., Getting the Big Picture in Perspectivist Optics, *Isis*, 72, 1981, pp. 568–589; Smith, A. M., *From Sight to Light. The Passage from Ancient to Modern Optics*, op. cit.

12 "... an evaluation of all the characteristics of a form", II.3.22, 432.

13 "Distinctio autem non est nisi virtutis distinctivae, non sensitivae", II.3.48, 114. According to Smith (op. cit. note 42, p. 538): "The *virtus distinctiva* ('faculty of discrimination') does not represent a discrete faculty as, for instance, does the imagination. Rather, it designates a peculiar capacity possessed by the final sensor. As such, it serves as an active complement to the more passive sensitive faculty (*virtus sensitiva*)."<sup>13</sup> For him, discrimination is a function of the final sensor, which is a sense faculty. I wonder if this is right, especially in face of the passage just quoted.

the sense perceives light and colour together, the power of discrimination perceives that the colour of the object, which is constant, is distinct from the light that shines upon it, which varies (II.3.48; see more on this below).

There is another function of the faculty of discrimination that resonates to a contemporary mind: it can recognize the perceived object without having to go through all its characteristics, provided it has previously encountered that thing (II.3.18). This means that sight is able to check any incoming sensory information against previously attained knowledge in order to identify the thing seen while it is seen. Alhacen therefore introduces yet another level:<sup>14</sup>

(iii) perception by means of reasoning (*comprehensio per argumentationem/sillogismum*)

According to this last type, perception in the robust sense, i.e., as the perception of all properties/*intentiones* constituting the sensible form, must include what has often been called (unconscious) sensory inference, because the perception of some of those properties is dependent on previously acquired knowledge and presupposes a process akin to reasoning (III.4.2): the immediate grasping of a conclusion that follows from the premises without knowing the relation of entailment between premises and conclusion.<sup>15</sup> Alhacen notes that, even though structurally it operates in a quasi-

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Smith refers however to a different passage: II.3.46; it seems to me that Alhacen does here is to use 'virtute' to characterize the sensitive power, the *ultimum sentiens*, and the power of discrimination. Perhaps my reading is influenced by an Aristotelian framework in which a power is defined by having a proper operation and proper objects. This is certainly the case with the power of discrimination: the objects are the *intentiones* or visual properties and the operations are to distinguish, to recognize, to categorize, to identify, to produce perceptual judgments. In II.3.47, it seems that Alhacen is stating the principle of division of labour between the two sensory powers: the sensitive power senses light and colour, whereas the power of discrimination discriminates all the other visual properties or intentions. If this reading were right, visual perception is the joint effort of these two complementary powers. Having said this, I do not claim that the text allows for a *definite* choice between these two readings. To make matters worse, at one point Alhacen states (II.4.2) that the power distinguishing between the different properties (intentions) that constitute the sensible form is the imagination.

14 II.3.25, 433; III.4.1: only as the result of the effort of the three types of perception are the totalities of all visual intentions perceived. The “/” in the (Latin) designation of the types of perception is intended to cover the different terms that Alhacen uses in different parts of the work, not always consistently.

15 It is important to note that the two first modes of perception are cumulative, that is to say, perception by means of recognition depends on perception by judgment, but not all cases of perception by judgment entail perception by means of recognition. If the object is not familiar to us, it is “perceived only after a scrutiny of all the characteristics” it possesses (II.3.22, 432). (Alhacen makes this point even clearer when dealing with perceptual error: he notes that there can be perceptual errors of inference with regard to all twenty-two sensibles: III.7.1.) If the ob-



rational way, such perception does not qualify as cognition in the full rational sense, because it is not linguistic (it does not make use of words, II.3.27-31).

Once the form of the object is acquired, this form is stored in the power of imagination, for future use.<sup>16</sup> With repeated encounters with numerous individuals of the same kind, the soul builds a general representation, for instance of a human being, but this form does not have the kind of properties a proper universal concept would have.<sup>17</sup> Interestingly, Alhacen does not conceive of memories as single wholes, in isolation, but rather as networks of associated memories: when remembering a person, one remembers also his/her face, the place of the encounter, etc. (II.4.12). Once it possesses these forms in its imagination and encounters similar instances of the same kind, or the same individual, the soul performs what Alhacen calls the second type of perceptual intuition, which is perceptual intuition with previous knowledge (II.4.18). In these cases, Alhacen describes how cognition or perception takes place when the form which is being perceived is compared with the form which is stored in the imagination,<sup>18</sup> namely to its similarity to a general or an individual form already acquired. If it “fits”/corresponds to the universal form, the cognitive power of discrimination identifies the kind to which the individual now perceived belongs, whereas if it bears correspondence with an individual form, it recognizes the individual thing. (Of course, the recognition of the kind is prior to the recognition of the particular form, so the former always takes place in the perception of the latter, but not vice-versa, II.4.19.) But the process is often swifter, because the power of discrimination is able to recognize an individual or a kind on the basis of distinctive or salient features (*per signa*), i.e., properties such as a flat nose or having the shape of a human being (an upright position), that are to some extent proper to that individual or that kind (II.4.21).

It is through this type of perception that one perceives what kind of thing the thing perceived is (e.g., a human being), in which it resembles a form

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ject is familiar, we quickly identify it by virtue of its most defining features (II.3.23–4, 432–433). On the role of inference, see Hatfield, G., *Perception and Cognition. Essays in the Philosophy of Psychology*. Oxford, Clarendon Press 2009, ch. 4.

16 II.4.11–12. See also II.3.48, where Alhacen states that any sensible property perceived by the power of discrimination “becomes ensconced in the soul”, available for future use.

17 *De aspectibus* II.4.12. It remains a possibility that this view influenced Roger Bacon (see below) in his account of induction. On this, see Antolic-Pier, P. A., Roger Bacon on Experiment, Induction and Intellect. In: *Interpreting Aristotle’s Posterior Analytics in Late Antiquity and Beyond*. Eds. F. A. J. De Haas et al. Leiden, Brill 2011, pp. 73–97, especially pp. 94–95. In a sense, this would strengthen the claim for the sensory (rather than strictly rational) nature of the process.

18 “... ex comprehensione assimilationis forme rei vise alicui formarum quiescentium in anima fixarum in ymaginatione”, II.4.17, 226–227.

of abstraction (II.3.21). Moreover, it is also in this way that one perceives (as in recognizing) individuals (e.g., as Socrates):

sight includes many things seen by cognition, and cognizes a man as a man and a horse as a horse and Socrates as Socrates (II.3.10)

Recognition operates just like other cases of perceptual judgment, but in this case the terms of the judgment are not simultaneously perceived forms of things but one incoming form and one existing in memory. Let us take the simple case of colour. When I perceive for the first time the colour “red”, I simply perceive it as a colour and compare it with the other colours I know from experience that resemble it (II.3.55); when afterwards I perceive “red” again, that is after I have acquired the capacity to recognize it, I perceive it immediately as being “the colour red” (II.3.49). In other words, before one knows what a thing (“red”) is, one perceives the difference between that thing and other things, i.e., the difference between “red” and “blue”; once the knowledge of “red” has been acquired, one begins to immediately see “red” (*quod est color*, insofar as it is colour, an instance of perception at first sight) followed by the recognition of “red” as the kind of colour it is (*cuiusmodi sit color* or the quiddity of the colour red) – as the perception of red precedes the perception of what kind of colour it is (II.3.53). In II.3.23, Alhacen gives another example, that of perceiving a word, “Lord/Master” (DOMINUS): if one knows the word from having seen it before, one does not have to differentiate between its composing letters, but rather is able to perceive it as a whole and immediately.<sup>19</sup>

All this is done in an amazingly short time, especially in the case of perception at first sight (II.3.62). In the case of perception by judgement and reasoning, which are slower than perception at first sight, the process is faster if the objects are familiar (“frequently perceived”, II.3.30; II.3.41) to the perceiver. In this case, the perceiver has a form retained in his/her memory to which it has access, and that can be applied to the identification of the thing present to the senses, rather than having to go through the process of discriminating all the intentions that constitute the object’s sensible form. As Alhacen makes clear, this is possible due to the way these properties are made available and the “familiarity” of the power of discrimination with them.<sup>20</sup> But this comes at a cost, as it means that it can make

19 On this reading, see Smith, A. M., *From Sight to Light. The Passage from Ancient to Modern Optics*, op. cit., pp. 191–192. See also Sabra, A. I., *Sensation and Inference in Alhacen’s Theory of Visual Perception*, op. cit., p. 175–176. The example is intended to illustrate the perception of the letters/word as a visual object(s), not the grasping of its meaning.

20 “per consuetudinem virtutis distinctivae ad istas intentiones”, II.3.26.

mistakes, as recognition is a step removed from the actual seeing of the visual form, and is dependent on a complex combinatory process (III.6). Perception of a kind takes less time to be effected than perception of an individual, but it is also less determinate: the general form is enough to perceive the thing by perceiving the forms that are proper to that kind, but not those that are proper to the individual alone (III.4.23).

In II.3.29-30, he explains this difference in terms of the perceptual nature of the process, that is, as being about the visual properties of things – or properties of things that are made available via visual experience. He then connects this with the immediate grasping that takes place when the soul is in contact with evident premises (II.3.31), such as first principles. But in II.3.35 Alhacen goes one step further, and explains that when the intellect has gone through a certain syllogism of universal premises a number of times, its conclusion gets certified and thus becomes evident. From that moment onwards, if I understand him correctly, this can be used by the power of discrimination to adjudicate the perceptual input without having to undergo the reasoning process itself. It is not only that it possesses the premise for its use, but that it naturally operates under the assumption of the truth of the premise. This is somewhat similar to the way universals in the soul are there ready to be used when encountering things via sense experience, but their process of discovery remains hidden from a current perceptual experience.<sup>21</sup>

There seems to be a division of labour and fair use of resources in that the power of discrimination makes use of what it takes from the intellect as evident premises, which constitutes the basis for its perceptual judgment. If this reading is right, the suggestion then is that we are able to perceive and judge that something is such and so without having access to what justifies it being so. The perceptual system – senses plus power of discrimination – receives incoming sensory information that is processed on the basis of some existing knowledge, the truth of which is secured by a higher cognitive power. One example of this is how the soul is able to perceive the colour of an object it now sees as distinct from the light that at different moments shines on it; this is possible because the power of discrimination judges the coloured object on the assumption (i.e., on the basis of background knowledge) that “the light in every form that is a mixture of light and colour is distinct from the colour in that form” (II.3.48). That is not to say that the soul does not have in an absolute sense access to such knowledge – “how it perceives what it perceives” (II.3.37) – but simply that this is a time

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21 II.3.42. See Sabra, A. I., *Sensation and Inference in Alhacen's Theory of Visual Perception*, op. cit., pp. 174–175, who emphasizes the empirical and sensory character of this universal form.

consuming and resource intensive process (of which we are aware when it is difficult)<sup>22</sup> that it is not required for normal instances of perception (otherwise, if it were so required it would slow down visual processing).

Maybe this last sentence has too much of a contemporary undertone to it that does not make sense to the medieval source; instead, it would be more accurate to say that a sensory power is not able to process that sort of conceptual resources, despite its operations being functionally defined by them. That this is the case seems apparent from the example Alhacen provides in II.3.38, of the child to whom a choice between two apples is given. Although the child is able to compare the forms of the two objects and opt for one of them, the most beautiful (*pulcrius*), the child uses the premises “the most beautiful is the better one” and “the better is more worthy of being chosen” without being aware that it is using them, as Alhacen explicitly remarks.<sup>23</sup> But to not know that one is using it in the description of the action does not mean that the premise had no role to play in the decision itself; on the contrary, the premise is what explains that the child decided the way it did. It seems clear, at least in the case of (adult) human beings, that one can have access, upon reflection, to such a premise and its use, which means also to the process by means of which its truth is asserted. It is clear that this power of discrimination has a sensitive nature, rather than a rational one, even though it has rational-like operations. I therefore side with Sabra (“Sensation and Inference”, 182, n. 34) against other interpreters, such as Mark Smith and, as we shall see below, Roger Bacon, who take Alhacen to be attributing the power of discrimination to reason.

But there is another aspect of what is accessible to the system, which is about what the system needs to have available, as coming from the external world. Earlier in this paper, I noted a basic distinction between the form of the visible thing as constituted by a number of properties and intentions. In chapter 4, Alhacen points out that what determines which of these properties needs to be processed depends on the level of attunement of the system to a certain thing; if a thing is well-known by the perceiver, some salient properties are enough for its identification and recognition. If, however, that is not the case, and the thing is unknown, the perceptual system – sensory

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22 “Quando vero non utitur difficultate et cognitione, non percipit quod arguit”, II.3.38, 108.

23 See also II.3.42, 438: “Comprehenduntur ergo iste intentiones sine aliqua argumentatione iteranda quam primo fecit, et sine ratione per quam comprehensa fuit veritas illius intentionis, et sine comprehensione qualitatis comprehensionis ipsius apud comprehensionem, et sine comprehensione qualitatis cognitionis apud comprehensionem”. This interpretation would explain why Bacon, as a careful reader of Alhacen despite having his own agenda, talks of the rational soul using the cogitative power (which Bacon identifies with the discriminative power) “as its own special instrument”, *Perspectiva* (for full reference, see below), pars 5, dist. 1, cap. 4.

power plus last sensor plus power of discrimination – must act on the entire spectrum of sensory information in order to unveil all of its intentions or sensible properties. Alhacen calls this perceptual intuition (*per intuitionem*) or “visual scrutiny” (II.4.2-3). Perceptual intuition is therefore the perception of the form of the visible thing with all its properties that includes discrimination and inference. In order to do so, i.e., to get a better hold of the object, the sensitive power will move the organ of sense to see the object from other viewpoints (II.4.7-8). This scanning process is automatically initiated as the result of the way the visual system is built (*natus est visus*). As Alhacen remarkably notes:

The eye, moreover, is naturally disposed to scan [objects for the sake of] visual scrutiny and to cause the visual axis to pass over all parts of the visible object. Thus, when the faculty of discrimination seeks to scrutinize the visible object, the visual axis will move over all parts of the object (II.4.8, 514).

As the object is best seen standing directly opposite the perceiver, and the part of the object that “virtually extends its ray” to the centre of the eye is better seen, the power of discrimination aiming to collect all the properties goes hand in hand with the eyes’ natural disposition to scan the different parts of the object, to collect precisely those aspects or viewpoints or perspectives.<sup>24</sup> The natural disposition of sight to visually scan the object for a complete scrutiny – *ad motum intuitionis* – means that this action is determined by how the visual system operates so as to naturally accommodate the inevitable perspectival nature of individual visual experience. I do not think one should make too much of this, but equally one should not make too little. The actions of looking at different sides of the perceived object are thus determined by how the visual system is wired and the (background) information available to the power of discrimination. It is not the case that *I desire to see the object from a different perspective*, but that *the presence of the object in my visual range*, to which I am paying attention, *requires my action* if I am to become fully acquainted with it.

The final aspect I would like to focus on is the perception of distance, one of the twenty-two visual intentions. According to Alhacen, distance cannot be accounted for by perception at first sight only; instead, the visual system proceeds (automatically) by noting (i) that there is an effect in the sense organ (eyes) that is caused by something external; next, (ii) that

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<sup>24</sup> II.4.7–10. On this fine point, see Sabra, A. I., *Sensation and Inference in Alhacen’s Theory of Visual Perception*, op. cit., pp. 170–171.

something causing an effect in the eye is not (/cannot be) placed directly on the eye; finally, (iii) the faculty of discrimination perceives that there is a distance between the thing and the eye. Alhacen notes that there is a difference between perceiving *that* there is a distance and perceiving *the magnitude* of that distance (II.3.74). If it is the case that there is a continuous ordered series of objects in the visual field, the discriminative power is able to perceive the size of the objects, the magnitude of the distance between the objects, and between the objects and the eye. But this is possible only if the discriminative power already knows the size of (at least) one of the objects currently present in the visual field, which it can use as its measure (II.3.81). Perception of distance is therefore an illustrative example of how background knowledge and inferential mechanisms are essential to current episodes of visual perception.

It is worth remarking, by way of a conclusion for this section of the paper, that in a sense this model constitutes a departure from traditional accounts of perception, because it does not make perception depend only on incoming information, even though it goes to great lengths in describing how exactly this information is made available. In the words of Sabra:

Seeing an object is not the result of a mere imprinting on the mind (brain) of a form emanating from the object. It is an inference from the material received from the object as sensation (“Sensation and Inference”, 174).

For Alhacen, to judge that  $x$  (standing for the object of the visual experience) is  $y$  (standing for a sensible property) is part of what it is to be perceptually aware of  $x$ . To get acquainted with an object on the basis of its sensible form is to be acquainted with those properties that constitute it, some of which we perceive by the sense of sight alone, others by means of perceptual judgement and others still by means of reasoning-like and inferential processes. But they are all perceptions broadly conceived, meaning that they result from the operations of a sensory rather than a rational power. Finally, this allows also for a conclusion concerning the active nature of the perceptual process (II.3.71): if it were passive, it would simply be perception at first sight, just receiving the impressions of light and colour. As we can conclude from Alhacen’s arguments, it is not. Perception of the object’s visual form (the assemblage of its properties or intentions) is the result of complex and complementary levels of psychological functions, including discrimination, recognition, and inference.

Next, I will examine whether this model is found in later authors. What I want to emphasize is how this shows the early recognition of this model

by some authors, which one needs as a complement to the general account of how, from the perception of accidental features of things such as those that are the objects of the proper senses, we come to provide an account of how particular objects, as the individuals they are and as belonging to a kind, are cognized. In case the object is known in advance by the perceiver, the content of the visual experience is not fully determined by what is received from the object. By focusing on the familiarity of objects to the perceiver, i.e., the background knowledge perceivers have of the world, Alhacen and authors of his perspectivist model of perception note that something very important was missing from other models of perception: despite being able to build an internal but accurate image of the object present to the senses, I am aware of nothing if I am not aware of *how that object relates to me*. As often is the case with tracing the evolution of historical ideas, the developments are neither linear nor continuous.

#### 4. Roger Bacon (1214–1292)

Alhacen's theory was further developed by Roger Bacon. Bacon's contribution to medieval theories of cognition cannot be overestimated, despite the lack of in-depth studies.<sup>25</sup> I would, however, in this section like to concentrate on two aspects of his theory that directly concern the focus of this paper: what the species represent, and the contribution of the internal processing faculties to the causal nature of the species.

In a definition that would impact the late medieval philosophy of perception, Bacon takes species to be the first effect of any naturally acting thing.<sup>26</sup> In other words, that is what things in the world do: they generate species. A species is a power or force (*virtus*) that elicits an action and that action is cognitive in the case that the recipient is a cognitive subject; but as an effect it lacks in being with respect to the generating thing:<sup>27</sup>

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25 The best study continues to be Tachau, K. H., *Vision and Certitude in the Age of Ockham: Optics, Epistemology and the Foundations of Semantics 1250–1345*, op. cit., pp. 3–26; see also Smith, A. M., *From Sight to Light. The Passage from Ancient to Modern Optics*, op. cit., ch. 6. However, these studies examine Bacon's view as part of a bigger project; it is significant that, to my knowledge, there isn't a single book-length study of Bacon's theory of perception and cognition.

26 "Species autem non sumitur hic pro quinto universali apud Porphyrium, sed transmittitur hoc nomen ad designandum primum effectum cuiuslibet agentis naturaliter", Roger Bacon, *De multiplicatione specierum*. In: *Roger Bacon's Philosophy of Nature*. Ed. and trans. D. C. Lindberg. Oxford, Clarendon Press 1983 (hereafter, Dms) I.1, p. 2.

27 This is why some call it "intention", precisely to denote its weak being and its nature of likeness rather than real thing: "Intentio vocatur in usu vulgi naturalium propter debilitatem sui esse respectu rei, dicentis quod non est vere res sed magis intentio rei, id est similitudo", Dms I.1, p. 4.

colour, odour, flavour, and the like cannot exist in air and simple bodies according to complete being, but according to incomplete being (Dms I.1, p. 17).

Species are of the same specific nature, but their being is (exceedingly) incomplete, which means that they represent but are not things like those which generated them; they exist in something else, first of all in the corporeal medium (Dms III.1, p. 180). Species do not have the power to change the specific nature of the receiver – if of a perceptive kind – into a thing of the nature the species represents, except in the cognitive sense of becoming like or being assimilated to (Dms I.1, p. 12). In such a being, this effect does not cause a change that is destructive to the receiving senses, because species are received according to the Aristotelian *dictum* in the manner of the recipient, and what characterizes the senses is their potentiality to perceive (Dms III.2, p. 188). An essential part of this account is to argue that it is not one and the same species moving throughout the medium, but rather that:

the active substance of the agent [touches] the substance of the recipient without intermediary [and alters], by its active [power], the first part of the recipient it touches.<sup>28</sup>

In other words, this is not a case of the local motion of one and the same species throughout the medium, but rather a case of the agent generating the species by bringing forth an effect out of the active potentiality of the matter of the recipient: “a continuous generation of a new thing” (III.1, p. 183). Notwithstanding the potentiality-actualizing nature of this successive multiplication,<sup>29</sup> Bacon emphasizes the connection between the causal and representational nature of the species, whose role is, by being received into the senses, to present that which it is the representation of. In order to do so, he says, the species must be a likeness of the generating thing that

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28 *De multiplicatione specierum* I.3, 53. On the same point, see also Roger Bacon, *Perspectiva*. In: Roger Bacon and the Origins of Perspectiva in the Middle Ages. Ed. and trans. D. C. Lindberg. Oxford, Clarendon Press 1996 (hereafter *Perspectiva*) pars I, dist. 9, cap. 4, p. 141.

29 A “virtually infinite multiplication of species in radiant fashion”, as he calls it (Dms II.1, p. 91). From the point of first contact between agent and recipient, the species are diffused in all directions; and this happens in all points of the whole surface of the agent (II.9, p. 165). The linear and radiant nature of this multiplication follows the same explanatory principles described by Alhacen. Contrary to Alhacen, Bacon thinks that species are issued also by the visual power, that is, that there is extramission in addition to intramission. These species play the role of preparing and assisting the medium in the reception of the species (from the object) and help them to be received by the sense. On this, see *Perspectiva*, pars I, dist. 7, cap. 2–4.



agrees with it in definition and nature.<sup>30</sup> In other words, the species of colour is colour.<sup>31</sup> On the other hand, the sense organ – in this case the eye – need not have a nature similar to the species (of colour) it receives (see Dms I.1, p. 10; *Perspectiva* I.10.2, p. 150).

Things in the world show great power, one is led to conclude, but Bacon must cope with an evident problem, which is the need to accommodate the representational and causal power of the species with their origin from a created thing with a limited power. As we just saw, Bacon does this by claiming that species have a weaker form of being than the hylemorphic substances they purport to represent. As a result, species as natural effects lose some of their causal force over distance, thus explaining the experiential evidence that objects very far from the perceiver are seen in a more faded manner. To argue otherwise would be to claim that an effect would be superior to its cause, a finite material thing with limited acting power.<sup>32</sup> Therefore, Bacon strongly argues against those of his contemporaries who maintain that:

species have spiritual existence in the medium and in the senses. And they impute this opinion to Aristotle and to Averroes in [their respective] *Books on the Soul*, book 2. And since, [according to them,] species have spiritual rather than material being, species do not obey the laws of material forms (...) This is a very serious error, for it contains many elements that are false and absurd.<sup>33</sup>

If the species are of the same nature as the generating thing, species of corporeal things must be corporeal;<sup>34</sup> in other words, they are corporeal forms that do not have dimensions of their own but of the subject in

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30 “species sit similis agenti et generanti eam in essentia et diffinitione (...) Propter quod oportet ponere quod virtus seu species facta ab agente sit consimilis agenti natura et diffinitione et in essentia specifica et operatione”, Dms I.1, p. 6; see also *Perspectiva* I.6.3, p. 80: “species est eiusdem nature cuius est agens eam. (...) Ergo relinquatur quod species albedinis, que est eius similitudo, erit individuum in specie albedinis praedicamentali.”

31 “Quapropter species coloris est color, et species lucis est lux, et sic de omnibus”, Dms I.1, p. 10.

32 See, e.g., Dms III.2, p. 190: “Item propter nobilitatem generantis respectu generati, sequeretur quod aliquid *corporale* daret esse spirituale speciei; sed non potest hoc dici”, reading “spiritual” for “corporale” as in manuscript O (see the critical apparatus).

33 *Perspectiva* I.6.3, p. 83. See also the extensive analysis in Dms III.2. Here he identifies this reading as being based on a “faulty translation of the works of Averroes, Avicenna, and Aristotle” (III.2, p. 193).

34 “quare oportet quod esse speciei sit *corporale*”, Dms III.2, p. 190. See also *Perspectiva* I.6.3, p. 82: “Dico igitur quod species habent esse materiale et naturale in medio et in sensu”. See further arguments against the immateriality of species in *Perspectiva* I.6.4. Bacon notes that he uses *corporale* and *materiale* interchangeably.

which they come to inhere (Dms III.1, p. 184; P I.9.4, p. 140). For Bacon, it is certainly not the case that species have a spiritual (in the sense of immaterial) mode of existence; by “spiritual” Aristotle and Averroes simply mean not visible or insensible, as what is really spiritual cannot be known via the senses.<sup>35</sup> The spirituality of the species would not explain how we are able to perceive different parts of objects as distinct and to perceive accurately different colours of the same object or objects of different colours (Dms III.3); what explains this is the way these species are received and the information processed by the perceptual powers. But having solved one problem, Bacon still needs to address a major difficulty in his account (as in any theory of perception that makes use of representational devices), that is, how do species represent? Namely, how do they represent accidental features of things, but are also the basis for universal knowledge via the intellectual process of abstraction?

Bacon answers this by arguing for the species’ power in representing both the substance and the accidental features of the generating individual thing. But what does Bacon mean by the assertion that aspects such as the substantial nature of a thing are among the *sensible* properties of things? Bacon starts by reminding the reader that (i) all things have one defining or determining form that explains what the thing is and that applies both to homogeneous or heterogeneous things (that is, things that are constituted by parts of the same nature or of a different nature); in addition, that (ii) things can have different accidental forms (such as sensible qualities) inhering in different parts, and they will figure in the description of the thing because each point issues forth a representation of itself.<sup>36</sup> Therefore, everything that is able to act acts on its surrounding matter, generating species out of the potentiality of that matter which represent its nature (e.g., lucid) and a property (e.g., red),<sup>37</sup> whether this nature is the same in the whole object or different (see, e.g., II.9, p. 164). According to Bacon, then, both the substance and accidents of an individual thing issue species, and the relation between these two aspects of species should be understood in the same terms as between substance and accidents in the extra-mental world, that is:

as substance is to accident, so is the species of substance to the species of accident. Therefore, just as there can be no accident without substance, so there can be no species of accident without the species of substance (Dms I.2, 25).

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<sup>35</sup> Dms III.2, p. 192; P I.6.4, p. 88. See footnote 30 above.

<sup>36</sup> Dms II.9, ed. Lindberg, p. 165.

<sup>37</sup> Cf. *Perspectiva* I.1.4, p. 12–14.

The point is that one cannot receive the species of a sensible quality that inheres in a given substance without also receiving the species of the substance that the quality qualifies. For instance, in Bacon's own example the substance of fire is issued together with heat.<sup>38</sup> Bacon makes it clear that the species of substance does not represent only the form, but the composite. Therefore, the unpacking of the species of a corporeal substance leads to the cognition of the whole generating composite, not only the form. The matter represented in the species of the composite is not the matter that is proper to that particular, but that is proper to the kind of thing that particular instantiates; in other words, the specific matter that enters into the definition of the thing (Dms I.2, pp. 28–32). As the species represent both substance *and* accidental features of the object, all that is required is for the perceiver to be endowed with the kind of cognitive abilities that are able to process the incoming stimuli in a way that respects their relation in the object. An important point to make is that these are described as sensory or sensory-based modes of cognition, although this does not mean that these are equally sensed by the external senses or even the common sense (I.2, p. 24).

The way to proceed is to claim that these two aspects are not received and processed by the same cognitive powers. Quite the opposite, in fact: whereas the sensible quality – say, “redness” – is perceived by the external sense of sight, other properties, such as the so-called intentions like the hostility perceived by the sheep when perceiving a wolf, are the objects of the other sensory powers; in this case, of the estimative. Likewise, substance (*substantia*) and substantial nature (*natura substantialis*) are perceived by the estimative or cogitative power, high-order perceptual faculties.<sup>39</sup> Other properties, such as being a man and being Peter, the Parisian, despite also being *sensibilia per accidens*, are cognized by a *non-sensory* cognitive power altogether (*Perspectiva* I.10.1, pp. 146–148). What matters, from a systemic point of view, is that by working in tandem, these powers of the human soul unpack the species of the substance, thus leading to the cognition of the whole

38 Matthew of Acquasparta seems to make a reference to such theory in his *Quaestiones de cognitione*. Quaracchi, Florence, 1957, q. 3, 13, p. 270, attributing it to Hugh of St. Victor. More recently, Christopher Martin has made the suggestion that Bacon's target may have been Richard Rufus of Cornwall (in his talk *Spiritual Being and the Powers of Perception: The First Latin Commentators on De Anima II*, Helsinki, November 4, 2016).

39 *Perspectiva* I.1.4, pp. 12–15. Bacon describes the cogitative power as “the mistress of the sensitive faculties” (which exist for the sake of the cogitative power) and as united with the intellect in human beings, standing in the place of reason in the case of non-human animals (*idem*). The cogitative “uses all the other powers as its instrument” and in turn is used by reason as its instrument (*Perspectiva* I.1.4, pp. 16–17). Bacon notes the absence of such power from Aristotle's philosophical psychology and explains it away by saying that *Aristotle was dealing with a narrow understanding of sensation* as including only the five external senses and the common sense (see Dms I.2, p. 26).

generating composite, not only the form or a particular property. Although Bacon's view must be understood in the context of an ongoing developing tradition that owes much to some authors, such as Avicenna, Bacon's theory highlights an important insight in Alhacen's work: that perception in the full sense must include the form of the thing, meaning all the properties of that thing that are relevant for us to isolate it from other things being perceived, and thus that it cannot be limited to the perception of the traditional Aristotelian proper and common sensibles (see, e.g., *Perspectiva* I.10.3, p. 158). This is only possible, however, if we look at perception not only from the point of view of what perceivers receive from the things, but also and especially from the point of view of the role played in the perceptual process by high-order cognitive powers, sensory or otherwise.

Contributing to this viewpoint is the reduction of the traditional distinction between sensibles *per se*, common sensibles, and sensibles *per accidens*, into sensibles *per se* and sensibles *per accidens*, because:

the discriminative (that is, the cogitative) faculty, which exists in the middle cell of the brain, judges concerning these sensibles, proper as well as common, by means of the common sense and the particular senses (...) and because the same cogitative power judges concerning sensibles *per accidens* by means of the estimative power and the memory rather than the common sense and the particular senses; thus common sensibles and proper sensibles are called 'sensibles *per se*' because they are apprehended by means of sense rather than through the estimative faculty (Dms I.2, pp. 37–39).

Bacon explores this idea further in his treatise on *Perspective*. In this work, the common sensibles are now assimilated into the twenty-two *per se* visible sensibles that we have found in Alhacen.<sup>40</sup> In fact, however, there is an internal distinction between nine proper sensibles (two from sight and seven from the other sense modalities)<sup>41</sup> and the remaining twenty common sensibles, thus called because they can be perceived by more than one sense

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40 "And in *On the Soul*, book 2, and the beginning of *On Sense and Sensibles*, Aristotle employs some of the common sensibles, such as size, shape, motion, rest, and number, as examples. And not only these, but all of the aforementioned, are common sensibles, although vulgar natural philosophers [*vulgus naturalium*] do not consider this, since they have not investigated the science of *perspectiva*. For the common sensibles are not so called because they are perceived by the common sense, but because they are commonly discerned by all or several of the particular senses", *Perspectiva*, I.1.4, pp. 11–13.

41 See the full list in *Perspectiva* I.1.3, p. 8.

modality, and by the powers of common sense and imagination (*Perspectiva* I.10.1, p. 147). In addition to these sensibles perceived by the sense modalities, we should add the sensibles *per accidens*, which are so called because they are not perceived by the external senses or the common sense, but by *other powers* of the sensory soul (*ab aliis virtutibus anime sensitive*), the internal faculties of the estimative, the cogitative, and the memory.<sup>42</sup> These include the Avicennian intentions, such as the already mentioned hostility the sheep perceives in the wolf. These intentions are representative of the “substantial nature of things” (*nature substantiales rerum*),<sup>43</sup> and as such are productive of a change of state in the perceiver, be it fear or flight; in other words, they represent the substantial nature of things *as* useful or harmful. Bacon notes that the terms used to designate the higher modes of perception seem to imply that for Alhacen the discriminative power is a rational power (*Perspectiva* II.3.9, p. 246); a few pages later, however, he blames this on the faulty translation of his work, noting that all these three modes of vision are sensory, that is, performed by faculties of the sensitive soul. Some of the operations performed by all non-human animals are rational-like but not rational; rather, they are performed by a sort of natural instinct.

Finally, there are other properties of things, such as where *x* was born, who his father is, etc., which “coexist with color, shape, and the other visible [properties]” (*idem*), but cannot be apprehended by sensory powers. This leads Bacon to develop three levels or modalities of sensory-based cognition:

since vision is threefold, namely, by sense alone, by *knowledge* [*scientia*], and by reasoning, similarly it is necessary for man to have threefold vision. For by sense alone we perceive few things and imperfectly, as, for example, light and color, and we have this perception weakly, namely, whether these objects of vision exist or which they are; but by memory we perceive of what kind and quality they are, whether the light is that of the sun or of the moon, whether the color is white or black. But by reasoning we perceive all that pertains to light and color in accordance with all of the twenty common sensibles. Therefore, the first kind

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42 On the internal senses in Bacon, please see Wood, R., *Imagination and Experience in the Sensory Soul and Beyond: Richard Rufus, Roger Bacon and Their Contemporaries*. In: Lagerlund, H. (ed.), *Forming the Mind: Essays on the Internal Senses and the Mind/Body Problem from Avicenna to the Medical Enlightenment*. Dordrecht, Springer 2007, pp. 27–57. On the cognitive powers of non-human animals, see Oelze, A., *Theories of Animal Rationality in the Middle Ages* (forthcoming, Brill). Of course, in another sense some of these sensibles are accidental to other sense modalities, such as warmth is accidental to sight; but that is another issue.

43 *Perspectiva* I.10.1, p. 149; and I.1.4, p. 12. See also Dms I.2, p. 40.

of perception is weak, the second is more perfect, and the third is the most perfect.<sup>44</sup>

Bacon makes a very clear point here with this hierarchy of visions of cognition by “sense alone”, (*solo sensu*), “cognition by means of prior knowledge”, and “[cognition] by means of syllogism”,<sup>45</sup> roughly corresponding to Alhacen’s model. In the first, we perceive the primary objects of sight, light and colour, whereas in the second, we perceive, with the help of the memory, the quality but also the kind to which a thing belongs, such as whether this is the light of moonlight. The second, “cognition by means of prior knowledge”, is described as:

the ability to distinguish universals from one another and from particulars, and particulars from each other by comparison of a thing seen to the same thing previously seen, recollecting that it was previously seen and known to the observer (*Perspectiva* I.10.3, p. 157).

The focus of this type of cognition is on the difference (and similarity) between things previously seen, which means that the difference itself is perceived – by the sense power – but needs to be certified by a higher perceptual power.<sup>46</sup> The example he provides is the colour of the light coming from the moon at different times of the day, and according to varying circumstances of the medium. Once this knowledge is acquired, we gain the capacity to recognize an instance of it whenever it occurs, which makes the process faster, while remaining largely not accessible to voluntary control. Before being in possession of that knowledge, “we did not perceive whether [that light] was the light of the sun or of the moon” (*Perspectiva* I.10.3, p. 155). Once we possess it, we perceive that light as being that of this or that star, as the continuation of the text shows, in other words we judge (and recognize) that this is (or is not) of that kind: this as a man and this particular man. The connection with Alhacen’s second type of vision, dependent on pre-existing knowledge, is clear and explicitly stated by Bacon.

Finally, as in Alhacen, the third kind of vision takes place by a process similar to reasoning,<sup>47</sup> but without entailing deliberation, a fact he attributes

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44 Roger Bacon, *Perspectiva*, transl. Burke as *Optical Science in The Opus Majus of Roger Bacon*, Vol. II. New York, Russell & Russell 1962, p. 579.

45 “... auctores perspective vocant argumentum et sillogismum”, *Perspectiva* II.3.9, p. 253.

46 “Et ideo visus percipit hanc diversitatem, sed non potest solus sensus hoc certificare”, *Perspectiva* II.3, p. 204. This kind of perception is common to humans and non-rational animals.

47 “... est quasi quoddam genus arguendo”, *Perspectiva* I.10.3, p. 156.

to it being an innate capacity of human (and nonhuman) beings. The full certification of the twenty common sensibles depends on this kind of cognition. Among the cases included in the third type of cognition is that of perception of distance,<sup>48</sup> which is not perceived as such but as the result of a process of inference from the angle of the visual rays from distinct bodies present in the visual field – entailed by the continuous sequence of bodies and the perceiver's prior adjudication of the size of those objects. In Bacon's own words:

Distance is grasped, therefore, when a sequence of bodies is arranged continuously between the eye and the object, provided that the distance is moderate and that the eye will have inspected those bodies and certified their magnitudes (*Perspectiva* II.3, p. 210).

Errors in this type of cognition are frequent, he points out, due to the “excessive remoteness of the object from the eye”.

### 5. John Pecham (1230–1292)

In a similar vein, and at roughly the same time, John Pecham subscribed to Alhacen's theory in his treatise *Perspectiva communis*, both in terms of the principles of geometric optics and his psychological account.<sup>49</sup> In propositions 47 to 54 he lists the conditions under which visual perception needs to occur, similar in nature to Alhacen (see section 1), and in proposition number 55 he lists the twenty-two visual intentions found in Alhacen.

However, in what follows I will briefly concentrate on two aspects of his account: first, the adoption of the principle of certification of the object by means of the turning of the eye around the object (I.38, p. 122), which contrasts *bare perception* with *discriminative perception*, with the former meaning the perception of light and colour (I.61) by sight alone (but not the essence of light and colour), and the latter the perception of all other intentions requiring the intervention of a higher cognitive power – the *virtute*

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48 For a more detailed account of reasoning in animals according to Bacon, see Hackett, J., *Animal and Human Knowledge in the Perspectiva: (Opus Maius, part five)* of Roger Bacon. In: López-Farjeat, L. X. – Telkamp, J. A. (eds.), *Philosophical Psychology in Arabic Thought and the Latin Aristotelianism of the 13th Century*. Paris, J. Vrin 2013, pp. 223–241; and Oelze, A., *Theories of Animal Rationality in the Later Middle Ages*, PhD Dissertation, Berlin 2016.

49 Pecham, J., *Perspectiva communis*. In: *John Pecham and the Science of Optics*. Ed. D. C. Lindberg. Madison, Milwaukee, The University of Wisconsin Press 1970.

*distinctiva* – and background knowledge (I.56, p. 136).<sup>50</sup> Pecham presents two examples of this latter kind: the identification of (the relation of) similarity between two individuals or two colours, and the recognition of things as familiar. Now, recognition presupposes the existence of universals that serve as the background against which the individuals perceived, whose species are retained in memory, are contrasted. This recognition is accomplished as it were by reasoning – *quasi per ratiocinationem* (I.56, p. 136). Pecham makes it clear that the discriminative power operates in a rational-like manner, being endowed with this natural aptitude (*aptitudo*) to perform comparison and adjudication without possessing propositional knowledge. The idea, already found in Alhacen and in Bacon, is that in doing so the animal soul does not perform a strictly discursive procedure of ordering propositions, but instead “the discriminative faculty was designed to inform without difficulty an aptitude that is naturally operative” (I.57, p. 145). In other words, that is the way the system naturally operates, without requiring any form of deliberation in normal functional conditions. The power of discrimination operates imperceptibly in perception, in cooperation with the sense power.

One example of this, and just like in Alhacen and Bacon, is how perceivers can have no direct perception of distance and size, but only via the mediation of inferential reasoning.<sup>51</sup> The perception of the quantity of distance is dependent on the knowledge of the size of objects located in the visual field and standing between the perceiver and the object the distance to which is to be estimated.<sup>52</sup> Without this knowledge, the distance cannot be asserted with any degree of certainty; thus, it is on the basis of what one already knows that the estimation of the distance to a given object can be achieved. That leads to the question how size is perceived. Pecham notes that the size of the angle of the object in the eye is not sufficient; instead, the base of the radiant pyramid must be compared with the angle’s size and length, so as to

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50 Pecham differentiates between the senses of certification implied in vision, which include the certification of distance, of size (of the object perceived), and of shape. Shape is perceived as the result of the perception of the order of the parts of the object (I.71, p. 145). Light acts on the surface of bodies and is reflected from it in the form of rays – “the species of a visible object fashioned into a straight line by extension” (I.27, p. 109) – forming a radiant pyramid that is perpendicular to the centre of the eye and that manifests the object in the appropriate order (II.2, p. 158). In Pecham’s own words, “the entire ray is the likeness of something else” (I.67, p. 143). Pecham is more forthcoming to the supporting role of oblique rays coming into the eye, complementing the picture resulting from perpendicular ones (I.42, p. 125). The lengths of the rays are perceived by the eye together with the part of the ray that conveys the qualities of the visible object.

51 [On the perception of distance:] “*Distantia siquidem visibilis visu non comprehenditur, sed ratiocinatione colligitur, docente hac phylosophia sic*”, *Perspectiva communis*, I.63, p. 140.

52 “*Dico igitur quod comprehensio quantitatis distantie accipitur a quantitate corporum interiacentium*”, *Perspectiva communis*, I.63, p. 140.



account for distance.<sup>53</sup> As in Alhacen, the perception of distance and size in this inferential way results in a learned ability that is then put into practice whenever we encounter objects in our visual field.

Pecham's treatment of visual perception may not be cursory but, from the point of view of examining the psychological aspects, it is superficial. This is most likely explainable by the textbook nature of the account in reproducing the main aspects of Alhacen's account rather than contesting them, but there is something striking: whereas in other works Pecham is adamant in insisting that the soul cannot behave in a passive way, but brings about its own representations following an affection of the sense organs, in this treatise on *Perspectiva* he avoids any such account.<sup>54</sup>

## 6. Blasius of Parma (1345–1416)

My final example is Blasius of Parma, who, in his *Questiones super Perspectiva Communi*, defines vision as being caused by the power of sight with the concurrence of the object.<sup>55</sup>

The subject of this act of visual perception is the soul, which Blasius equates with its sensitive and intellectual components as the agent sense (I.2.2, p. 78). The object concurs by means of a varying intensity of the active qualities it issues forth, in the form of rays of light (I.6.2, p. 117). These active qualities as rays are the species, and their function is to be representative of the thing of which they are the species.<sup>56</sup> The presence of the species received in the sense organs acts as a disposition for the reception of the power's operation (I.14.1, p. 202), but is not enough to cause a visual perception. The object should be said to concur to the production of the act of seeing as the *causa sine qua non*, but that it is not as such primarily the cause of seeing (*non causat visionem*). Instead, this role belongs to the soul (I.10.3, p. 162):

It is truer to say that the soul causes vision or intellection than [to say that it is] the object.<sup>57</sup>

53 *Perspectiva communis*, I.74, p. 147. See *De aspectibus* II.3.143: "Quantitates ergo visibilium non comprehenduntur nisi per distinctionem et comparisonem."

54 On Pecham's activity of the soul in perception, see Silva, J. F., *Medieval Theories of Active Perception: An Overview*. In: Silva, J. F. – Yrjönsuuri, M. (eds.), *Active Perception in the History of Philosophy*. Dordrecht, Springer 2014, pp. 117–146, at pp. 126–128.

55 "visio est quedam cognitio causata a potentia viva in oculo, obiecto concurrente", Blasius of Parma, *Questiones super Perspectiva Communi*. Ed. G. F. Vescovini – J. Biard. Paris, Librairie Philosophique J. Vrin 2009, p. 71.

56 "evidens est quod species est representativa eius cuius est species", *Questiones* I.2.1, p. 77.

57 "Et cum dicitur similiter de visibili quod 'visibile si ponatur iuxta oculum non causat visionem', respondetur quod obiectum secundum rei veritatem nec in parte propinqua nec in remota cau-

If the reception of the species were sufficient on its own for seeing, the more the species would efficaciously act on the senses, the better we would see. But this is simply not the case: we only see when the visual power (or, the faculty of sight) directs its attention to the object via the reception of the species. If the object making itself present is not moderate (i.e., proportional) and the power of sight is not attending, there is no visual experience (I.6.2, p. 117). Blasius makes it clear that without the soul's turning/attending to the object being presented, there is no perception and no understanding.<sup>58</sup> The soul is the cause of vision.<sup>59</sup> Concurrent to this internal principle of causation is the object, which has the primary external causal role, rather than the species it generates.<sup>60</sup>

An important feature of this account is that the species can have different modes of being, with greater or lesser intensity. In I.14.1, Blasius gives the example of the persistence of the species in the eyes, when closed after being exposed to bright sunlight; in this case, he advocates, the species realize their tendency to nonbeing, progressively losing their intensity by going from white to reddish to violet (*alurgum*) (I.14.1, p. 203). The point is worth emphasizing: vision comes in degrees, thus meaning that from the outset our acts of visual perception are limited to a range of actual but changing qualities; in other words, our perceptions are restricted to partial knowledge rather than a complete one, which is the case with intellectual cognition.<sup>61</sup> Perception is not an all or nothing affair, but a perspectival one.

The focus then shifts to the nature of the species and the qualities that generate them. Blasius proposes that a colour, white, must be an active quality because it is able to generate a species of itself, but not so active that it is able to act on the surrounding matter in such a way that this matter takes the form of this quality. The example he supplies is clear enough: if white inhering in a wall was so active, then if one were to place one's hand on the wall, the hand would acquire the quality of whiteness (i.e., would be made white: *albifieri*). The same reasoning should be applied to the medium sepa-

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sat visionem licet concurrat cum causa ut velim dicere quod est causa sine qua non. [...] Et *ideo est tutius dicere animam causare visionem vel intellectionem quam obiectum*", *Questiones* I.10.3, p. 162.

58 "ubi anima non advertat, non causatur visio nec intellection", *Questiones* I.10.3, p. 162. See I.14.1, p. 204 on the non-voluntariness.

59 "obiectum non est illud quod causat visionem in oculo, nec species diffuse ab ipso et multipliate in oculum, sed est anima visive", *Questiones* I.12.3, p. 190.

60 *Questiones* I.6.2, p. 118. It is important to note, however, that colour is not per se the efficient cause of visual perception, because all natural actions require efficient causation from celestial bodies, as a form of "flux" (*Questiones* I.15.2, p. 219).

61 "Patet etiam quod nulli dubium quod visio est qualitas gradualis, modo sicut non contingit aliquam qualitatem gradualem simul totam deperdi, sic non contingit totam adquiri. Et ita putandum est de notitia intellectuali", *Questiones* I.14.1, p. 203.

rating the object from the perceiver. The way out is to claim that the species of white generated by the whiteness in the object has an imperfect mode of being, that is not able to produce the normal sort of alteration – when the matter in which the qualitative form is received takes in the quality – but one in which the receiving thing is perfected (I.6.2, p. 119). (This clearly echoes Bacon’s weak being of the species examined in Section 4.)

The soul is perfected by sensation,<sup>62</sup> and sensation is only painful (*dolorosa*) when the object is disproportionate to the organ, as in the case of a too intense light (I.15.2, p. 217). Thus, visual perception *qua* visual perception is not painful, but only insofar as it is realized in a badly disposed sense organ. This being-perfected remains problematic in a number of ways: it is easy to understand what it means in respect to the soul being actualized in its natural inclination for knowledge (I.15.2, p. 218); however, it is less clear what it means in the case of the medium, or the hand on the wall, to use Blasius’s own example. One option is to restrict this sort of perfective alteration (*alteratione perfectiva*) to cognitive states.

The issue of whether or not the species mix in the intervening (between object and perceiver) medium is central to adjudicating between its material or immaterial nature, because no two material entities can occupy the same point in space. In his reply to this question, Blasius starts by noting the distinction between intellectual species, sensible species, and species in the medium. Sensible species are those which are received in the sense organs, and that contribute to cause sensation (of the object they represent).<sup>63</sup> What this causation amounts to is further specified in questions 15 and 16 of his commentary. The focus of Blasius’s account is on the quantitative dimensions (*quantum sit*) of the thing perceived (I.16.2, p. 225). This cannot be achieved simply by the visual power (*potentia visiva*) in isolation from the internal cognitive powers;<sup>64</sup> rather, it depends on them, and on the capacity for inference and relating (the quantity of) objects.<sup>65</sup> That is why there is, to Blasius, more to visual perception than meets the eye, namely that it can be understood on three levels:<sup>66</sup>

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62 *Questiones* I.15.2, p. 217. See also I.15.2, p. 218: “omnis visio ut cognitio est perfectio ipsius anime et corporis”. In the case of cognitive acts that depend on bodily organs, this perfection is more properly said to be of the composite.

63 “Quedam sunt species que dicuntur sensibiles, aut quia recipiuntur in organo sensus, aut quia causant sensationem de obiecto”, *Questiones* I.6.1, p. 114.

64 “ad iudicandum quantum sit hoc vel illud, potentia visiva non sufficit”, *Questiones* I.16.2, p. 225.

65 “Nunc superest loqui de potentia visiva regulata per superiorem virtutem”, *Questiones* I.16.2, p. 225.

66 “Tertia evidentialia: tripliciter contingit nos habere cognitionem rei quante. Uno modo solo visu concurrente et hoc scientur per quantitatem anguli ut videbitur in questione vel secundum quod plus vel minus informabitur de humore glaciali. Secundo modo possumus cognoscere rem

- (1) the first is the result of the power of sight only (*solo visu*), thus the quantification of the angle that reaches the glacial humour in the surface of the eye;
- (2) the second is the quantity of the thing itself, which requires the intervention of the distinctive power (*virtute distinctiva concurrente*) in addition to sight. The distinctive power adjudicates the size of the thing from the relation between the angles of the visual rays and the distance;
- (3) the third is the quantity of the thing from the point of view of the proportions of the body on the basis of lines, diameter and such – this is the result of an intellectual operation (*per visum intellectu concurrente*).

Anything that can be apprehended by the visual power is able to generate rays that touch the eye at straight angles, and on the basis of these angles the distinctive power is able to judge the size of the object.<sup>67</sup> Blasius insists on the distinction between the power of sight (*potentia visiva*), as one of the five external senses, and the common sense, as the internal vision (*visus interior*). Blasius renders the common sense as the power of discrimination (*virtus distinctiva*), which distinguishes between the objects of the different sense modalities and perceives the object as well as the distance to the object; and, on the basis of this, it perceives the object, the size of the rays, and that different objects are at different distances from the perceiver (I.16.3, p. 230).

One of the points in contention between Blasius and what he calls “all Perspectivists” (*omnes Perspectivi*) – by which he probably means the Euclidean tradition – is the perception of the size and distance of an object, that is, whether this can be known only on the basis of the angles of the rays coming from the object that constitute the sides of the visual pyramid, the base of which is the object and the axis the middle of the eye.<sup>68</sup> Blasius

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quanta sit per visum, virtute distinctiva concurrente, et hoc fit per angulos relatos ad distantiam secundum quod apparebit. Tertium modo possumus apprehendere rem quanta sit per visum intellectu concurrente, et hoc per modo investigamus quantitatem et proportiones corporum per lineas, per diametra et per alia ut dicetur”, *Questiones* I.16.1, p. 224.

67 “...res, quantumcumque magna, tantum informat de humore glaciali quantum est illud quod intercipitur inter latera pyramidis concurrentia ad angulum rectum in oculo. Et precipue tantum et non plus potest informare res quantumcumque parva, postquam talis res, quantumcumque parva, potest subtendi angulo recto in oculo”, *Questiones* I.16.1, p. 224.

68 “In oppositum sunt communiter omnes Perspectivi, dicentes pro principio que sub maiori angulo videntur, maiora apparent, et que sub minori, minora”, *Questiones* I.16, p. 223. On this identification and Blasius’s reply, see Rignani, O., Baigio Pelacani e il senso agente. In: Vescovini, G. F. – Sorge, V. – Vinti, C. (eds.), *Corpo e Anima, Sensi Interni e Intelletto dai Secoli XIII-XIV ai Post-Cartesiani e Spinoziani*. Turhout, Brepols 2005, pp. 247–266, at p. 264; see also Vescovini,

strongly argues against this and claims that the size of an object as perceived cannot simply be proportional to the size of the angles received in the eye.<sup>69</sup> Perception of size must be the result of a judgment that includes knowing the quantity of the distance,<sup>70</sup> but this requires a capacity for inference and the visual power is not capable of it as such.<sup>71</sup> Thus, when visually perceiving an object, the intellect concurs with the incoming species, registers the size of the angle, and judges the length of the rays, allowing the perceiver to know the distance to the object being perceived. This intellectual judgment concurrent with the processing of sensory information has an effect in the content of the perceptual experience; for instance, we are able to perceive how far two cities are from each other.<sup>72</sup> No object is so large or so small that the distance to the perceiver and to other objects in the visual field cannot be ascertained.<sup>73</sup>

We are now able to understand what Blasius means when he says that visual perception is the cognition of a visible thing,<sup>74</sup> i.e., that “to see is to know” (*videre est cognoscere*, I.16.2, p. 225). Visual perception (*visio*) includes three levels of processing the incoming sensory information: first, the simple reception of the species of the visible thing in the sense organ; second,

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G. F., *Astrologia e Scienza. La crisi dell'aristotelismo sul cadere del Trecento e Biagio Pelacani da Parma*. Firenze, Nuovedizioni 1979, pp. 150–151. Blasius denies this: “*a videtur sub maiori angulo quam b, igitur a videtur esse maius quam b. Patet, quia visus non apprehendit distantiam seu longitudinem radorum ut postea patefiat. Et per hoc non refert obiecta ad distantiam. (...) argumentum non valet (...). Intellectus enim iudicat et deprehendit Solem esse maiorem Terra, et tamen sub minori angulo videtur Sol quam Terra*”, *Questiones* I.16.2, p. 229. (He develops the argument further in article 3 of this question.) On this debate and Blasius’s position, see G. F. Vescovini and J. Biard in their “Introduction” to Blaise de Parme, *Questiones*.

- 69 “*cum quantitas anguli, sub quo res videtur, non sufficit pro quantitate rei visibilis deprehendenda*”, I.16.2, p. 225. See also I.16, p. 221: “*ergo proportio visibilium non insequitur proportionem angulorum*”, I.16, p. 221; repeated in I.16, p. 222, in I.16.2, p. 225, and in I.16.4, p. 232. Blasius himself notes that this is Alhacen’s own view: “*Idem voluit Magister in hac prima parte Perspective in hac forma: ‘angulum sub quo res videtur, non sufficere pro quantitate rei visibilis capienda’*”, I.16, p. 223.
- 70 *Questiones* I.16.4, p. 232. On this same point, see Alhacen, *De aspectibus* II.3.73-6. Thank you to one anonymous referee for insisting that I make this point clearer.
- 71 “*cum potentia visiva non sit virtus illative*”, *Questiones* I.16.2, p. 225.
- 72 “*visus intellectuali iudicio concurrente, potest longitudinem radorum comprehendere, idest distantiam in qua vel per quam visibile ab oculo distat. De quo post hoc erit questio generalis. Sed quod propositio sit vera, patet, quoniam visus, mediante claro intellectu, deprehendit quantum est inter unam civitatem et aliam, et similiter quantum est a centro mundi ad centrum solis existentis in auge aut in oppositione augis aut in locis intermediis*”, *Questiones* I.16.2, p. 226.
- 73 “*Quarta conclusio: omni quantitate data, quantumque magna vel parva, potest visus mediante claro intellectu per angulos cum relatione unius obiecti, vel plurium, ad distantias, quanta sit, calculare*”, *Questiones* I.16.2, p. 227. Error in this is mostly due to refracted rays: *radius frangi vel flecti* (*Questiones* I.16.3, p. 230).
- 74 “*Nunc pono conclusiones, presupposito primo quod visio sit cognitio rei visibilis quod omnes audaciter concedunt*”, *Questiones* I.14.1, p. 202.

the general cognition of the object, which entails perceptual judgement; third, the intellect operating on the sensory information and inferentially coming to know what the object is, where it is, its size, shape and proportion between its parts (I.15.1, p. 216). The different types of seeing take place at different paces: the first takes place immediately; the second in an imperceptible (*imperceptibile*) amount of time; the third, which entails the turning of the eyes around the axis in order to fully perceive the totality of the object, requires local motion and therefore time (I.14.1, pp. 201–202). Moreover, it presupposes the other types of vision, direct and judgmental, which means that it is overall slower than they are. Perception in this full sense entails the possibility of error, of course, but Blasius does not see this as a problem in itself; rather, it simply confirms that in all levels of the cognition of natural things our knowledge can never be as complete as we would wish.<sup>75</sup>

The conflation between these different levels of visual perception taking place concurrently could be problematic, if they were to correspond to two epistemic subjects; however, Blasius is adamant in asserting that the visual power, the discriminative faculty, and intellect are not really distinct but are rather constitutive of one and the same soul. In fact, Blasius seems to take these as aspects or functions of one and the same power, which is to be identified immediately with the soul.<sup>76</sup> Visual perception is therefore a full scale, intertwined sensory and intellectual process,<sup>77</sup> rather than a strictly modular one.

## 7. Conclusion

Perception is about getting a picture of the world. The problem is *how* we get that picture and of *what* that picture is, that is to say, which features of the world constitute the content of our perceptual experience. Visual perception is as much about the *act* of “to see” as about *what* I see. But *to see* is a verb, meaning that it has a subject: subjects, at least in the medieval conceptual

75 “...et consequenter causabitur error in intellectu de rebus naturalibus. Ad istud respondetur quod hoc argumentum concludit tantum quod numquam de re naturali per visum et consequenter per intellectum homo habet tantam evidentiam quanta haberi potest; et hoc est verum. Et sequitur corollarium ex hoc in hac forma quod nulla humana cognitio videtur omnem gradum erroris excludere”, *Questiones* I.6.2, p. 120. In addition, the intellect can override the knowledge acquired via the senses, for instance as it corrects the size of the Earth (smaller relative to the Sun (bigger) on the basis of mathematics (I.14.3, p. 212).

76 “Sed tunc ad argumenta in oppositum, cum dictum fuit quod potentia visiva apprehendit longitudinem radiorum, dicitur quod potentia distinctiva bene hoc facit, que secundum rei veritatem non distinguitur realiter a potentia visiva, cum in corpore humano non sit nisi unica anima”, *Questiones* I.16.3, p. 230. On this identification, see Vescovini, G. F., *Astrologia e Scienza*, op. cit., p. 139.

77 On this see Rignani, O., Baigio Pelacani e il senso agente, op. cit., pp. 250–251.

framework, logical or otherwise, can be either *that about which something is said*, that undergoing the experience – the one to which an experience happens; or *that which does something*, and in this interpretation the subject is the agent. There are, however, many ways to be an agent, and many actions constituting a perceptual experience.

In the tradition of reflecting on visual perception examined in this paper, and apart from a number of technical details, it seems clear that perception is understood as a more complex process than the simple reception of sensible species generated and flowing from the objects they represent. That the model of transmission advocated is that of geometrical optics is relevant to explaining how the final image is achieved with accuracy in retaining the correspondence between thing and internal image; but it is irrelevant to explaining how we actually see things the way we do: things we recognize or identify as being this or that table, dog, etc. To have that information accessible to us, we need the active perceptual faculties of the soul, which process the sensory information received through the senses in a way that is not simply dependent or operative on what we receive from the senses. In some cases, however, it also includes the interference of intellectual capacities operating on the incoming sensory information, and thus having a role to play in establishing the content of that particular experience. This means that the clear-cut distinction between senses and intellect, as well as the understanding of the process of cognition as sequential – first senses, then intellect – in a largely modular and contained way needs to be problematized. The model of perspectivist optics briefly examined in this paper shows a more robust account of the interaction between senses and intellect than one is often lead to believe is the case for medieval theories of perception. There is a longer story to tell about this interpretative model than what I have presented here; however, this is not the place to tell it.

## ABSTRACT

By the end of the thirteenth century several models of visual perception were available in the Latin West, differing according to their influences – Aristotelian, Augustinian, Avicennian – and their interpretations. One such model was that of perspectivist optics, as espoused by Alhacen and popularized by Roger Bacon. While the general structure of this theory is well-known, until recently scholars have paid less attention to the issue of discrimination – distinction, comparison, judgment – by a higher cognitive faculty (the *virtus distinctiva*) of incoming sensory information. In my paper, I specifically examine what role this discriminative faculty, as proposed by Alhacen, plays in the works of later *perspectivi* such as Roger Bacon, John Pecham, and Blasius of Parma, proceeding from the assumption that the best way to understanding the in-

fluence of any given theory is by understanding the authors influenced by it. My focus is on two aspects of this power: what exactly its functions are, and whether its nature is rational or sensory. Building on this last aspect, I consider whether this nature is better suited for passive or active accounts of perception.

**Keywords:** perception, optics, judgment, reason, inference, recognition