

# ROGER BACON'S NEW METAPHYSICS (1260-1292): THE INTEGRATION OF LANGUAGE STUDY AND NATURAL SCIENCE WITH METAPHYSICS AND MORALS

## LA NUEVA METAFÍSICA DE ROGER BACON: LA INTEGRACIÓN DEL ESTUDIO DEL LENGUAJE Y LA CIENCIA NATURAL CON LA METAFÍSICA Y LA MORAL

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### Abstract

The paper presents evidence that Roger Bacon was endeavouring to structure what he considered as a “new metaphysics”. Moreover, it identifies the *Opus maius* as Bacon’s new preliminary text in metaphysics and morals. The evidence is found in the *Communia naturalium* and in the *Communia mathematica*, in which one finds a reference to the *Opus maius* as a sketch for a new metaphysics. From part seven of the latter work, namely, the *Moralis philosophia*, one can see that Bacon views the latter work as closely connected to his new metaphysics. In fact, the material in the *Communia mathematica* connects his studies on languages to the communication of his moral vision. I present a review of the sources for the different parts of the *Opus maius*. This is followed by an account of Bacon’s philosophical sources. It becomes clear that Bacon was acquainted with Plato’s *Meno*, *Phaedo* and part of the *Timaeus* with Calcidius’s Commentary. The variety and significance of his Neo-Platonic sources is outlined. It turns out that Bacon was not an Avicennian substance-dualist. Moreover, the paper demonstrates the extent to which Bacon’s criticism of Averroes was based on his natural philosophy. Bacon presents an account of human intellectual knowledge which is clearly based on and refers to his account of human perceptual knowledge in his *Perspectiva*. He uses his account of an integrated perceptual and intellectual human individual being to question the Latin Averroist’s claim that there is one possible intellect for all human beings.

### Keywords

Averroes; Intellectual Knowledge; Substance Dualism; The Unity of the Person; Platonic Sources

## Resumen

El artículo aporta pruebas de que Roger Bacon se esforzaba por estructurar lo que consideraba una “nueva metafísica”. Se identifica el *Opus maius* como un texto preliminar de Bacon en metafísica y moral. Las pruebas se encuentran en la *Communia naturalium* y en la *Communia mathematica*, en las que se encuentra una referencia al *Opus maius* como esbozo de una nueva metafísica. De la séptima parte de la *Moralis philosophia* se desprende que Bacon la consideraba estrechamente relacionada con su nueva metafísica. De hecho, el material de la *Communia mathematica* conecta sus estudios sobre las lenguas con la comunicación de su visión moral. Tras presentar una revisión de las fuentes de las diferentes partes del *Opus maius*, se exponen las fuentes filosóficas de Bacon. Queda claro que Bacon conocía el *Menón* de Platón, el *Fedón* y parte del *Timeo* con el Comentario de Calcidio. También se esboza la variedad y el significado de sus fuentes neoplatónicas. Da la impresión de que Bacon no era un dualista de la sustancia de carácter avicenisista. Además, se demuestra hasta qué punto la crítica de Bacon a Averroes se basaba en su filosofía natural. Bacon presenta un relato del conocimiento intelectual humano claramente fundamentado y referido a su descripción en torno al conocimiento perceptivo humano en su *Perspectiva*. Utiliza su descripción de un ser humano individual que integra percepción e intelecto para cuestionar la afirmación del averroísmo latino de que hay un intelecto posible para todos los seres humanos.

## Palabras clave

Averroes; Conocimiento intelectual; Dualismo de la sustancia; La unidad de la persona; Fuentes platónicas

## Introduction

In the early 1260's, Cardinal Guy le Gros de Foulques, who had presided at the Franciscan General Chapter at Narbonne in 1260, instructed Roger Bacon to send him his writings on Philosophy. Bacon set out to write a major work, an *Opus principale*. It is clear that by at least 1267-68 Bacon did not have the institutional support for his major project. Instead, in answer to the mandate of June 22, 1266, from the Cardinal (now Pope Clement IV), Bacon wrote a persuasive *Opus preambulatum*, namely, the *Opus maius*.<sup>1</sup> He did, however, between 1266 and 1268 also produce other works related to the latter which we will examine below.

The scope of Bacon's plan for the *Opus principale* can be glimpsed from his claim in the introduction to the *Communia naturalium* that he wrote four volumes on different parts of philosophy. He claims that he presented a volume on Grammar and Logic

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<sup>1</sup> See Roger Bacon, *Opus tertium*, edited by J. S. Brewer (London: Rerum Britannicarum Medii Aevi Scriptores-Rolls Series-Vol. 15, 1859; Kraus Reprint, 1965), 13-17. See new edition: Roger Bacon, *Opus Tertium*, edited by N. Egel (Hamburg: Felix Meiner Verlag, 2020; Philosophische Bibliothek 718), 26-34.

necessary for the Latins, and that he had written a second volume on Mathematics (presumably, the *Communia mathematica*).<sup>2</sup> He wrote a third volume on the common teaching on natural philosophy, the *Communia naturalium*, and he claimed that a fourth volume was written by him on metaphysics as it relates to moral philosophy.<sup>3</sup> How then does this body of work by Bacon relates to the *Opus preambulatum*, the *Opus maius*? I will attempt to answer this question by demonstrating the extent to which Bacon's studies of the sciences, linguistic and natural, are integrated with his teaching on metaphysics and morals.

In dealing with Bacon's metaphysics and morals, I will argue for a close continuity between Bacon's scientific works and his account of metaphysics as it is related to morals. Bacon, did not write a formal treatise on metaphysics in itself, that is, on Being and its attributes. Yet, there are elements of metaphysics present in part of the *CN* dealing with universals, individuals, causation and generation, and in the *De multiplicatione specierum* and in parts of the *Opus maius* and the *Opus tertium*, dealing with agency, spiritual and material being. He did, however, write a work which integrates the linguistic and mathematical sciences with an account of metaphysics specifically as it relates to morals. That work which was written in the mid-1260's is the *Opus preambulatum*, namely, the seven-parts work known to us as the *Opus maius*. In the seventh part of that work, the *Moralis philosophia*, Bacon explicitly addresses metaphysical themes as they relate to moral and civil life. These include brief accounts of metaphysics of God (infinite being), angels, the immortality of the soul, the unity of the human person, the role of religion in public life, and an extended account of ancient Latin texts on the virtues, mainly from Seneca. These sections of the *Moralis philosophia* are related to corresponding sections of the *Opus majus*, namely, the account of error in *Opus maius*, Part One, the account of truth and its history in Part Two, the account of language in Part Three, the account of the applications of mathematics on natural philosophy in Parts four, five and six. The principles from these parts are thus taken up and used in the different parts of the *MP* (= *Opus maius*, Part Seven).

In section one of this paper, I will present an account of Bacon's new method. In section two, I examine Ferdinand M. Delorme's claims about Bacon's new method and new metaphysics which he based on the Prologue to the *De influentiis agentium/De multiplicatione specierum* and some short cross-references in *CN*. I will draw on Bacon's lengthier references to the new metaphysics in the *CM* in order to identify the volume in which Bacon presents his new metaphysics. In section three I will outline philosophical and scientific sources from the world of Islam that Bacon uses to structure the parts of the *Opus maius*, and I will also present the full range of Bacon's Platonic sources as he outlines them in the *MP*. In section four, I will use a brief but

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<sup>2</sup> For brevity, in the body of the text but not in the citations I will designate the *Communia mathematica* as *CM*.

<sup>3</sup> *Communia naturalium Fratris Rogeri*, edited by R. Steele, Liber Primus; Opera hactenus inedita Rogeri Baconi, Fasc. II, (Oxford: Clarendon Press, 1911), 1.

central example from Bacon's *Perspectiva* to illustrate how Bacon uses Ptolemy and Augustine to correct Alhazen, Avicenna, and Averroes on the important issues of intromission and extramission of species in perception. As I will show, even this scientific example has metaphysical and theological implications. Section five examines Bacon's summary sketch of the unity of the human being, spiritual species and intellectual knowledge from the *MP* and from the *CN*. I argue there that Bacon overcomes the substance dualism of Avicenna. Further, Bacon presents a metaphysics of a unified but complex individual human cognizer, whose intellectual knowledge is firmly grounded in Bacon's mathematical and physical-experiential account of perception. Bacon explicitly uses the teaching of his *De multiplicatione specierum* and the *Perspectiva* to correct Averroes' teaching on the unity of the possible intellect. This account of the metaphysics of intellectual knowledge shows that there is no human knowing without a reference back to experience and especially to the experience as mediated by the species of the cogitative sense. And so Bacon's scientific works can be seen as forming the basis for his sketch of a theory of intellectual knowledge and to his concept of a unified human person.

### 1. Method and Metaphysics

When he sent out the *Opus majus* to Pope Clement IV, Bacon has also his student John to convey the true meaning of his works. Bacon was rightly worried about mixed vocabularies and systematically misleading statements in philosophy and in public life:

And because of this I have concerned myself with one young student whom for about five or six years I have instructed in languages, mathematics and *perspectiva*, in which study is found all the difficulties of those writings I send to you, and freely (without a fee) I have instructed him orally after I received your mandate (first one, ca. 1262)...For without a doubt, there is no scholar among the Latins who can respond in such a manner in all the things that I write, because of the method that I use, and because I have instructed him (with this method). Not even that great master nor any of the others whom I have mentioned above can respond in this way, *because they do not know my method* as does the one whom I myself have taught orally, and who has been instructed by my counsel.<sup>4</sup>

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<sup>4</sup> Roger Bacon, *Opus tertium*, edited by J. S. Brewer (London, 1859, Rolls Series, 15; reprint Nedeln, Lichtenstein: Krauss, 1965), 61: "Et propter hoc consideravi unum adolescentem quem a quinque vel sex annis feci instrui in linguis, mathematicis, et perspectivis, in quibus est tota difficultas earum que mitto; et gratis eo ore meo instruxi, postquam recepi mandatum vestrum [...] Nam procul dubio nullus est inter Latinos, qui in omnibus quae scribe possit ad tot respondere propter *modum quem teneo*, et qui eum instruxi, nec illa Magister magnus, qui nesciunt *modum meum*, nec aliquis eorum de quibus superius feci mentionem, quia nesciunt *modum meum*, sicut iste qui ore meo didicit, et qui consilio meo est instructus." See new edition, *Opus tertium*, edited by N. Egel (Hamburg: Felix Meiner Verlag), 124-126. The reference to the unnamed master has been thought to be a reference to

What were Bacon's duties in the Franciscan Studium circa 1262-68? Bacon had complained much about the preoccupations of his life in the Franciscan house which prevented him from writing an *Opus principale*, a *Summa sapientialis*. In his *Opus minus*, Bacon provides some hints about these duties. This information places Bacon's criticisms of the Masters of the *Sentences* in the context of the scholarly practices in the Franciscan studium in Paris. He complains that the Book of the *Sentences* of Alexander of Hales has the weight of one horse. What follows is significant. It shows that Bacon objects to the lack of good teaching hours for the Biblical Scholars and the consequent removal of attention from the Sacred Text.

For the one among the religious Orders who teaches the [book] of the *Sentences* has as he wishes the important teaching hours and has his own lecture-room and his own assistants. But those who teach the biblical text lacks this [right] and need to beg for [good] teaching hours depending on what pleases the teachers of the book of the *Sentences*. In other universities, those who teach the *Sentences* are allowed to hold disputations and are [honored] as masters. The others who teach the biblical text cannot hold disputations as was the case this year at Bologna. And yet, the (ancient) Holy Doctors used only the biblical text. Indeed, the ancient wise teachers, some of whom we have seen such as the Lord Robert Bishop of Lincoln and brother Adam Marsh and other great teachers used the biblical text [alone]...But [the teachers of the *Sentences*] do not stick with the text [of *Scripture*] but speculate beyond the textual meaning by means of the methods of invention...And so, on account of the abuse of the book of the *Sentences*, it is impossible that the text of God can be known.<sup>5</sup>

In contemporary Bacon scholarship, there is now a consensus that between 1257 and 1263, Bacon was still an active scholar, although he was not one who held a magisterial positing in teaching the *Sentences*. A careful and critical study of Toulouse, Bibl. Mun., MS 402 and Florence, Biblioteca Laurenziana, MS Laur. PL XXV cod. 4 has proved that they contain a Latin, Greek and Hebrew glossary which includes teaching

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Albertus Magnus. See Jeremiah Hackett, "The Attitude of Roger Bacon to the *Scientia* of Albertus Magnus", in *Albertus Magnus and the Sciences: Commemorative Essays 1980*, edited by J. A. Weisheipl, O.P. (Toronto: PIMS, 1980), 53-72. The great master in this latter text is certainly Albertus Magnus. See *Opus tertium*, ed. Brewer, 14 and *Opus tertium*, ed. Egel, 28. For a qualification of Hackett's position, see H. Darrell Rutkin, *Sapientia Astrologica: Astrology, Magic and Natural Knowledge, ca. 1250-1800, 1. Medieval Structures (1250-1500): Conceptual, Institutional, Socio-Political, Tehologico-Religious and Cultural* (Cham: Springer Nature, 2019), 42-43.

<sup>5</sup> *Opus minus*, edited by J. S. Brewer (London: Rolls Series, 15, London, 1859; Reprint, Nedeln, Lichtenstein: Krauss, 1965), 328-30: "Nam ille qui legit *Sententias* habet principalem horum legendi secundum suam voluntatem, habet et socium et cameram apud religiosos. Sed qui legit *Bibliam*, caret his et mendicant horum legendi, secundum quod placet lectori *Sententiarum*. Alibi qui legit *Sententias* disputant et pro magistro habetur. Reliqui qui textum legit, non potest disputare, sicut hoc anno Bononiae [...] Deinde facti doctores non usi sunt nisi hoc textu, neque sapientes antiqui, quorum aliquos vidimus, ut fuit Dominus Robertus episcopus Linconiensis, et frater Adam de Marisco, et alii maximi viri [...] Et liber *Sententiarum* non adhaeret textui, sed vagatur extra textum per viam inquisitionis [...] Item, impossibile est quod textus Dei sciatur propter abusum libri *Sententiarum*."

on the meaning of biblical words. These teachings are closely related to Bacon's treatment of such matters in his *Opus tertium* (ca. 1268) and his *Compendium studii philosophiae* (ca. 1271-72). These notes are, therefore, attributed to Bacon and are dated to between ca. 1257-1263 by Étienne Anheim, Benoit Grévin and Martin Morard. They argue that Bacon worked on the Franciscan correction of the biblical text in the Franciscan studium in Paris with William of Mare, and that the material has a connection with the work of Gerard of Huy.<sup>6</sup>

We can see Bacon's involvement with the critical correction of the biblical text as the central context in the 1260's for his attack on the Masters of the Sentences and for his general criticism of the common teachers of philosophy and theology (the *vulgus philosophantium*).<sup>7</sup>

Bacon objected strongly to non-semiotic metaphysical essentialism that ignored the context of human communication. Hence, in a manner non typical of scholasticism, he insisted on the primacy of grammar.<sup>8</sup> In his account of equivocation and analogy, he objected to the theory of essential meanings adopted by numerous scholastics from the work of Averroes.<sup>9</sup> In methodic terms, he objected strongly to long drawn out series of chains of arguments. He believed that more concise and careful summaries should replace these long chains. This would in turn lead to clearer pedagogical presentation. This was part of his objection to the length of the work on the *Sentences* by Alexander of Hales. Bacon had a keen sense for the rhetoric of persuasion, and since he could not complete an *Opus principale*, he opted instead to write a Franciscan sapiential work in the form of a persuasive argument.<sup>10</sup> Even in his scientific works such as the *De*

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<sup>6</sup> See Étienne Anheim, Benoit Grévin and Martin Morard, "Éxégè Judéo-Chrétienne, Magie et Linguistique: Un Recueil De 'Notes' Inédit Attribuée a Roger Bacon", *Archives Histoire Doctrinale littéraire Du Moyes Âge* 66 (2001): 95-154. See also Cornelia Linde, *How to Correct the Sacra Scriptura: Textual Criticism of the Latin Bible Between the Twelfth and Fifteenth Century* (Oxford: The Society for the Study of Medieval Languages and Literature, 2012), for Roger Bacon, see especially, 17-20, 1-63, 101-104, 138-53, 223-25.

<sup>7</sup> See Timothy J. Johnson, "Preaching Precedes Theology: Roger Bacon and the Failure of Mendicant Education", *Franciscan Studies* 68 (2010): 83-95; Timothy J. Johnson, "Roger Bacon's Critique of Franciscan Preaching", in *Institution and Charisma: Festschrift für Gert Melville*, edited by F. J. Felten, A. Kehnel, and S. Weinfurter (Köln: Böhlau, 2009), 541-48.

<sup>8</sup> For Bacon on Grammar, see Irène Rosier-Catach, "Roger Bacon and Grammar", in *Roger Bacon on the Sciences: Commemorative Essays*, edited by J. Hackett (Leiden-New York-Köln: E. J. Brill, 1997), 67-102; see idem, 2020 Roger Bacon Research Society Lecture, "The Diversity and Coherence of Roger Bacon's Interests in Language", Video section of the Roger Bacon Research Society WebPage. For a careful presentation of the relation of Grammar and signs to species and *Perspectiva* in Bacon's Philosophy, see Yael Raizman-Kedar, *Species as Signs: Roger Bacon (1220-1292) on Perspectiva and Grammatica* (University of Haifa Ph.D. Dissertation, 2009).

<sup>9</sup> See Roger Bacon, *Compendium of the Study of Theology*, edited and translated with Introduction and Notes by T. S. Maloney (Leiden-New York-København-Köln: E. J. Brill, 1988).

<sup>10</sup> See Timothy J. Johnson, "Wisdom has built her house; she has set up seven pillars: Roger Bacon, Franciscan Wisdom and Conversion to the Sciences", in *The English Province of the Franciscans (1224-c.1350)*, edited by M. Robson (Leiden: E. J. Brill, 2017), 296-315.

*multiplication specierum* and the *Perspectiva*, Bacon makes it clear that he wishes to focus his attention on careful summaries of argumentative points. Still, Bacon is not satisfied with “bare argument alone”. That is, for him the results of demonstrative argumentation which begin from experience must be verified by means of carefully observed experiential facts.

## 2. Bacon's Own Claims for his New Metaphysics (1260-92)

In his account of the prologue to the *De influentiis agentium/De multiplicatione specierum* of Bacon, Ferdinand M. Delorme used some references from the *Communia naturalium* to argue that Bacon had written a ‘new’ metaphysics in the 1260's. Was Delorme's argument correct?<sup>11</sup> There is further evidence in the *CM* for the claim that Bacon in the 1260's did write a new metaphysics, one quite different in method and content from his earlier metaphysics from the 1240's. The older metaphysics was a school commentary on Aristotle, Avicenna and Averroes with very limited reference to Christian philosophers. The new metaphysics as is demonstrated below, involved wholesale use of multiple authors from Jewish, Arabic and Christian traditions.<sup>12</sup>

Delorme notes that Bacon conceived a work divided into four parts. The first part was on grammar and logic as it related to the needs of the Latins; the second part was on the applications of mathematics; the third part was the work on natural philosophy (*Communia naturalium*). Delorme saw the Prologue to the *De influentiis agentium/De multiplicatione specierum* as providing the evidence that the new metaphysics included a special section on species, called ‘*De aspectibus metaphysico*.’<sup>13</sup> For a scientific approach to physics as a starting point for metaphysics, one has need of strict mathematics. For Bacon, such scientific works are found in Ptolemy's *Optics*, Alhazen's *Optics*, Jacobus Alkindi's *Optics*, “the expert on the books of mirrors through which reflected vision

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<sup>11</sup> Ferdinand M. Delorme, “Le Prologue de Roger Bacon à son traité *De influentiis agentium*”, *Antonianum* 18 (1943): 81-90. Delorme uses the few references to Bacon's *metaphysica mea* from the *Communia naturalium*. See p. 88: Dans les *Communia naturalium*, où il parle encore de *influentia agentium in patinetia*, sujet ici abordé ex professo, je remarque maints renvois de Bacon à ce traité de lui sur la Métaphysique, don't il se contente de donner un résumé dans les premiers chapitres. C'est ainsi qu'il écrit, p. 16: *Metaphysica habet certificare ad plenum, ut in Metaphysicis edocetur*; p. 17: *ut in Metaphysicis demonstravi*; p. 18: *sicut in Metaphysica mea potest cuilibet patere*; p. 25: *ut ex Metaphysica Melius immotescit*; p. 44: *horum profunda certification ex Metaphysica requiratur*; p. 51: *in Metaphysicis plenius scripsi*. Henceforth, in the body of the text I will designate *De multiplicatione specierum* as DMS.

<sup>12</sup> For the status questionis of Bacon's metaphysics (1240's), see Sylvia Donati, “Pseudoepigrapha in the Opera hactenus inedita Rogeri Baconi: The Commentaries on the Physics and Metaphysics”, in *Les débuts de l'enseignement universitaire à Paris (1200-1245 environ)*, edited by O. Weijers and J. Verger (Turnhout: Brepols, 2013), 153-203.

<sup>13</sup> See Roger Bacon, *CN*, I, Ch. 2, 38: “Sed complete destructio harum opinionum et aliarum consimilium patet in tractatu meo De speciebus metaphysico cum certificatione istius dubitationis et aliarum.”

occurs” and also Euclid’s *Optics* and *On Mirrors*, Euclid’s *Elements*, Theodosius’ *On Spheres* and Appolonius’ *On Conic Sections*.<sup>14</sup>

This list of authorities raises some interesting questions. It is evident that Bacon saw the *De influentiis agentium/DMS* as the presupposition for his *Perspectiva*. It sets out the mathematical sources for any interpretation of issues in natural philosophy. And for Bacon, mathematics with its focus on the category of quantity was closely related to metaphysics. Indeed, as Bacon makes clear in the Prologue, the natural philosophies of Aristotle, Avicenna and Averroes were lacking in both theoretical and practical mathematics, and in experiential certification.<sup>15</sup> They lacked the applications of the mathematical texts cited above from the Prologue to *De influentiis agentium/DMS*. I will demonstrate in part seven below that Bacon’s metaphysics and moral philosophy of the human cognizer and agent is based solidly on materials from the *De influentiis agentium/DMS* and the *Perspectiva*. But there is more evidence from Bacon on the nature of his new metaphysics, to which I will now turn.

(1) In the *CM*, Bacon writes the following concerning the new *Metaphysica mea*:<sup>16</sup>

“And each special science presupposes that the principles of [science already] exist. And they cannot on their own proper power investigate those principles, and *I have demonstrated this in my Metaphysics*.”<sup>17</sup>

(2) In his *MP*, part one, Bacon had argued that “moral philosophy is the end (*finis*) of all the parts of philosophy” as he clearly proved in parts one to six of the *Opus maius* and “as is clear from metaphysics”.<sup>18</sup> Again Bacon states: “I have stated in the

<sup>14</sup> See Delorme, “Le Prologue”, 86: “Unde Ptolomeus in libris *De opticis sive de aspectibus*, est principaliter imitandus, quia hic dividit omnes radices aspectuum cum ramis qui sunt de necessitate Perspective. Omnes alii exposuerunt eum et addiderunt ea que sunt de bene esse seu de bonitate artis et pulchritudine; inter quo longe precipuus aliis Halacen *De aspectibus*, deinde Jacobus Alkindi *De aspectibus*, et auctor libri *De speculis per que fiat visus reflexus*, et Euclides *De aspectibus* et idem *De speculis*, et Trocus *De aspectibus*, et auctor librifi *De speculis comburentibus*, Et Euclides *De libris elementorum* et Theodosius *De speris*, et Apollonius *De Pyramidibus*, quorum sententias in 3a parte hujus Operis pertractabo ut mihi videbitur expedire.”

<sup>15</sup> Delorme, “Le Prologue”, 86-87: “Quia vero non habemus in latino libros Aristotelis et Avicenne et Averrois et al-Farabi de ista influenza, scilicet librum eorum *De aspectibus* [et] ideo que hic recitari habent non possunt principaliter verificari per vias Aristotelis, Avicenne et Averrois, oportet uti sententiis istorum in naturalibus libris [...] propter quod philosophans in sententia naturali et rerum naturalium generatione secundum libros Aristotelis, Avicenne et Averrois et Seneca non poterit hec ut oportet scire, nisi sciat uti sententias auctorum predictorum.”

<sup>16</sup> Roger Bacon, *Communia mathematica Fratris Rogeri*, edited by R. Steele (Oxford: Clarendon Press; London: Humphrey Milford, 1940). [I will designate this work as *CM*, ed. Steele, followed by Part, Distinction, Chapter, Page number].

<sup>17</sup> *CM*, ed. Steele, I. 1. 1. p. 1-2: “Et omnis scientia specialis supponit sua principia esse et non potest ex sua virtute propria investigare ut Aristoteles docet et hoc manifestavi in *Metaphysica mea*.”

<sup>18</sup> Roger Bacon, *Moralis philosophia*, edited by E. Massa (Zurich: Thesaurus Mundi, 1953), 4-5: “Et quoniam moralis philosophia est finis omnium parcium [...] ut sint in precedentibus bene probate et certificate [...] secundum quod ex metaphysicis patens est.”

*Metaphysics* that mathematics is spoken of in two ways...But these matters have been verified in the *Metaphysics* in so far as it is relevant.”<sup>19</sup>

(3) Again, he indicates his *Metaphysica mea* and refers the reader to part one of his *Opus maius* on the causes of error:

The order however of [the sciences] with sure proof from my *Metaphysics* requires a teacher/reader, and so in this first book I will give a summary... And so in the first part of [my] *Metaphysics* which orders all of science, I have demonstrated the wickedness of those causes of error by means of authority, reason, and examples copiously drawing on the wise [Philosophers]. And as a consequence, I show how these [false authorities] destroy all things and all study.<sup>20</sup>

It should be noted that this reference to part one of his *new Metaphysics* is in fact a reference to part one of the *Opus maius*. There, Bacon presents the causes of errors, criticizes false authorities and draws on many wise ancient philosophers.<sup>21</sup> Thus, we must see the *Opus maius* as the first draft of Bacon's new metaphysics.

(4) Further in *CM*, Bacon names these ancient wise philosophers. They are the *philosophantes*, that is, those theologians such as Cassiodorus and Boethius who make use of mathematics.<sup>22</sup>

For just like the wise Christian Boethius and great theologians, as is apparent from his books *On the Trinity and the Two Natures and One Person of Christ* and his other works, so I introduce authorities which he has written from philosophy. And so I am able, I wish and I ought through the authorities of Cassiodorus and the teachings of the wise (*philosophantis*) go through mathematics on account of the divine praise, especially since (mathematics) is gloriously taught in their philosophical books. For I have demonstrated in [my] *Metaphysics* that the Christian wise thinkers (*philosophantes*) ought to hold philosophy higher than do the unbelieving people.<sup>23</sup>

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<sup>19</sup> *CM*, ed. Steele, I, 1.1., p 2-3: “Declaravi quidem in *Metaphysica*, quod mathematica dicitur dupliciter [...] Sed de his in *Metaphysica* certificatum est quantum ad eam pertinet.”

<sup>20</sup> *CM* ed. Steele, I.1.1. p. 4- I. 1. 2, 4: “Ordinem autem hunc cum certa probacione ex *Metaphysica* mea requirit lector, et tamen in isto libro aliquid exponetur [...] Et ideo in principio *Metaphysice* que ordinat totam sapienciam demonstravi maliciam istarum causarum auctoritates rationes et exempla sapientum copiosus ingerendo, et ostendi quod hec totum studium et per consequens omnia confundunt.”

<sup>21</sup> See Roger Bacon, *Opus maius*, 3 Vols., ed. J. H. Bridges (Oxford and Edinburgh, Vols. 1 and 2; Oxford, 1897; vol. 3 with corrections, Edinburgh, 1900; Reprint, Frankfurt: Minerva, 1964).

<sup>22</sup> On the meaning of the term *philosophantes*, see Étienne Gilson, “Philosophantes”, *Archives d'histoire doctrinale littéraire du Moyen Âge* 19 (1952): 135-140; Pierre Michaud-Quantin and Michel Lemoine, “Pour Dossier des ‘Philosophantes’”, *Archives d'histoire doctrinale littéraire du Moyen Âge* 35 (1968): 17-22.

<sup>23</sup> *CM*, ed. Steele, I. 1. 4., p. 8-9: “Sicut vero Boethii philosophantis Christiani et theologi magni, ut patet in libris suis *de Trinitate et de duabus naturis et una persona Christi* et aliis opera ejus, induxi auctoritates quas philosophice scripsit, sic possum et volo et debeo per auctoritates Cassiodori et sentencias philosophantis propter divina laudes mathematice revolvere, precipue cum illas in suis

Bacon claims that he has demonstrated in his *Metaphysics* that the *philosophantes Christiani* ought to hold philosophy in higher esteem than do the non-Christian peoples.<sup>24</sup>

(5) In the *CM*, Bacon argues that the Christian thinkers can know more than did the ancient wise philosophers such as “Avicenna, Democritus, Plato, and Cicero who treat of such matters as resurrection of the body and the pains of hell.”<sup>25</sup> Again, Bacon indicates that since metaphysics is common to all the sciences, he will focus on the praise and utility of mathematics in philosophy, law, and theology.<sup>26</sup> For Bacon, this very important book has an essential connection to mathematics, poetics, and music, since arguments and logic find their completion in poetics.

(6) Regarding the issue of the goal of logic, Bacon, as he will do in parts three and seven of the *Opus maius*, presents his ‘authorities’ for the nature of the poetic argument and its connection to logic. They are al-Farabi [*De scientiis*], the *Logica* of Avicenna and Al-Ghazali and Averroes on the poetic argument as translated by Hermannus Alemannus:

For I have demonstrated in [my] *Metaphysics* that this kind of argument is necessary and is found in logic. Such logical argument is for all thinking since it deals with the salvation of the soul, the virtues and happiness so that vices can be refused. This kind of argument is properly found in moral philosophy... And I have [already] composed a treatise on this in my logical writings.<sup>27</sup>

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libris philosophicis edoceant gloriose. Manifestavi enim in *Metaphysica* quod philosophantes Christiani debent extollere philosophiam quam homines infidels.”

<sup>24</sup> This is clearly a reference to part two but especially part seven of the *Opus maius*. See Roger Bacon, *Moralis philosophia*, ed. Massa, part one, 22-23.

<sup>25</sup> *CN*, ed. Steele, I, Part 3, dist. 1, 161; See also *Opus maius*, part seven = *Moralis philosophia*, part one, 22-23.

<sup>26</sup> See *Opus maius*, Vol. I, Part Four, 98-99: “Et in particulari ostenditur [Pythagoras] per Ptolemaeum et ipsum Boetium. Cum enim sint modi tres philosophiae essentialia ut dicit Aristoteles in sexto *Metaphysicae*, mathematicus, naturalis, et divinus, non parum valet mathematicus ad reliquorum duorum modorum scientiae comprehensionem, ut docet Ptolemaeus in capitulo primo *Almagesti* quod et ipse ibidem ostendit. Et cum divinus sit dupliciter, ut patet ex primo *Metaphysicae*, scilicet *Philosophia prima*, quae Deum esse ostendit, cuius proprietates excelsas investigat, et civilis scientia quae cultum divinum statuit, multaque de eo secundum possibilitatem hominis exponit, ad utramque istarum multum valere mathematicam idem Ptolemaeus asserrit et declarat. Unde Boethius in fine *Arithmeticae* mathematicas medietates asserrit in rebus civilibus inveniri.” [I discuss Ptolemy below, see section six] See also p. 102 on the primacy of the Category of Quantity, which cannot be known without mathematics, and which is essential for an understanding of time and place. See Bacon’s explicit account of the importance of the *Posterior Analytics* in *CM*, ed. Steele, 14-16.

<sup>27</sup> *CM*, ed. Steele, I. 1. 7, p. 16-17: “Nam certum est per Alfarabium in libro *de scientiis* et per logicam Avicenne et Algaselis, et per commentum Averrois super librum *de argumento poetico* translatum [Hermannus Alemannus]...Ceterum demonstravi in *Metaphysicis* quod hoc genus arguendo est necessarium, et quod scientia debet de eo constituti in logica, et quod argumentum hoc est utilis omni argumento cum feratur in anime salute et circa virtutes et felicitatem, et ut vicia declinentur. Quod argumentum proprium est in textu *Moralis Philosophie* et in ejus usu et similiter in theologicis

This aforementioned treatise on logic can be found in *Opus maius*, part three, including *De signis* and part seven (=MP, part five), and in the *Compendium studii theologiae* on equivocation and analogy.

Again, in *CM*, in his discussion on abstraction in grammar and logic, Bacon mentions Aristotle's three modes of philosophy: Physics, Mathematics, Metaphysics (*Divinus*), and makes a closed connection between metaphysics and morals. Bacon continues:

And the Rhetoric which uses this argument is part of *Moralis philosophia* as I have demonstrated in [my] *Metaphysics* and *Moral Philosophy*, and so the common teachers of philosophy err when they posit rhetoric in a division with logic and grammar. In a similar manner, poetics, which teaches a poetic argument, is a part of logic, and the topics which uses such argument are part of moral philosophy as I have demonstrated in their proper places.<sup>28</sup>

Bacon provides an important definition of metaphysics in the *CN*:

And in a like manner he [Avicenna] teaches that Metaphysics follows Physics since according to him the conclusions of the other sciences are principles in Metaphysics. And this is certain from Aristotle since through the conclusions of Astrology he teaches the unity of the first cause and the multiplicity of the intelligences, although in another way the metaphysician can prove the principles of all the sciences as ought to be explained in that science, namely, Metaphysics. Moral Philosophy, however, is the goal of all other sciences. And so, the goal or end holds [primacy] in philosophical thinking. For all the other sciences are concerned with seeking the truth; this science [moral science] however, is concerned with doing the good, that is, it is an operative or practical science. Because of this it follows the other sciences in the order of nature. For knowledge of truth is directed towards the love of the good and its activity.<sup>29</sup>

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probacionibus et doctrinis, et plus potest hoc argumentum movere sine omni comparacione quam demonstracio quantumcumque potissima habetur. Et jam composui de eo tractatum in *logicalibus*, et extendi quod ei proprium est.”

<sup>28</sup> *CM*, ed., Steele, I. 4. 3, 64: “Et Rhetorica utens hoc argumento est pars Moralis Philosophia, ut in Metaphysica et Moraliibus demonstravi; et ideo multum errat vulgus quando point Rhetoricam in divisione contra Logicam et Grammaticam. Similiter Poetica, docens argumentum poeticum, est pars Logice, et ea que utitur tali argumento est pars Moralis Philosophie, ut demonstravi suis loci.” See Irène Rosier-Catach, “Roger Bacon, al-Farabi et Augustin. Rhétorique, logique et philosophie morale”, in *La Rhétorique D’Aristote. Traditions et Commentaires De L’Antiquité Au XVIIe Siècle*, edited by G. Dahan and I. Rosier-Catach (Paris: Vrin, 1998), 87-110.

<sup>29</sup> *CN*, ed. Steele, ed. cit., I. 1. 1., 1-2: “Similiterque ibidem docet quod Metaphysicabilia sequuntur Naturalia, quia secundum eum, conclusions aliarum scienciarum sunt principia in Metaphysicis. Et hoc est certum ex Aristotele, cum per conclusions Astrologie doceat unitatem cause prime et multitudinem intelligenciarum, licet alia via metaphysicus habet probare principia omnium scienciarum, ut debet in illa sciencia edoceri.”

Moralis autem philosophia est finis omnium scienciarum aliarum, et ideo finem in consideracione philosophica optinebit; quia omnes alie sunt speculative Veritatis, hec autem est practica boni, id

We can see from these two quotations that first, Bacon links a new concept of grammar and his new semiotic logic directly to rhetoric and poetics, while setting aside the rigid school division of grammar, logic, rhetoric. Then, he argues that the principles of the natural sciences should be taken up into metaphysics, which would prove the reliability of the principles of natural science. But these metaphysically verified principles must in turn be linked to morals, that is, to bringing about the practices of goodness.

Ferdinand Delorme is correct in seeing the Prologue to the *Opus maius* and related works as a key to Bacon's new methodology. Bacon found that Aristotle, Avicenna and Averroes had serious methodological deficits in their physics and metaphysics. They did not use the mathematical methods of the scientists listed above beginning with Ptolemy and ending with Apollonius. Further, Delorme recognized that Bacon's *DMS* and the *CN* were not just works in physics but had significant metaphysical elements. As will become apparent in the next sections of this paper, the *Perspectiva* also has metaphysical implications. We demonstrated from the *CM* that Bacon intended the *Opus maius* to be a work in metaphysics conjoined with morals. It was not intended to be a formal treatise on Being and the attributes of Being. We showed how Bacon in various parts of the *Opus maius* coordinated logic with the study of rhetoric and poetics. For Bacon, the formal study of the latter was a task of logic; rhetoric and poetics in practice was the task of moral philosophy.

It remains for us then, to review the scientific texts from the Islamic world that helped Bacon structure the various parts of the *Opus maius* and to disclose his main sources for his metaphysics in relation to morals as outlined in his *MP*, part one.

### 3a. The Structure of the *Opus maius*, Parts Three to Seven: Bacon's Islamic Sources

It is important to note that the teleology of the sciences, linguistic and natural, in the *Opus maius* is borrowed from the *De scientiis* of al-Farabi.<sup>30</sup> Parts three to seven, all dealing in some sense with the study of languages and the applications of mathematics, all depend on the work of important Muslim thinkers. In part three, on languages, Bacon draws from al-Farabi's *De scientiis*. In part four, the physics section makes use of Alhazen, Ibn Gebirol and Avicenna as mediated by Gundisalinius; the discussion of astrology and statecraft depends on Abu Ma'shar. Avicenna, al-Farabi, al-Gazali, and Averroes are central for Bacon's theory of communication of true religion. In parts Part Five and Six, the *Perspectiva* and *Scientia experimentalis* are influenced by Alhazen's (Ibn al-Haytham) *Optics*. Part six uses the *Centiloquium commentary* of Pseudo-Ptolemy (Ahmed Ibn Yusuf) on knowledge and revelation. Further, Bacon uses al-Gazali for his

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est, operativa, propter quod sequitur alias ordine naturali. Nam veritas cognitio ad amorem boni et ejust operacionem ordinatur."

<sup>30</sup> See Alain Galonnier, *Le De scientiis Alfarabii de Gérard de Crémone: Contribution aux problèmes de l'acculturation au xiie siècle* (Turnhout: Brepols, 2016).

understanding of spiritual experience. And in part seven Avicenna is central to parts one and two of the *MP*. Of course, these authors are linked with important Greek and Latin authors on the relevant topics and are re-interpreted to form the Baconian synthesis of wisdom. Therefore, Bacon's sketch for a new metaphysics reflects the still open cultural borders of the time of the Crusades up until 1292.<sup>31</sup> Bacon's search for a universal wisdom would, in my view, still find its renewal and true completion not only in the English Franciscan school but also in a more comprehensive manner in the universal wisdom based on mathematical philosophy and an openness to world-cultures as found in the works of Nicholas of Cusa in the 15<sup>th</sup> century.<sup>32</sup>

### 3b. Bacon's Greek and Latin Philosophical Sources: Bacon's Neoplatonism

In part one of his *MP*, Bacon provides his account of the positive contributions of the ancient Greek and Latin philosophers. The extended treatment of the "Philosophers" in *Opus maius*, parts one, two and seven of the *MP* is very positive indeed. In part one of the *MP* he offers an important rationale for his strong praise for the ancient philosophers and this later Christian followers. He states,

This is a wonderful teaching and wholly favorable to the Christian; it contains nothing unworthy either in the letter or in the literal sense. Indeed, we clearly see that it contains well-known articles belonging to the faith. Nor should a philosopher find fault, since it obviously contains nothing except that which, in a wonderful way, is consistent with truth. *I make this statement because some others try to obscure our Catholic teachings found in the books of the Philosophers. But we should gladly receive them in testimony of our faith, especially since it is certain that these men learned these (teachings) through a revelation made to them and to the holy Patriarchs and Philosophers as was shown above.*<sup>33</sup>

Bacon treats the ancient philosophers and the muslim philosophers as persons of wisdom. He bases much of his account of the Platonists on Porphyry as presented in Augustine, *De civitate dei*, on Apuleius, *De deo Socratis*, and especially the *De platone*, Book 3, the very useful summary of the major works of Plato. Bacon had access to and used three authentic Platonic texts in Latin: the *Meno*, *Phaedo* and part of the *Timaeus* with the Commentary by Calcidius.<sup>34</sup> These are supplemented by accounts of other ancient

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<sup>31</sup> See J.R.S. Phillips, *The Medieval Expansion of Europe*, 2<sup>nd</sup> edition (Oxford: Clarendon Press, 1998); R. W. Southern, *Western Views of Islam in the Middle Ages* (Cambridge and London: Harvard University Press, 1962).

<sup>32</sup> See David Albertson, *Mathematical Theologies: Nicholas of Cusa and the Legacy of Thierry of Chartres* (Oxford University Press, 2014). It would not be anachronistic to speak also of Roger Bacon's Mathematical Philosophical Theology.

<sup>33</sup> Roger Bacon, *MP*, ed. Massa, 20. Translation: Thomas S. Maloney and Jeremiah Hackett, *The Moral Philosophy of Roger Bacon* (Olean, NY: Franciscan Institute, Forthcoming 2022).

<sup>34</sup> For the references to Augustine, Apuleius, Plato and Calcidius, see below the Bibliography of Other Primary Sources.

philosophers such as Seneca, Cicero, Hermes Trismegistus, Aethicus Ister, and others.<sup>35</sup> Among the others, one finds brief references to two important ancient sources, Greek, and Hebrew. The first is a brief reference to Pseudo-Dionysius.<sup>36</sup> The second is the following about the sons of Noe and Abraham who were the first expert Astronomers: “...as Josephus relates and is [stated by] Isidore [of Seville] in his third book [of the *Etymologies*] and as Clement relates in the first book of [*The Stromata*]. And according to Augustine these [sons of Noe and Abraham] lived when Moses was born....”<sup>37</sup>

This latter work by Clement of Alexandria is so important in that it shows how Bacon has appropriated an ancient Platonist understanding of science and philosophy that can be useful for a Christian. It takes up and transcends the other two traditions, the Aristotelian, and the Stoic.

We turn now to a brief review of one example from the *Perspectiva* in which Bacon used the teaching of mathematics to correct the teaching of Avicenna, Averroes and Alhazen.

#### 4. Re-Reading Alhazen, Avicenna, and Averroes through the lens of Ptolemy and Augustine

In the context of Bacon’s *Perspectiva*, however, two other ancient sources matter greatly. One is a pagan philosopher, Ptolemy and the other is a Christian philosopher and theologian, Augustine. Both enable Bacon to “correct” the teaching of Alhazen, Avicenna and Averroes on the primacy of intromission of species in vision. They enable Bacon to construct his own individual synthesis of perspectival human knowledge. And as made clear by the research of Cecilia Panti, the key to this move for Bacon is the work on science and optics by Robert Grosseteste.<sup>38</sup> It is well-known that Bacon considers

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<sup>35</sup> One should note that part three of the *MP* is a digest of text and comment on and from the Moral Essays of Seneca which has its own distinctive natural philosophy and moral psychology.

<sup>36</sup> See Roger Bacon, *MP*, ed. Massa, 231 and 261.

<sup>37</sup> Roger Bacon, *Opus maius*, part two, vol. 3, ed. Bridges, 57: “...ut Josephus narrat , et Isidorus libro tertio, et Clemens libro primo, hoc idem de Abraham confitentur.” See also 55.

<sup>38</sup> Cecilia Panti, “The Oxford-Paris connection of optics and the Rainbow: Grosseteste’s *De iride*, Pseudo-Oresme’s *Inter omnes impressiones* and Bacon’s *Perspectiva* in Paris, BNF, lat. 7434”, in *Les Sciences au Moyen Âge (XIIIe-XVe siècle). Autour de Micrologus, 251-280*, edited by D. Jacquart and A. Paravicini Bagliani. See also Greti Dinkova-Bruun and Cecilia Panti, “Robert Grosseteste’s *De iride* and its *addendum* in the Vatican Manuscript Barb. Lat. 165: Transmission, Reception and Meaning”, in *Manuscripts in the Making: Art and Science*, vol. II, edited by S. Panautova and P. Ricciardi (London and Turnhout: Brepols/Harvey Millar Publishers, 2018), 23-31. These studies are important as indicators of the continuity between Bacon and Grosseteste and Bacon on *De iride* as the central reference point for the applications of *Perspectiva*. See also Cecilia Panti, “The Theological Use of Science in Robert Grosseteste and Adam Marsh According to Roger Bacon: The Case Study of the Rainbow”, in *Robert Grosseteste and the pursuit of Religious and Scientific Learning in the Middle Ages*, edited by J. P. Cunningham and M. Hocknull (Cham: Springer Nature, 2016) 143-64.

Ptolemy to be the foundation for optics. While Bacon takes over the mathematical teaching of Alhazen, he re-interprets that teaching, especially on intromission and extramission of species through the *Optics* of Ptolemy.<sup>39</sup>

Bacon uses Aristotle, Ptolemy, Tideus, Alkindi, and Augustine (*De musica*, Book 6) “who asserts that the species of the eye is engendered in the air as far as the object” with the expressed intention of correcting Alhazen, Avicenna and Averroes.<sup>40</sup> Thus, the inanimate medium will not become animate but will be assimilated to animate things by virtue of its reception of the similitude of an animate thing. However, Bacon’s visual species are not the Platonic emanation of visual fire from the eye to the object and back. The visual power is not only a recipient; it is also an agent. Therefore, visible species from the eye are needed to ennoble the material physical species to be assimilated to human perception. Lindberg continues:

Bacon was acute enough to notice that Alhazen, Avicenna and Averroes had never disproved the existence of visual radiation; they had according to him merely demonstrated the absurdity of maintaining that something material passed from the eye to the visible object, seizes the species of the visible object and returns it to the eye.<sup>41</sup>

Mark Smith, comments: “For another thing, in the absence of visual radiation, sight would be reduced to pure passivity. Having the eye cooperate actively in the visual process makes the process intentional – or as Augustine would have it, willfully ‘attentional’”.<sup>42</sup> And since Alhazen took his optics from the arch-extramissionist Ptolemy, Bacon will read Alhazen through the lens of Ptolemy, as it were.

What then are “visual rays” for Bacon? They are extensions of the perceiving perspectival knowing subject. Two of Bacon’s sources, Ptolemy, *Introduction to the Almagest* and Augustine, *De musica*, Book VI provide the explanation. Commenting in the *Communia mathematica* on Aristotle’s division of the essential parts of speculative philosophy, namely, physics, mathematics and metaphysics, Bacon comments that Ptolemy in his preface to the *Almagest* states that Aristotle does not sufficiently use

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<sup>39</sup> David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: Chicago University Press, 1978), 109-113: “The essentials of Bacon’s theory of vision are all drawn from Alhazen [...] But Bacon was more than a follower of Alhazen, he was also, as he saw it, a follower of almost everyone else [...] The resulting doctrine is Neoplatonic in its metaphysical basis.” See David C. Lindberg, *Roger Bacon and the Origins of PERSPECTIVA in the Middle Ages: A Critical Edition and English Translation of Bacon’s PERSPECTIVA with Introduction and Notes* (Oxford: Clarendon Press, 1996), 100-101; hereafter cited as Bacon, *Perspectiva*, ed. Lindberg.

<sup>40</sup> Augustine, *De musica*, edited by M. Jacobsson (Berlin-Boston: De Gruyter, 2017), 209, l.23-24.

<sup>41</sup> Lindberg, *Theories of Vision*, 116.

<sup>42</sup> A. Mark Smith, *From Sight to Light: The Passage from Ancient to Modern Optics* (Chicago and London: University of Chicago Press, 2015), 264.

mathematics in either physics or metaphysics (Divinity).<sup>43</sup> Aristotle's lack is made up from Augustine, *De musica*, Book 6.8.21: "And the diffusion of rays shining out from the small pupils of our eyes assist us in [measuring] the spaces of places".<sup>44</sup> It is important to note that Bacon's insistence on a the method of a careful combination of logical-mathematical reasoning and discrete experiential observation is derived from the introduction to Ptolemy's preface to the *Almagest*.

In the light of these sources, what then for Bacon are these visual rays? They are geometrical measuring lines that enable us to visually certify the object and its proper location.

The certification comprises the complete perceptual process, namely, visus, comparison, and syllogism (as defined by Alhazen, an instantaneous intuition of the object based on very fast and imperceptible inferences). In this way, the rational perceiver, using a combination of experience and reason can accurately measure the location, magnitude and distance of objects.

Still, one question remains. Why did Bacon think it necessary to advocate for a combination of intromission and extramission of species? Was it just a matter for the physics and psychology of vision? Bacon himself answers the question in part three of the *Perspectiva*. There, he argues that the combination of intromission and extramission of species provides a natural analogue for the metaphysical and theological doctrine of the cooperation of divine Grace and Freedom of the Will.<sup>45</sup> In order, however, to get an account of how Bacon relates the theories of species and vision to his metaphysical concerns, one must examine his understanding of the unity of the human being as presented in his *Moral Philosophy*, part one. One must also examine Bacons summary sketch of spiritual species and intellectual knowledge as found in his short summary in the *CN*. There, Bacon explicitly connects the physics of species and vision as found in *DMS* and the *Perspectiva* with the metaphysics of intellectual knowledge and the unity of the human cognizer. For Bacon, there is no pure intellectual intuition or knowledge without a return to the physical and perspectival account of vision. The metaphysics of human knowledge must be based on an adequate scientific account of physical action and vision.

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<sup>43</sup> See *CM*, ed. Steele, 8, l. 2-23. This is a repetition of the text from *Opus maius*, Part Four on mathematics cited above in Note 15. See G. J. Toomer, *Ptolemy's Almagest* (Princeton: Princeton University Press, 1998), 35-37 (Bk. I-Preface).

<sup>44</sup> Augustine, *De Musica*, 209, l. 21-24: "Ut igitur nos ad capienda spatia locorum diffusio radiorum iuuat, qui e brevibus pupilis in aperta emicant et adeo sunt nosri corporis, ut quamquam in procul positis rebus, quas videmus, a nostra anima vegetentur, ut ergo ergo eorum effusione adiuvamur ad capienda spatiorum locorum..."

<sup>45</sup> See Bacon, *Perspectiva*, Pars 3, Dist. 3, Cap. 1, ed. Lindberg, 324-25: "Et dictum est quod ad visionem exigitur non solum ut fiat intus suscipiendo, sed extramittendo et cooperando per virtutem et speciem propriam. Similiter et visio spiritualis non solum requiritur ut anima recipiat ab extra, scilicet a Deo gratias et virtutes, sed cooperetur per virtutem propriam. Nam motus liberi arbitrii et consensus requiruntur cum gratia Dei ad hoc ut videamus et consequamur statum salutis."

### 5. Bacon's account of the metaphysical unity of the individual human being, spiritual species and intellectual knowledge

In the *MP*, when Bacon comes to present an account of the immortality of the soul, he stresses the essential unity of soul and body. For him, the human being is a unity, although a complex unity. He does not posit the substance-dualism attributed to him by some modern writers, and which one might expect from his praise of Avicenna. Bacon states:

This is necessary, since they derive [it] from the source of philosophy, because according to them virtue belongs to a whole composed of soul and body, that is, a man, not to the soul only nor to the soul in a man, but to a man through a soul, just as understanding and building do, as Aristotle says in Book One of *On the Soul*. And so, they have assumed that happiness belongs to something conjoined. Hence, they have not assumed that a man is a soul in a body but in reality is something composed of a soul and a body, such that the essence of a man is constituted from a soul and a body, and not that his essence is the soul alone in the body.<sup>46</sup>

Bacon did not provide a formal account of the essence of the human being. Citing the authority of Aristotle, he simply stated his own position on the unity of the human being as a composite of soul and body. He was more focused on proving that without a true scientific account of the human perceiver one could not provide the basis for a mature understanding of human intellectual knowledge. In his view, they had ignored the role of mathematics and observation in the act of perception.

Bacon in his criticism of the common teachers in philosophy, demands that one produce a natural philosophy of perception based on the application of mathematics as practiced in *DMS* and the *Perspectiva*. He did this to provide a secure scientific basis for metaphysical claims about human perception. He wished to avoid the argumentative folk-psychology of his contemporaries that lacked a foundation in the sciences. Bacon's metaphysical account of the human being in the *CN* already presupposes the fact that he has given a mathematical, medical, and natural philosophical account of vision and perception in his central treatises *DMS* and *Perspectiva*.<sup>47</sup>

Having dealt with the natural multiplication of species to the particular senses, the common sense and imagination, Bacon notes that one needs "A far more powerful and noble power of the sensitive soul" for judgment of the insensate species resulting from sensible matter. He designates the middle cell of the brain, called Cogitation, to take the place of reason in brute animals allowing them geometrical reality and perception. Men have the exact same faculty as well:

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<sup>46</sup> Bacon, *MP*, ed. E. Massa, 23. Translation by Maloney and Hackett (forthcoming).

<sup>47</sup> See Bacon, *CN*, I.4.6, 297: "Partes vero sensitive virtutis ego posui cum omni diligencia in principio *Perspectivae*, quod capitulum est in quo tantum vulgus errat medicorum, naturalium et theologorum, et est unum de dignioribus capitulis que misi, continens sapiencie potestatem."

For the species that are in the imagination multiply themselves in the cognitive faculty... but the cogitative power possesses those species in a nobler way, and the species of the estimative power and memory exist in the cogitative power according to a nobler way of being than in the estimative power and memory. And therefore, the cogitative power uses all the other powers as its instruments.<sup>48</sup>

What follows is important for Bacon's psychology of the human knowledge.

And in humans a rational soul is added from without by an act of creation, and the rational soul is united primarily and immediately with the cogitative faculty, which it puts to use mainly as its own special instrument; and species are produced in the rational soul by the cogitative faculty. Consequently, when the cogitative faculty is injured, the judgment of reason is thoroughly corrupted; and when it is healthy, the intellect functions well and rationally.<sup>49</sup>

David Lindberg translates the part of the text as: "And species are produced in the rational soul by the cogitative faculty (et ab ea fiunt species in anima rationali)." I would prefer the following: "And from [or on the basis of] the cogitative power as its instrument, [spiritual] species are produced in the rational soul." The work of producing species in the rational soul of the human being is not just the cogitative sense working alone but it is the rational soul intervening and using the *vis cogitativa* as its special instrument. In this mortal life, the human intellect does not produce pure spiritual species nor is it given species by the *Dator formarum*. Spiritual species cannot be formed in the intellect without the incorporation of the purified sensible species from the cogitative sense. We will see below that Bacon makes use of his optics and multiplication of species when he addresses the issue of spiritual species.

The important point to note here is that with the supervenience of the rational soul on the cogitative power in the human being, we have a fully united rational human being exercising administrative judgment while being intimately united to the cogitative sense. There is no substance dualism here. There is one human being with the unity of the composite. And it is an intimate unity. But while the rational soul cannot have its species without the cooperation of the cogitative sense, the latter has been united with rational soul and acts as its instrument, forming with it one substantial intellectual-corporeal human being. Thus, for all his praise of Avicenna as the leader of the philosophers after Aristotle, Bacon transformed Avicenna's substance dualism into a non-dualist unified human incarnate rational being.<sup>50</sup> There is a gradual

<sup>48</sup> Bacon, *Perspectiva*, Pars I, Dist. 1, Cap. 4, ed. Lindberg, 16-17.

<sup>49</sup> Bacon, *Perspectiva*, Pars I, Dist. 1, Cap. 4, ed. Lindberg, 16-17.

<sup>50</sup> See Thérèse-Anne Druart, "Roger Bacon and His 'Arabic' Sources in the *Moralis Philosophia*", in *Pre-Modern Philosophi in Greek, Hebrew, Arabic and Latin Traditions*, edited by L. Farjeat, K. Krause and N. Oschman (forthcoming). Druart comments on how Bacon interprets Avicenna in an idiosyncratic way, as he ignores Avicenna's substance dualism and focuses his attention mostly on book ten, the moral section of the *Philosophia prima*. [I thank Professor Druart for allowing me to use and cite this forthcoming study].

purification of the initial physical-material species given by the multiplication of species. But even after the optic nerve and curvature, the process is “spiritual” in the medical sense. With estimation, memory and especially cogitation, there is a higher purification.<sup>51</sup> Then, the rational soul united with the cogitative sense understands things in the world with intimate reference to the species of the cogitative sense. With the human rational soul, the in-built geometric reality of the cogitative sense becomes an explicit formulated logic and mathematics. But the human perceiver is no mere non-rational observer, but a *Perspectivus*. And so, when we talk about the emission of rays, we must include the projection of geometrical measuring to the object via the visual powers in order to measure and estimate the location and distance of objects in space. I turn now to Bacon’s explicit remarks on spiritual species.

In his discussion of spiritual and celestial activity and their effects, Bacon notes that “For since corporeal matter has nowhere near the active virtue of spiritual substance (and the same relationship holds between non-celestial body and celestial substance), if the species of spiritual substances should be completed, all things would become spiritual.”<sup>52</sup> Again, in his discussion of the nature of species in the medium and in sense, Bacon attacks those philosophers who talk about spiritual being of the species in the medium.<sup>53</sup> Bacon writes explicitly of the superiority of spirit over body. He remarks:

And what is more, spirit in body and united with it as its form and perfection (as, for example, the rational soul) does not give up the spiritual being that it owes to its essence; rather, that spiritual being is more apt to flow into the body than the converse; and virtually the whole of a man becomes in a certain way spiritual since the soul is more important (almost beyond comparison) than the body. Therefore, a corporeal thing existing in body is far less apt to give up the being which, according to the law of body, is due it....Later we will investigate the species of corporeal things as they exist in the soul and intellect, and the first cause of their being there.<sup>54</sup>

In the *De anima* section of CN Bacon provides a summary sketch of his teaching on some aspects of spiritual species. He correlates them closely with his treatment of physical-material species in his *DMS* and his *Perspectiva*. In what follows, I will give an outline of his teaching on this matter as it arises in his defense of the individual human intellectual cognizer against the position of Averroes on the unity of the possible intellect.

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<sup>51</sup> See Bacon, *Perspectiva*, Part I, Dist.1, Chs. 1-5, ed. Lindberg, 1-20. See also David C. Lindberg, *Roger Bacon's Philosophy of Nature: A Critical Edition, with English Translation, Introduction and Notes, of De multiplicatione specierum and De speculis comburentibus* (Oxford: Clarendon Press, 1983; reprint: South Bend, Indiana: St. Augustine's Press, 1998), Part II, Ch. 2, 190-94 on material and spiritual species.

<sup>52</sup> Bacon, *DMS*, ed. Lindberg, Part I, Ch. 6, 82-83.

<sup>53</sup> Bacon, *DMS*, ed. Lindberg, Part III, Ch. 2, 187-95.

<sup>54</sup> Bacon, *DMS*, ed. Lindberg, Part III, Ch. 2, 188-93. Lindberg notes that Bacon never gets to this subject, referencing *Do Nascimento*, 19-21. As we will see in the next section, in the CN Bacon provides a summary account of the soul and intellect and their relationship to corporeal species.

Bacon constructs his criticism of Averroes and his Latin readers on natural and scientific analogies from his *DMS* and his *Perspectiva*. In part three of this latter work, Bacon argues that all spiritual analogies must be based on a sound knowledge of natural behaviors and structures. Averroes, as interpreted by the Latin philosophers, had posited one common possible intellect for all humans such that it is not this individual person that thinks. Bacon comments:

When indeed Averroes argues to the contrary stating ‘if the intellect were multiple in number and numbered according to the diverse number of humans, then the thing understood would be multiple in number.’ But this is insane, nor does he verify this consequence. From his statements in the same chapter and elsewhere a fantasy is conjectured in order to verify this consequence, that is, that from an intellect and by an intellect one true thing is made which is truer than from matter and form. And so if the intellect is numbered in humans, then the same intellect or the same understood things will be numbered (multiple) since it will be understood by many. But many [philosophers] explain this in multiple ways, [making a distinction between] the thing understood and the species of the thing before the soul... For when it is argued that the species in the soul will be multiplied, I concede that diverse species of the same thing can be present before diverse knowers, because the thing produces its species in all directions, as was proved in the treatise *On the Multiplication of Species*. And so, just as in diverse parts of the air there are diverse species of the same thing, and diverse species come the eyes of diverse humans, it is the same in the case [of representation] for the diverse intellects.<sup>55</sup>

Bacon continues and in the case of complex truths, the agent intellect accounts for the interior cause of knowing while the teacher is the cause of our knowledge of exterior things. Further, in the case of in-complex truths, the object of knowledge (the thing) can be visually presented and exemplified by the teacher.

The species (representation) of the thing arrive at the intellect by means of the senses, is enlightened by the agent intellect and as a result a cognitive habit is born in the soul. Through these processes it is possible for science to come about in the student such that it is not the case that knowledge (automatically) generates itself.<sup>56</sup>

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<sup>55</sup> Bacon, *CN*, ed. Steele, Book One, Part four, dist. 3, Ch. 3, 288-89. Translation, Hackett.

<sup>56</sup> Bacon, *CN*, ed. Steele, Book One, Part four, dist. 3, Ch. 3, 290. Both Yael Kedar and Chiara Crisciani argue for a theory of the direct incorporation of corporeal species in the rational soul. See Yael Kedar, “The Intellect Naturalized: Roger Bacon on the Existence of Corporeal Species within the Intellect”, *Early Science and Medicine* 14 (2009): 131-57; Ciara Crisciani, “Universal and Particular in the *Communia naturalium*: Between <Extreme Realism> and <Experientia>”, in *Roger Bacon’s Communia Naturalium: A 13<sup>th</sup> Century Philosopher’s Workshop*, edited by P. Bernardini and A. Rodolfi (Firenze: SISMEL-Edizioni del Galuzzo, 2014), 57-82. Clearly, Bacon did not develop a formal theory of agent intellect such as one finds in Thomas Aquinas and John Peckham. But his theory of spiritual being as outlined here implies the existence of spiritual processing of the incorporated material species.

Bacon concludes Chapter three with the claim that he is certain that the soul is composed from matter and form just like the Angels.

In Chapter four, Bacon presents a developmental understanding of the human being and ties his understanding of the rational soul to the normal development of the embryo of the human being who is a composite of body and soul. The soul too must be a composite such that “its form perfects the form of the embryo and its matter perfects the matter of the embryo.” And in this manner, one can defeat “the great error” and weak arguments of those who conjecture “the simplicity of the rational soul”.<sup>57</sup> There is little doubt that Bacon is polemically distancing himself from the new position of Thomas Aquinas.

In Chapter seven, Bacon examines the properties of the intellectual soul. He begins by stating that it is his understanding that “there is one human substance that has diverse activities, names and relationships. This substance first knows and desires what is known...”<sup>58</sup> Once again, when Bacon turns to a consideration of the nature of intellectual memory, he immediately correlates it with the account of physical memory processing in his *Perspectiva*, drawing especially on Avicenna’s psychology. Bacon offers his own correction of Avicenna, who according to him, holds that estimation takes the place of intellect in brute animals, and that reminiscence will differ from intellect just as memory differs from estimation. Bacon overcomes Avicenna’s substance dualism by claiming that there is one human substance, and that memory and estimation are one human power according to substance but have diverse activities in the final part of the brain cavity. Analogously, reminiscence is not a power different in kind from the intellect. Indeed, it is less so than is memory different from estimation since intellect and reminiscence do not require diverse subjects or diverse instruments as do memory and estimation in the brain. Bacon seeks to link up this concern with the diverse instruments of perception in the brain with the supervenience of the intellect. This includes the high point of intellect that arises from intellectual memory. Bacon’s aim is to argue that perception and intellect work together in the act of achieving certified knowledge.

This is because intellect is not bound to [a particular physical] organ. If Augustine and the theologians posit [separate] parts for imagination, memory, intelligence and will, it should be stated that this separation is not according to parts, but in terms of act and habit. And in this they agree when they say that intelligence is formed from memory, which would not occur if there they were diverse powers, because such diversity of powers would be according to nature, essence and species just as is the case with *Vision* and *Hearing*. Whence, when the high point of intelligence is formed from memory, this

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<sup>57</sup> Bacon, *CN*, ed. Steele, Book One, Part four, distinction 3, Ch. 3, 294. Translation, Hackett.

<sup>58</sup> Bacon, *CN*, ed. Steele, Book One, Part four, distinction 3, Ch. 3, 299: “Et dominabitur intencioni mee ad presens quod una est substantia, habens diversas operationes et diversa nomina et diversas comparaciones, que primo cognoscit et eadem appetit cognita...”; I will not address Bacon’s teaching on the practical intellect here; instead I deal with his account of the speculative intellect.

is nothing other than the same power of the soul, that is, the intellect or the intellectual soul...<sup>59</sup>

Here, we have Bacon's expression of his unitary but complex understanding of human knowledge where the work of the *Perspectiva* provides the natural perceptual basis for his understanding of the thinking and willing human being. Just as the *Perspectiva* at the end of part III provided a natural analogue for the eight beatitudes using the structure of the eye, and also the basis for a cooperation of human freedom and Grace, so we see Bacon mining the *Perspectiva* for natural analogues to solve discussions on the nature of the intellect, and on the nature of the soul. We also need to ask: Did Bacon's own Franciscan Christian Theological understanding affect the way he read the ancient Greek, Latin, and Muslim texts on Optics? I believe that it did. We notice however, that his position is directed against a famous one who held to the simplicity of the human intellect, one who taught in Bacon's view an *error pessimus*. And this places Bacon's concerns in the context of the teaching debates on the soul at the University of Paris in the mid to late 1260's.

### Conclusion

I have presented Roger Bacon (1257-92) as a scholar who worked on the correction of the Bible and one who sketched out a new metaphysics closely linked to morals. One must see Bacon as the voice of the Biblical Scholars who had been subordinated to the practice and ideology of the Masters of the Sentences, who had adapted the metaphysics of Aristotle, Avicenna and Averroes. Bacon, however, was driven to construct a new metaphysics, a new Christian philosophy in which all ancient traditions of science and philosophy would be integrated. It was Bacon's view that Masters of the Sentences did not do justice to the natural sciences. This paper has demonstrated the extent to which Bacon formed his own new synthesis of wisdom, and it has added much new evidence to the brief references set out by Delorme to identify the mathematical and scientific pre-requisites for a new metaphysics. Further, it identified the *Opus maius* as Bacon's new preliminary text in metaphysics and morals. In particular, it argued that Bacon was not an Avicennian substance-dualist. Moreover, the paper showed the extent to which Bacon's criticism of Averroes was based on his natural philosophy. And likewise, his doctrine of spiritual species and intellectual knowledge was tightly integrated with his natural science of perception.

Bacon's unique synthesis in this work was programmatic. Bacon's ideas would be taken up and significantly developed in the English Franciscan tradition up to and including Duns Scotus and William of Ockham. And as is clear from his uses of Avicenna, Bacon is doing the work of a philosopher and theologian, and not that of an historian of philosophy. With not a little 'deconstruction' and 'creative misreading', Bacon is

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<sup>59</sup> Bacon, *CN*, ed. Steele, Book One, Part four, distinction 3, Ch. 3, 301. Translation, Hackett.

creatively (poetically) re-writing what he thought Avicenna should have said or meant to say had he had access to the resources provided by Christianity and had he had a better knowledge of the ancient philosophers and scientists.

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