

# Chapter 4

## Space and Movement in Medieval Thought: The Angelological Shift



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*Oportet hic considerare de loco eorum [sc. substantiarum spiritualium], quod non habet aliquid difficilius se in tota speculatione sapientiae.*

*Here it is necessary to take into account their place [sc. of spiritual substances]: nothing is more difficult in the whole speculation of wisdom.*

Roger Bacon, *Opus tertium*, c. XLVII in Roger Bacon 1859, Chap. 6, 172.

**Abstract** This paper explores the contribution of medieval metaphysics to the development of the theories of space and movement through an investigation of some metaphysical conceptions of the late thirteenth and early fourteenth centuries. If treatises on the philosophy of nature – especially the commentaries on Aristotle’s *Physics* and *De caelo* – generally provided the theoretical context for notions of place, location and space in medieval thought, medieval thinkers also examined these notions in a metaphysical context in order to explain the relationship between immaterial substances (souls, angels and God) on one hand, and the space of the physical World on the other. This paper outlines three different medieval modalities of location: the circumscription of bodies, divine ubiquity, and the delimitation of souls and angels. On the basis of these modalities, medieval thinkers developed two types of explanation for the location of created immaterial substances: firstly, location through operations, and secondly, location through the being. According to these models, space is an external (first model) or internal property of the being itself (second model). These conceptions bear important consequences on the theo-

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ries of movement, especially those focusing on the movement of indivisibles (that is, non-extended substances like spirits) in the physical extended space. In this context medieval thinkers intensely discussed the possibility of instantaneous movement and elaborated a complex notion of resistance as crucial to each movement in the world.

## 4.1 Introduction

The importance of medieval conceptions of space and place in the genesis of early modern physics is, by now, a well-documented fact. Over the last two decades numerous works have enabled us to better know and appreciate the doctrines of several thinkers, as well as the ramifications of their theories and their contributions to what we might call an ‘occidental philosophy of space.’<sup>1</sup>

This paper approaches the importance of medieval theories of space and place from a specific vantage point: it will highlight the role of the doctrines concerning spiritual creatures in this context by investigating the conditions of the localization and motion of immaterial substances in physical and material space.

From the thirteenth century onwards medieval natural philosophy developed within the framework of commentaries on the Aristotelian corpus, in particular those on the *Physics* and *On the Heavens*, as well as in the context of metaphysical and theological texts such as the *Commentaries on the Sentences* or the *Disputationes de quolibet* (open disputations).<sup>2</sup> These texts discuss important questions on matter, body and spirit, as well as movement, place, and the localization of God and spiritual creatures. These are not basic commentaries, but rather essentially doctrinal treatises that construct novel conceptions; advance natural philosophy through the acquisition of new instruments of thought (such as the important linguistic and terminological analyses of the fourteenth century); and encourage the formulation of

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<sup>1</sup> Among these studies, note particularly – in addition to the classic studies of Pierre Duhem 1913 and Anneliese Maier 1955 and 1966 – the following publications of a more general and/or interdisciplinary character: Sorabji 1983; Aertsen and Speer 1998; Moraw 2002; *Uomo e spazio* 2003; Suarez-Nani and Rohde 2011. Additionally there are studies specific to medieval theories of space and place, for example, Grant 1981; Cross 1998; Trifogli 2000; Grellard and Robert 2009; Biard and Rommevaux 2012; Weill-Parot 2013.

<sup>2</sup> Written around the middle of the twelfth century, Peter Lombard’s *Sentences* is a collection, in four books, of statements (‘sentences’) from patristic writings (especially Augustine, but also Ambrose, Hilary, and Jerome): the first book deals with God, the second with angels and human beings, the third with Christ, and the fourth with the sacraments. At the beginning of the thirteenth century, this work was adopted as a university textbook in medieval universities: the training curriculum for the masters of theology required them to comment on the ‘Sentences,’ that is to say, to explain their content and to discuss the topics that were raised within them. Therefore, in commenting on book II, masters of theology discussed numerous questions pertaining to spiritual creatures, including their relations to places in the material world. Since commenting on the ‘Sentences’ was compulsory, numerous commentaries survive, and they constitute a specific literary genre through which medieval thought was conveyed. Cf. Evans 2002; Roseman 2004.

new problems.<sup>3</sup> These developments had considerable repercussions in medieval physics and metaphysics and beyond, and their contributions to the development of the concepts of space, place and localization were recognized by scholars from the mid-twentieth century onwards – in particular those of the medieval thinkers who went beyond the Aristotelian conception, and thus paved the way for its demise as brought about by Galileo and Newton.<sup>4</sup>

The questions that define the evolution of medieval theories of space and place include questions regarding the localization of God and spiritual creatures. Since Aristotelian physics of bodies does not offer valid conceptual tools for solving this problem, many thinkers looked for new solutions, and proposed new theoretical frameworks that would allow them to think about the relationships of spirits to physical places, and to clarify the conditions for including spirits within the space of the world.<sup>5</sup> As early as 1964 Paul Vignaux emphasized the necessity of research into medieval philosophy for deepening the study of metaphysical doctrines on the relationships of spirits to places:

We stand before a doctrine of space for which the point of departure is the relation of spirits to places. The detailed understanding of such reasoning [...] [in this matter] requires a study of fourteenth-century speculation on the place of angels [*de loco angelorum*].<sup>6</sup>

Paul Vignaux was inclined to find the question of God's relationship to the material world essential for a clarification of the concepts of space and place (especially through introducing the notion of spatial infinity) in the intellectual process leading "from the closed world to the infinite universe" (as illustrated in Alexandre Koyré's famous work *From the Closed World to the Infinite Universe*).<sup>7</sup> Vignaux thus noted that John of Ripa's (fourteenth century) reflection on the coexistence of creatures with the "infinite imaginary void" focuses on the relationships between spirits (angels and souls) and places, which then become paradigmatic in his elaboration of his theory of space; Vignaux concluded that John of Ripa's text is "invaluable for the history of the relationships between religious and scientific thought because of the radical distinction it presents between God's immensity and spatial infinity, a

<sup>3</sup> See Biard 2005, 289–300 (esp. 290).

<sup>4</sup> See Clavelin 1968. Maurice Clavelin recognizes the importance of medieval antecedents for the development of Galilean mechanics, but proposes that the compartmentalization of disciplines prevented medieval thinkers from seeing in their 'new solutions' the roots of mechanical science, which would not see the light of day until Galileo's time (cf. 121, 291); see also Koyré 1939; Wallace 1981. For Newton see also: Jammer 1954. See Funkenstein 1986; Sorabji 1988; Sylla 1997, 65–110; Leijenhorst, Lüthy and Thijssen 2002; esp. Sylla 2002, which discusses the evolution within the Aristotelian tradition; Giovannozzi and Veneziani 2014; Suarez-Nani, Ribordy and Petagine 2017; Suarez-Nani 2017a, 93–107.

<sup>5</sup> These discussions would continue into the seventeenth century, in particular with Descartes, Henry More, Hobbes and Gassendi. Of the many studies dedicated to this subject the following shall be noted: Sylla 2002; Paganini 2005, esp. 258–339; Grant 2007, 127–155; Normore 2007, 271–287; Agostini 2011, 49–69; Pasnau 2007, 283–310; Anfray 2014, 23–46; Jaffro 2014, 3–22; Suarez-Nani forthcoming.

<sup>6</sup> See Vignaux 1967, 194.

<sup>7</sup> Koyré 1957.

distinction that began to haunt natural philosophy.”<sup>8</sup> Vignaux’s statement has a general import and can be applied to numerous medieval doctrines on the relationships of spirits (God, angels, and human souls) to places; such doctrines propose new notions and hypotheses that are not found in treatises on physics (which largely remain indebted to Aristotle’s conception). These doctrines, indeed, represent a major milestone on the path leading towards the demise of the Aristotelian paradigm. It is, therefore, both important and interesting to explore angelological doctrines related to questions on the relationships between spirits and space.

This paper will present some prominent aspects of the doctrine of space and place developed by medieval thinkers in an angelological doctrinal context before approaching a hitherto unexplored problem: the role ascribed to resistance in medieval theories of the movement of immaterial substances. In the second part of this article, once the specific mode of localization of spiritual substances in physical space has been explained, I will evaluate to what extent the analysis elaborated in the angelological context modifies the conception of local motion: what is at stake here becomes especially obvious in my analysis of the role of resistance – a condition that necessarily determines the movement of bodies – in the transport of immaterial substances.

## 4.2 Place, Space and Movement of Spiritual Creatures

### 4.2.1 *Relationships to Place/Space*

In the medieval period the relationship of spiritual creatures to space was addressed via two very different questions: “Where are the angels?” (*ubi sunt angeli*), and “Are angels in a place?” (*utrum angeli sint in loco*). The reply to the first question – which assumed that angels can be located in a place – was theological in nature, stating that the angels and the blessed are in the Empyreum: not an astronomical, but a ‘theological’ or spiritual heaven, created by God in order to host the blessed spirits (the angels and those human souls that deserved beatitude).<sup>9</sup>

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<sup>8</sup>Vignaux 1967, 209.

<sup>9</sup>Deriving from a long tradition dating back to Antiquity (especially the school of Gnosticism, the *Chaldean Oracles*, and some Neo-Platonic thought) the Empyreum was introduced into medieval Christian theology by Valafrius Strabo, a monk of the first half of the ninth century and disciple of Raban Maur. Its reality was widely accepted thanks to its association with the theological tradition, which lent it authority. The Empyreum was conceived as a spiritual or intellectual sphere (sometimes ‘sphere of fire’ or ‘sphere of light’) surrounding the material world. It was, thus, considered the tenth celestial sphere, which was immobile and located beyond the Primum Mobile, i.e. outside the ninth sphere according to the Aristotelian-Ptolemaic cosmology. The Empyreum’s influence upon the inferior world was, however, not unanimously accepted: Bonaventure, Richard of Middleton and Giles of Rome acknowledged it, while Thomas Aquinas and the Aristotelians rejected it. On the medieval doctrine of the Empyreum see Nardi 1967, 167–214. Regarding the angels’ cosmological function as movers of the celestial spheres, there was no unanimous agree-

But even if this reply allowed for the angels to be somewhere within the created universe it in no way accounted for their presence in the material world, nor did it explain which type of relationship to physical space angels might have. By contrast, the second question (the question on which this paper will focus in particular) addressed precisely this subject, and was more specifically philosophical in nature, as it questioned the conditions for the localization of spirits in the material world.

It is worth emphasizing here that, for medieval thinkers, there was no doubt that immaterial substances were related to and located in physical space. On the one hand, biblical passages – incontestable authorities – told of many angelic movements from the sky to the earth.<sup>10</sup> On the other hand, the intrinsic limits of the created world required the inclusion of all creatures (even spiritual creatures) in a spatio-temporal framework. The specific way in which purely immaterial substances were localized, then, had to be examined and determined, since in this case the Aristotelian conception of place as the limit of a surrounding body did not apply.<sup>11</sup> Thus, from the middle of the twelfth century onwards, Peter Lombard gathered specific elements from the earlier tradition and formulated three possible modalities of localization: through the circumscription of bodies (*circumscriptio*); by divine ubiquity (*ubiquitas*); and finally, through definition or delimitation (*definitio*). The first of these methods defines the relationship of bodies to their respective places: each body is, literally, circumscribed, i.e. it is contained in a place dependent on its dimensions. The second method characterizes divine reality only: ubiquity means that God is present everywhere, without being contained in a determined place. And the third method corresponds exactly to the manner of localization proper to created spirits, since spirits are neither circumscribed in physical space, nor, like God, present everywhere, but rather necessarily delimited in relation to a place, that is to say “situated somewhere, such that they cannot be everywhere simultaneously.”<sup>12</sup>

The notion of a ‘definition’ or ‘delimitation’ in a place, which was generally accepted by medieval thinkers, nevertheless gave rise to many interpretations, notably when it came to clarifying the how and why of delimitation in space. On this basis two principal explanations of local ‘definition’ or ‘delimitation’ with regard to place emerged: one anchored the localization of spirits in their operations, the other in their being. Adopted, notably, by Thomas Aquinas in the wake of Albert the Great, the thesis of localization by activity led to the attribution of an extrinsic

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ment, either: while Bonaventure conceived this function in strictly theological terms, Aquinas transformed it into a philosophical thesis, creating the possibility of accounting for universal dynamism; see Suarez-Nani and Faes de Mottoni 2002, 717–751; Suarez-Nani 2002, 91–164.

<sup>10</sup> See, among others, Tobit 3:25; Luke 1:26 and 8:35–36; Acts 2:31.

<sup>11</sup> *Physics* in Aristotle 1937, IV, 4, 212a20: “place is the immobile limit of the containing body.”

<sup>12</sup> *Sententiae* in Peter Lombard 1981, I, I, d. XXXVII, chap. 6, 270: “spiritus vero creatus quodam modo localis est, et quodam modo non est localis. Localis quidem dicitur, quia definitione loci terminatur, quoniam cum alicubi praesens sit totus, alibi non invenitur; non autem ita localis est, ut dimensionem capiens, distantiam in loco faciat.” The distinction between circumscription and delimitation goes back to *De fide orthodoxa* in John of Damascus 2010–2011, I, chap. 13; it is taken up by, among others, Hugh of St. Victor in *De sacramentis*, see Hugh of St. Victor 2008, I, pars 3, chap. 18.

relation between angels and physical space, because such activity referred exclusively to operations they could carry out on bodies.<sup>13</sup> In this theory, an angel who does not act is not localized in the space of the material world. An inactive angel is, essentially, nowhere, while yet in the Empyreum, which is not a material place. For thinkers following this school of thought angels were not involved in spatial dimensionality, since they are totally foreign to the material world's conditions. They were, nevertheless, endowed with a 'quantity of power' (*quantitas virtutis*), with which they could act on bodies and their places, such that angels were situated without being circumscribed.<sup>14</sup> This sort of localization resulted from a causality between the angel entering into contact (*contactum virtutis*) with the place of the body upon which it acted, and therefore being delimited or localized in that place 'from outside.'<sup>15</sup> This explanation, then, allowed for the possibility of an extrinsic relation to space: a relation that is qualitatively different from the spatial relationships of bodies because it is freed of all mass and all material conditions.

The second explanation of *definitio*, in contrast to the first, somewhat interiorized of the relationship of angels to space by defining localization as based in the being of created spirits themselves. This position had already been defended by Bonaventure,<sup>16</sup> and became predominant after the condemnation of 1277, which censured the thesis that an angel is located nowhere,<sup>17</sup> as well as the thesis that an angel is localized by its operations.<sup>18</sup> The theory was supported by Peter John Olivi, Matthew of Aquasparta, Henry of Ghent, Richard of Middleton, John Duns Scotus and others, and conceived the relationship to physical place as a necessary and

<sup>13</sup> *Sententiae* in Albert the Great 1893, d. XXXVII, a. XVIII, 254–255: "Dicendum quod non est idem in loco esse, et locale esse [...]. Locatum enim proprie non est nisi corpus: cum tamen spiritus creatus diffinitive sit in loco, et non locatus, nec localis, nisi secundum quid, ut dicit in littera."

<sup>14</sup> *Summa theologiae* in Thomas Aquinas 1889, I, q. 52, a. 1, vol. V, 20: "angelo convenit esse in loco: aequivoce tamen dicitur angelus esse in loco et corpus. Corpus enim est in loco per [...] contactum dimensionis quantitatis. Quae quidem in angelis non est; sed est in eis quantitas virtualis. Per applicationem igitur virtutis angelicae ad aliquem locum qualitercumque dicitur angelus esse in loco corporeo." The same thesis is formulated in: *Scriptum in I Sent.*, in Thomas Aquinas 1929, d. 37, q. 4, a. 1 and in the *Quodlibet* in Thomas Aquinas 1956, I, q. 3, a1. For the Thomist conception, see Suarez-Nani 2002, 87–90, as well as Suarez-Nani 2011, esp. 126–127.

<sup>15</sup> *Summa theologiae* in Thomas Aquinas 1889, I, q. 53, a. 1, 30: "Sed angelus non est in loco ut commensuratus et contentus, sed magis ut continens. Unde motus angeli in loco non oportet quod commensuretur loco, nec quod sit secundum exigentiam eius, ut habeat continuitatem ex loco, sed est motus non continuus. Quia enim angelus non est in loco nisi secundum contactum virtutis, ut dictum est, necesse est quod motus angeli in loco nihil aliud sit quam diversi contactus diversorum locorum successive et non simul, quia angelus non potest esse simul in pluribus locis."

<sup>16</sup> *Sententiae* in Bonaventure 1885, dist. II, pars II, a. II, q. III, vol. II, 81–82: "Et ideo est tertia positio, quod angelus, cum contineatur a loco corporali, quod est in loco partibili, tamquam in loco primo; et quoniam non potest extendi in eo, ideo necesse est, quod sit in toto, ita quod totus in toto, et totus in qualibet parte."

<sup>17</sup> This thesis was, notably, defended by Roger Bacon: cf. Panti 2017, 57–77.

<sup>18</sup> See Denifle and Chatelain 1889, vol. I, art. 204, 218 and 219, 554–555; Hissette 1977, art. 53–55, 104–110; see also Piché 1999, 140, 144 and 146. On the echoes of this condemnation, see Mahoney 2001, 902–930.

intrinsic condition of all creatures, both material and immaterial.<sup>19</sup> From this perspective, the question *de loco angelorum* was to make the relationship to space uniform for all created beings, based on their finitude. This motif was present in most of the arguments looking to prove the intrinsic character of the relationship of all beings to physical place, beyond and independently of the quantitative dimensionality and proper conditions determining the circumscription of the bodies.<sup>20</sup>

Despite their shared appeal to the motif of finitude, the argumentative strategies often differed from one another significantly, sometimes giving place to novel explanations of the nature of the relationship between spirits and physical space. To take only two examples, we will now look briefly at the doctrines of Henry of Ghent and of John Duns Scotus.

#### 4.2.1.1 Henry of Ghent

According to Henry of Ghent, it “is necessary for the angel to be located somewhere in the corporeal universe: not nowhere, nor everywhere, but somewhere, even if the angel is not in a determined manner only here or only there.”<sup>21</sup> Freed from the conditions for the localization of the body, this way of being in space does not imply any relationship of co-naturality, dependence or commensurability between the angel and the place it occupies.

This thesis results from a twofold distinction: that between place (*locus*) and position (*situs*) on the one hand, and that between ‘natural position’ (*situs naturalis*) and ‘mathematical position’ (*situs mathematicus*) on the other. The ‘natural position’ implies a (natural) dependence of the localized object on the body that contains it, while the *situs mathematicus* is not dependent upon or attached to one position rather than another.<sup>22</sup> Henry clarifies that only the category of position (*situs*) befits an angel, which is, thus, only localized in the sense that it is necessarily

<sup>19</sup> I have analysed these authors’ doctrines in: Suarez-Nani 2003, 233–316 (esp. 262–274); Suarez-Nani 2008, 89–111; Suarez-Nani 2017b, 123–133.

<sup>20</sup> Francis of Marchia’s position is significant in this regard; see Suarez-Nani 2015a, 237–274.

<sup>21</sup> *Quodlibet* in Henry of Ghent 1983, q. 9, 68.

<sup>22</sup> *Ibid.*, 60: “Appellatur autem ‘situs naturalis’ rei, ad quem se habet per naturalem dependentiam, ut naturale sit ei esse in illo, et violentum et extra naturam esse alibi et extra illum [...]. Appellatur autem ‘situs mathematicus’ applicatio rei ad ‘ubi’ aliquod determinatum, sive supra sive infra, sive in oriente sive in occidente, sine aliqua naturali dependentia et determinatione plus ad unum quam ad alterum, ita tamen quod necesse est rei ex sua natura esse in aliquo illorum.” The distinction between ‘natural place’ and ‘mathematical place’ had already been introduced in question 5 of the same *Quodlibet*, to explain the means by which Christ’s body is present in the Eucharistic sacrament: “Et hoc modo, sicut substantia panis per sua accidentia habuit esse in loco non naturali sed mathematico in altari, et substantia corporis Christi non habet ibi esse nisi quatenus transsubstantiata est substantia panis sub illis speciebus ibi existens in corpus Christi” (29–30).



‘situated’ somewhere, according to the mode of *situs mathematicus*; that is to say, it is ‘situated’ without any natural link with or dependence on the place where it finds itself.<sup>23</sup>

It seems clear that this argument implies an important modification of the Aristotelian doctrine: given that the relationship of an angel to a place is devoid of all natural character, Henry was able to formulate the innovative idea of a place or mathematical position separate from a body, and therefore also independent of bodily qualities.

#### 4.2.1.2 John Duns Scotus

Similarly to Henry of Ghent, John Duns Scotus, while appealing to Aristotle, proposes a novel conception of the place of bodies.<sup>24</sup> He conceives of place as a mathematical quantity or dimension rather than a physical property. Place is presented as a homogenous entity, a “form without content,” that is, “an absolute mathematical property of all corporeal or incorporeal being.”<sup>25</sup> Thus, Scotus does not base localization on the physical or natural properties of things, but on a ‘passive potency,’ in virtue of which each thing relates to a place; as a consequence, this relationship is not one of necessity but becomes, strictly speaking (*de iure*), nothing more than a simple possibility.<sup>26</sup> In this way, Scotus removes localization from the network of physical qualities and the relationships between bodies.

This conception has wide-ranging implications when applied to separate substances for which, just as for natural bodies, Duns Scotus rejects the necessity of a relationship between separate substances and physical places. For him, such a relationship is nothing but a possibility due to the ‘passive potency’ by which an angel can be in a place.<sup>27</sup> This means that, for Scotus, angels do not necessarily have to be

<sup>23</sup> Ibid., 59: “loquendo proprie de esse in tali loco sub ratione tali, quia angelus simplex est, omni ratione quantitatis dimensivae carens, nullo modo angelus intelligitur esse in loco secundum suam substantiam [...]. Nec de hoc modo essendi in loco est quaestio. Sed solum est quaestio extendendo ‘locum’ ad omnem rationem situs, ut dicatur esse in loco, quod situm sibi aliquod determinat per suam praesentiam alicubi.”

<sup>24</sup> For Scotus see also Duba’s Chapter 5 in this volume.

<sup>25</sup> See Boulnois 1998, esp. 325, 327 and 330.

<sup>26</sup> *Ordinatio* in Duns Scotus 1973, II, d. 2, p. 2, q. 1–2, 259: “Per nihil igitur absolutum in alio, requirit necessario esse in loco, sed tantum habet necessario potentiam passivam qua posset esse in loco”; see also *Quodlibet* in idem 1895, q. XI, a. 2, 444–446. This doctrine, which does not *de facto* preclude creatures from being located in cosmic space, relies on the principle of divine omnipotence and on the hypothesis that “God could create a stone in the absence of any other containing body or create it outside the universe,” see *Ordinatio* in Duns Scotus 1973, d. 2, p. 2, q. 1–2, 259.

<sup>27</sup> *Ordinatio* in Duns Scotus 1973, II, d. 2, p. 2, q. 1–2, 261: “Ad propositum igitur ista applicando de angelo, dico quod angelus non necessario est in loco, quia multo magis posset fieri sine creatione creaturae corporalis, vel facta creatura corporali posset fieri et esse extra omnem creaturam corporalem. Et tamen in angelo est potentia passiva, qua potest esse in loco”; if the angel is not localized *de iure*, according to Scotus, it is nevertheless localized *de facto*; see Suarez-Nani 2008.



in the cosmos. Moreover, he considers this passive potency ‘neutral’ for angels, that is, neither natural nor violent.<sup>28</sup> Strictly speaking, the angel is ‘indifferent’ to all spatial configurations, and can therefore occupy any place.<sup>29</sup>

This thesis marks a noteworthy theoretical step within medieval theory: the notions of limit and capacity, as well as the natural proximity of a place to a located substance – all of which constitute fundamental elements of Aristotle’s natural philosophy – are overtaken by an idea of place as a mathematical dimension (homogenous and neutral), and by a conception of localization as the pure possibility of relating to space. Whether speaking of a body or a spirit, Duns Scotus (even more radically than Henry of Ghent) moves towards a separation of place and the localized substance.

## 4.2.2 Movement of Spiritual Creatures

Medieval doctrines on the movement of angels attest to a similar dynamic of thought. Peter Lombard identified two different schools within them: one held that spiritual creatures did not move in space but only in time; the other, that spiritual creatures were subject to local motion.<sup>30</sup> From the mid-thirteenth century onwards views on the angels’ ability to move converged, but opinions were divided regarding the manner of their local movement.

Albert the Great and Thomas Aquinas, among others, considered the local movement of angels not natural but voluntary, and concluded that angels did not successively cross the intermediate space between the points of departure and arrival. Here, the movement of an indivisible (such as an angel) is necessarily discontinuous and indivisible, because it is constituted by a succession of instantaneous and indivisible movements.<sup>31</sup> In other words, Albert and Thomas thought it impossible that an indivisible might move continuously in a continuous and divisible space.

<sup>28</sup> *Ordinatio* in Duns Scotus 1973, II, d. 2, p. 2, 1. 1–2, 267: “ista potentia passiva (quae est in angelo ad essendum in loco) non est naturalis nec violenta, sed neutra.”

<sup>29</sup> Nevertheless, Scotus leaves a lingering doubt about the compatibility between the virtual quantity of the angel and the quantity of the place it occupies: cf. *Ordinatio* in Duns Scotus 1973, d. 2, p. 2, q. 1–2, 264–265.

<sup>30</sup> *Sententiae* in Peter Lombard 1981, I, chap. 8, 272–273. The first position appealed to Augustine, *De Genesi ad litteram*, VIII, chap. 26; the second to biblical passages such as Luke 1:19, and Isaiah 6:6.

<sup>31</sup> *In I Sententiarum* in Albert the Great 1893, d. XXXVII, a. XVIII, 259–261: “Dicetur quod angeli moventur localiter [...]. Sine praeiudicio loquendo, dico quod [angelus] transit medium [...] et ideo dico quod transit spatium indivisibiliter: et sibi efficitur totum spatium sicut unum indivisibile”; *Summa theologiae* in Thomas Aquinas 1889, I, q. 53, a. 1, 30: “Sed angelus non est in loco ut commensuratus et contentus, sed magis ut continens. Unde motus angeli in loco non oportet quod commensuretur loco, nec quod sit secundum exigentiam eius, ut habeat continuitatem ex loco, sed est motus non continuus. Quia enim angelus non est in loco nisi secundum contactum virtutis, ut dictum est, necesse est quod motus angeli in loco nihil aliud sit quam diversi contactus diversorum locorum successive et non simul, quia angelus non potest esse simul in pluribus loci.”

The opposite approach to this attributes to angels a local movement that is continuous and successive across the intermediate space between the points of departure and arrival, and continuous in time.<sup>32</sup> This position would dominate the works of numerous authors after 1277, among them Matthew of Aquasparta, Richard of Middleton and Peter John Olivi.<sup>33</sup> In their wake Duns Scotus, too, rejects instantaneous angelic movement and defends the thesis of continuity, his argument resting as much on the continuum of space traversed as on the continuum of time that measures each movement. He thus explicitly maintains the – non-Aristotelian – thesis of the successive and continuous movement of an indivisible through continuous and divisible space.<sup>34</sup>

### 4.3 The Problem of Resistance in the Movement of Immaterial Substances

The question of the movement of spirits also involved the question of resistance as one of the factors determining the local movement of bodies. According to Aristotle's doctrine, the medium in which movement takes place is crucial.<sup>35</sup> For projectile movement, the surrounding air was considered responsible for prolonging the

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See Suarez-Nani 2015b, 427–443. This angelological position is closely related to the physical doctrine developed by certain 'finitists' of the fourteenth century, including Walter Chatton. In the context of the Pythagorean and Platonic tradition, they considered place the finite sum of 'punctual places' occupied by the points that compose bodies. Some of these thinkers, like Marco Trevisano, went so far as to defend the movement of an indivisible as a change of position through indivisible instants; see Robert 2017, 182–206.

<sup>32</sup> *In II librum Sententiarum* in Bonaventure 1885, dist. II, pars II, a. II, q. III, 81–82 (see above, note 16); *ibid.*, in Bonaventure 1885, dist. XXXVII, pars II, a. II, q. III vol. I, 657–663: "Dicendum quod angelus, sicut dicit Scriptura, habet moveri. [...] Rationabiliter dicitur, quod angelus per medium movetur. [...] Sed quoniam difficile videtur intelligere, quod pertranseat medium, quin sit in pluribus partibus medii; et ponere, quod subito moveatur et sit in pluribus partibus medii, est ponere in illo motu, quod sit in pluribus locis simul; et hoc omnino est absurdum dicere de angelo [...], ideo dicendum est, quod angelus non movetur per medium motu subito, sed successivo. [...] Concedendum est igitur quod motus angeli per medium non est perfecta successione successivus, quia deficit ibi resistentia spatii et partibilitas mobilis; est tamen successivus ratione distantiae spatii, in qua non potest esse simul per totam, et finitatis virtutis moventis, quae non excedit medium improporcionabiliter."

<sup>33</sup> See Cappelletti 2009, 433–451, as well as *idem* 2011; *In I librum Sententiarum* in Richard of Middleton 1591, d. XXXVII, a. III, q. 3, vol. I, 333; *Quaestiones in II Sententiarum* in Olivi 1922, q. XXXII, vol. I, 571–591; Demange forthcoming; Suarez-Nani 2003, 262–278.

<sup>34</sup> *Ordinatio* in Duns Scotus 1973, II, d. 2, p. 2, q. 5, 288–289; q. 7, 382 and q. 8, 385–387. On this, see Suarez-Nani 2017a, and Suarez-Nani 2015b, 441–442. Indeed, Duns Scotus was not alone in defending the possibility of local movement of the indivisible. He would be followed by Francis of Marchia, among others, and also Walter Chatton, whose doctrine was studied by Robert 2012, 78–79.

<sup>35</sup> Nevertheless, according to Aristotle, other factors contribute to the movement; see Esmaeili 2011, 13–34.

movement once the object's contact with the motor had ceased. Also, according to a greater or lesser density (of air or water) the medium exerts resistance and determines the speed of the mobile's displacement.<sup>36</sup>

In an angelological context, these elements of Aristotelian doctrine were taken into consideration in the question of whether spirits moved instantaneously: (*utrum angelus possit moveri in instanti*). Given that an instant does not have a temporal span and designates nothing other than a limit of time, the reply to this question necessarily determined whether the movement of spirits was temporal – and, consequently, measured by cosmic (or continuous) time – or instantaneous and indivisible. Instantaneousness could be taken to mean either that the angel instantaneously traversed the medium located between two termini of displacement; or that the angel instantaneously jumped from one point to another without crossing the intermediate distance.<sup>37</sup>

### 4.3.1 Three Possible Solutions

Given the above, three possible answers to the question “*utrum angelus possit moveri in instanti*” emerge:

- (a) an angel cannot move instantaneously;
- (b) an angel can move instantaneously by crossing the intermediate space between the points of departure and arrival;
- (c) an angel can move instantaneously without crossing the intermediate space between the points of departure and arrival.

The two underlying concerns regarding the local movement of spirits (its spatial continuity and its temporality) arise because, according to the doctrine formulated by Aristotle in books four and five of the *Physics*, distance and duration are the inherent conditions for local motion.

That a local movement, caused by whatever object or subject, implied a distance to cross was, indeed, considered indisputable. Consequently, in the case of moving spirits, not just spatial continuity, but also duration or temporal continuity of movement posed a problem. If, following Aristotle, continuity or temporal succession in

<sup>36</sup> See *Physics* in Aristotle 1937, IV 8, 215a1–215b15; VII 10, 266b27–267a12; here one of the reasons emerges for Aristotle's rejection of the vacuum, which for him made movement and time (which measured movement) impossible: there cannot be movement in a medium without resistance, because then the speed of the mobile would be infinite. On specific aspects of the medieval reception of Aristotle's doctrine of movement see Biard 1991, 1–32, which discusses John Buridan's critique of the thesis that projectile movement is caused by the medium. For another example of the reworking of the Aristotelian notion of 'medium' and its function in movement see Weill-Parot 2014, 59–71, which examines the question of the 'medium' in relation to magnetic attraction.

<sup>37</sup> These two aspects are clearly articulated in the *Lectura* in Gregory of Rimini 1979, d. 6, q. 3, vol. V, 47.

movement was due to the resistance applied by the medium, continuity and temporality in movement had to be rejected should this medium not give any resistance to immaterial entities.

Appealing to Averroes – who had clarified and further developed Aristotle’s doctrine on this matter – medieval thinkers conceived resistance to the movement in three ways: first, as the resistance of a moving body to its motor (the latter always distinct from the former, according to the Aristotelian principle that “what is moved is moved by something”)<sup>38</sup>; secondly, as the resistance of the medium to the moving body; and thirdly, as the simultaneous resistance of the moving body and the medium.<sup>39</sup> Any examination of the movement of spiritual creatures, therefore, required a verification of the presence of one or another kind of resistance, or their absence, in order to establish if the movement of the immaterial substances was temporal and successive or, on the contrary, discontinuous and instantaneous.

It is not surprising to see that in the attempts to find a solution for this question, the divisions of opinion that we have considered above appear to repeat themselves.

#### 4.3.1.1 Thomas Aquinas’ and Giles of Rome’s Solution

As partisans of instantaneous spiritual movement (not subject to the necessity of crossing the intermediate space between two points, see solution c) above), Thomas Aquinas and Giles of Rome thought the movement of angels to result only from the succession of the angels’ operations on physical bodies and places. As mentioned above, this succession followed the will of the acting subject, meaning that the angel was not in itself dependent on the spatial continuum it traversed. Each angelic operation corresponds to an indivisible instant, such that the resulting movement is discontinuous (immediate displacement from one point to another), just like the time that measures their operations, which is composed of instants.<sup>40</sup> According to this

<sup>38</sup> *Physics* in Aristotle 1937, III 1, 202a9–11. Joël Biard has noted the modification used by medieval thinkers regarding this principle: “moved by *something*” becomes for medieval thinkers “moved by another” (Biard 1991, 3).

<sup>39</sup> *In Aristotelis Physicam* in Averroes 1562, vol. IV, ff. 161M–162B: “Nos autem dicamus quod necesse est quod inter motorem et rem motam sit resistentia. Motor enim movet rem motam secundum quod est contrarium et res mota movetur ab illo, secundum quod est similis [...] et ista resistentia aut erit ex ipso moto [...], aut erit ex ipso medio [...], aut resistentia erit ex utroque, scilicet ex re mota et ex medio.” This passage from Averroes is often cited and employed by medieval thinkers: we can note as examples *In I Sententiarum* in Giles of Rome 1521, d. XXXVII, pars II, princ. II, q. III, f. 198r; *Ordinatio* in Duns Scotus 1973, II, d. 2, pars II, q. 5, 286; *Lectura* in Gregory of Rimini 1979, d. 6, q. 3, 47. Galileo, referring to the medieval doctrine of the resistance of medium and mobile, would say that it amounts to one and the same sort of resistance: see *De motu* in Galilei 1890–1909, vol. I, 410.

<sup>40</sup> *Summa theologiae* in Thomas Aquinas 1889, I, q. 53, a. 1–3; and *Scriptum in I librum Sententiarum* in Thomas Aquinas 1929, d. XXXVII, q. IV, a. III, vol. I, 889–890: “Unde cum motus angeli non sit continuus, quia non est secundum necessitatem conditiones habens magnitudinis per quam transit, [...] sed per successionem operationum in quibus nulla est ratio continuitatis;

theory, it was therefore inconceivable that an indivisible subject should traverse a divisible space successively and continuously, given that such a space exerts no resistance on it.

Giles of Rome, nevertheless, admits a form of resistance in the local movement of spirits, attributing it to the distinction between motor and mobile: there is, in effect, a resistance between the force applied (through which the angel-motor acts) and spatial points on which the angelic power is applied. This form of resistance is, however, restrained, and serves only to justify the *sui generis* temporality of spiritual movement – a temporality which for Thomas Aquinas is completely different from the continuity of cosmic time. The angel thus moves in a discontinuous and instantaneous manner, that is, in the time (composed of instants) proper to immaterial substances.<sup>41</sup>

#### 4.3.1.2 Duns Scotus' and Francis of Marchia's Solution

The position taken by Thomas Aquinas and Giles of Rome was rejected by a number of authors, including those from the abovementioned Franciscan tradition, who vigorously rejected the idea that an angel could move instantaneously. In their wake, Duns Scotus insisted on the continuity and the successive character of the local movement of angels, both because of the divisibility of the spatial continuum and because of the resistance of the mobile with respect to the motor.<sup>42</sup> Scotus' doctrine attracted many followers, among them the early Scotist Francis of Marchia, who commented on the *Sentences* in Paris in the years 1319/1320.<sup>43</sup>

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ideo tempus illud non est continuus, sed est compositum ex 'nunc' succedentibus sibi [...]. Quamvis linea sit continua per quam angelus transit, non tamen est continuitas secundum quod refertur ad motum angeli, qui diversa 'ubi' non continuatim pertransit." Cf. Suarez-Nani 2015c, 71–96.

<sup>41</sup> *In I librum Sententiarum* in Giles of Rome 1521, d. XXXVII, pars II, princ. II, q. III, f. 198r: "Ad cuius evidentiam notandum quod angelus dupliciter movetur. Primo in corpore assumpto. Secundo per applicationem virtutis ad diversa spatia [...]. Cum autem movetur per applicationem virtutis ad diversa locorum spatia, tunc requiritur ibi tempus propter distinctionem angeli applicantis virtutem suam ad corpus ad quod eam applicat. Istud tamen tempus quod requiritur ad talem applicationem non est eiusdem rationis cum tempore quod est passio primi motus, quia talis applicatio non reducit in motum caeli. Patet ergo etiam ratione resistentiae motus angeli fieri in tempore accipiendo resistentiam non solum pro impedimento medii, sed large ut dicamus talem resistentiam esse cum est distinctio motoris ad mobile vel applicantis virtutem ad id cui applicat."

<sup>42</sup> *Ordinatio* in Duns Scotus 1973, II, d. 2, p. 2, q. 5, 344–346: "sed talis resistentia [consistit in hoc], quod mobile semper stat sub aliquo cui non potest immediate succedere terminus intentus a movente. Et ista resistentia mobilis ad motorem est propter defectum virtutis moventis [...]; si enim esset virtus infinita, posset ponere mobile statim in termino ad quem. [...] Necessitas tamen successionis [...] est [...] praecise comparando illam [resistentiam] ad agens, cui mobile resistit propter istam resistentiam medii ad ipsum, – ita quod, sicut erat possibilitas ex sola resistentia medii ad mobile, ita virtus illa limitata non possit tollere istam resistentiam; et ideo resistit ista resistentia agenti, ne statim inducat terminum."

<sup>43</sup> One example is Nicolaus Bonetus, who was already noted by Duhem; concerning resistance, which arises as much in the question of angelic movement as in movement in a vacuum, Duhem

Francis shared Duns Scotus' thesis of continuous movement of indivisibles in a divisible space. His argument, however, introduced a novel reference to the notion of 'divisibility:' according to Francis, it is necessary to distinguish between a 'formal' divisibility (applicable to whatever is intrinsically divisible) and a 'virtual' or 'causal' divisibility that only bears relevance to the effect produced, such as movement in physical space. Attributing this form of divisibility to non-dimensional (that is, formally indivisible) entities, Francis concluded that the movement produced and effected by an angel is divisible, because a spirit cannot entirely be present in two parts of space at the same time, that is, it cannot produce two distinct effects at the same time.<sup>44</sup>

In his examination of the question whether angelic movement is instantaneous, Francis proceeded in an analogous way, submitting the notion of resistance to a revision which guaranteed its pertinence while permitting him to apply this notion to the movement of spiritual entities. After considering the points in favor of instantaneousness, Francis argued for an angelic movement that is temporal, continuous and successive, in order to avoid the possibility – which he finds unacceptable – that an angel could be simultaneously at the departure point and end point of its movement, and that it could thus occupy two places at the same time.<sup>45</sup>

To justify this position, Francis criticised Duns Scotus, who saw in the continuity and divisibility of space a sufficient – while non-exclusive – reason for the continuity and succession of angelic movement.<sup>46</sup> In agreement with Averroes, Francis underlines that some form of 'resistance' determines each local movement, includ-

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insists on the elements of Bonetus' doctrine that would lead to "the Dynamics of Galileo, of Descartes and of Beeckman" (Duhem 1913, 78–81).

<sup>44</sup> More precisely, according to Francis the moving angel is partly in the first term and partly in the final term of its movement, while being in each of them entirely (because he is not quantitatively divisible), but not totally (because he cannot occupy two places at the same time): in other words, an angel can travel from one place to the other while entirely occupying the place where he is, but without occupying the totality of space he has to go through. Cf. *Quaestiones in II Sententiarum* in Francis of Marchia 2010, q. 16, vol. II, 75–106, 98: "Angelus autem, quia est divisibilis non formaliter, sed tantum causaliter in ordine ad effectum, ideo est partim in termino a quo et partim in termino ad quem non prout 'partim et partim' opponuntur 'toto,' sed prout opponuntur 'totaliter'." See Suarez-Nani 2017b.

<sup>45</sup> *Quaestiones in II Sententiarum* in Francis of Marchia 2010, q. 16, 100: "Tunc per hoc potest argui sic ad propositum [...]; sed medii per quod angelus movetur ad medium per quod corpus movetur nulla est proportio quantum ad resistantiam, cum medium per quod angelus movetur nullo modo resistat angelo; ergo nec motus angeli ad motum corporis erit aliqua proportio in velocitate. Ergo est in instanti." Francis adds other arguments, notably referring to the Aristotelian thesis that, if there were movement in a vacuum, it would be instantaneous due to the absence of resistance. Ibid., 102: "Dico tamen quantum ad hoc quod angelus non potest naturaliter virtute sua moveri localiter in instanti. Hoc proba sic: illud quod in eodem instanti movetur de loco ad locum per medium in eodem instanti est in termino a quo et in termino ad quem; sed angelus non potest simul esse in pluribus locis sibi aequalibus; ergo non potest de loco sibi aequali et proportionato moveri in instanti ad alium ab illo loco priori distantem."

<sup>46</sup> *Ordinatio* in Duns Scotus 1973, II, d. II, p. 2 q. 5, 341: "in motu locali est successio ex duplici causa, videlicet ex divisibilitate mobilis et ex divisibilitate spatii – quarum utraque causa, si esset per se et praecisa, esset sufficiens ratio successionis."

ing that of spirits: this movement is certainly free of any resistance exerted by the medium, but nevertheless subject to the resistance of the mobile with respect to the motor.<sup>47</sup>

It is precisely on this point that Francis makes an original contribution to the debate, with his distinction between two types of resistance. A first form of resistance may be due to the natural inclination of the mobile towards a place opposite to the place to which it is moved by its motor. This is the resistance at work in the movement of bodies, for example the resistance acting on a stone thrown upwards, when its natural inclination pushes it downwards. But another form of resistance comes into play when the mobile does not perfectly ‘obey’ a motor of limited power: in this case the mobile cannot be perfectly moved from one place to another, and thus it resists the movement; this applies, for example, to an angel who cannot instantaneously transport himself from one place to the other because of his lack of a moving force.<sup>48</sup> This second type of resistance, resulting from the limits of a mover’s force, is called ‘privative resistance,’ to distinguish it from ‘positive resistance,’ which corresponds to the physical resistance exerted by the medium on the material mobile.

It is this privative resistance that applies to the local movement of angels, and determines its temporal succession: angelic movement cannot be instantaneous due to the privative resistance of the mobile with respect to the motor.<sup>49</sup> Yet this resistance is completely different from the resistance affecting bodies: indeed, it is conceivable that it might be annulled, to the extent that the angel as moving entity would be capable of achieving a state of pure obedience with itself as motor – something that is simply impossible for bodies because of their materiality.<sup>50</sup> The originality of Francis’ position lies in his invention of the concept of ‘privative’ resistance

<sup>47</sup>Duns Scotus had also taken this type of resistance into account; see *Ordinatio* in Duns Scotus 1973, 345.

<sup>48</sup>*Quaestiones in II Sententiarum* in Francis of Marchia 2010, q. 16, 103: “Ubi tamen advertendum quod mobile resistere motori potest esse duplici de causa: uno modo aliquod mobile resistit motori ex hoc quod habet inclinationem naturalem ad aliquod ubi oppositum illi ubi ad quod movetur. [...] Alio modo aliquod mobile potest resistere suo motori [...] solum quia non habet perfectam oboedientiam ad ipsum; quia enim istud mobile, quodcumque sit, non potest simul esse naturaliter in pluribus locis, ideo quando est in uno loco, non potest esse in alio. Nec est in perfecta oboedientia respectu alicuius agentis finiti quod possit moveri ab isto [loco] et poni in alio in quacumque mensura.” By introducing the second type of resistance, Francis aims to avoid the possibility that an angel could perform an instantaneous motion.

<sup>49</sup>*Ibid.*, 104: “Dico ergo quod [...] causa successionis motus [est] etiam resistentia privativa, qualis est in quocumque motu locali cuiuscumque rei finitae, sive corporalis sive spiritualis, facto a virtute finita. Ex quo concludo quod angelus potest movere se ipsum et alia successive et non in instanti propter rationem iam dictam, quia, scilicet in eius motu quo movet se localiter non sit resistentia mobilis ad motorem positiva contraria, est tamen ibi, ut dictum est, resistentia privativa.”

<sup>50</sup>*Ibid.*, 105: “Angelus etiam resistit sibi, sed ista resistentia qua angelus ut mobile resistit suae virtuti motivae alterius rationis est ab illa resistentia qua corpus resistit sibi vel cuicumque alteri, et minor illa. [...] Nec corpus posset esse in illa perfecta oboedientia ad motum localem respectu angeli, nec etiam respectu alicuius alterius, sicut est ipse angelus.” See Schabel 2001, 175–89 (esp. 187–188).



as a metaphysical counterpart to the concept of ‘positive’ or physical resistance which plays an important role in the explanation of the local motion of bodies.

Francis of Marchia’s contemporary Walter Chatton defends a similar position (although without the outlined distinction between different types of resistance). For Chatton, the resistance of a mobile to a motor plays a role in the local movement of angels, due to the limited power of an angel as a motor, and also the fact that an angel cannot coexist simultaneously at all points of the spatial distance that is traversed.<sup>51</sup>

#### 4.3.1.3 Gregory of Rimini’s Solution

Twenty-five years after Francis of Marchia and Walter Chatton, Gregory of Rimini examined the same question in its different aspects, and came to two conclusions: firstly, that an angel can move instantaneously from one place to another by crossing the intermediate space (solution b) above); and secondly, that God’s agency can cause an angel to move instantaneously from one place to another without crossing the intermediate space.<sup>52</sup>

The first thesis presents an intermediate solution between the two mentioned before (solutions a) and c)): it admits the natural possibility of instantaneous angelic movement, exempt from resistance, but with the necessity of crossing intermediate space. This position is defended by different arguments, the most important of which is based on an analogy between angelic movement and the movement of a body in a vacuum: appealing to an existing hypothesis, albeit not one accepted by Aristotle, Gregory observed that if a body were to move in a vacuum it would meet no resistance, so that its movement would be instantaneous. The same applies to angelic movement, which experiences no resistance from the medium.<sup>53</sup>

Gregory’s second thesis, by contrast, admits the possibility of surpassing all the natural conditions for local movement (spatial distance, temporality and resistance), but only by virtue of divine power. He considers this in analogy with the Eucharistic transubstantiation, in which the matter of the bread is instantaneously transformed into the body of Christ, that is, without intermediate steps. According to Gregory, God might operate in a similar fashion with angels, moving them from one place to another, without the necessity to pass through intermediate places.<sup>54</sup>

<sup>51</sup> *Reportatio super Sententias* in Chatton 2004, I. II, 173–174; and analysis in Robert 2012, 78–79.

<sup>52</sup> *Lectura* in Gregory of Rimini 1979, d. 6, q. 3, 47: “Hiis praemissis pono duas conclusiones: Prima est quod angelus potest a seipso mutari de loco ad locum in instanti, transeundo per totum medium. Secunda, quod potest a deo mutari de loco ad locum in instanti, non transeundo per medium.” Gregory discusses the problem of angelic location in *ibid.*, d. 2, q. 2, vol. IV, 331–343.

<sup>53</sup> *Ibid.*, 47 and 49–50. In this way Gregory of Rimini criticizes Giles of Rome’s theses. For the latter, whenever there is a distinction between motor and mobile, there is necessarily resistance that makes the movement temporal.

<sup>54</sup> *Ibid.*, 50.

Gregory's position provides a nuanced approach, which requires him to differentiate between two orders of argument: the first concerns the natural capacities of created spirits; the other privileges supernatural intervention. The interesting aspect and importance of his approach lies in the analogy he develops between the movement of angels and that of bodies in a vacuum – an approach that allows him to view resistance no longer necessary, nor an intrinsic condition for all local movement.

#### 4.4 Concluding Remarks

I will conclude this short investigation with three points. First, far from constituting a uniform doctrinal corpus, medieval theories of space, place and movement show a great diversity of approaches that coexist and compete with one another, certainly in a shared cultural space, but with differentiated, and even diametrically opposed, sensibilities and philosophical aims.

Secondly, while all positions of the medieval thinkers discussed in this study draw from the natural philosophy of Aristotle, they dispose of his doctrinal authority in some fundamental points, and thereby evolve further in new and interesting ways. Indeed, it is through appealing to the doctrinal canon of the *Physics* while, at the same time, distancing themselves from it that medieval thinkers can formulate concepts including a 'mathematical position,' 'passive power,' 'causal divisibility,' and 'privative resistance,' and theses on continuous or instantaneous movement of indivisibles, or even on local movement that knows no resistance whatsoever.

Thirdly – and it is here that we find the hypothesis that has directed my own research for several years – it appears that the development of medieval theories of place, space and movement were strongly dependent on metaphysical reflections applied to questions of natural philosophy. As we have seen, thinkers of the Middle Ages submit certain fundamental notions in physics to an interrogation that is, in fact, metaphysical: what happens with place and movement when it comes to immaterial, purely spiritual, entities such as angels? For medieval thinkers, there was nothing strange about this approach, which gained far-reaching importance in the history of ideas.<sup>55</sup> Indeed, the metaphysical construct of angelology constituted a

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<sup>55</sup>Indeed, the importance of angelological considerations in the development of conceptions of place and movement should not conceal other factors that, in the framework of natural philosophy, contributed to developing medieval doctrines and to the progressive shift away from Aristotle. We should consider, for example, the position of Gerardus Odon, studied by Bakker and De Boer 2009, 149–184. Not knowing specific critiques (those of Philoponus, for example) already mounted against the Aristotelian conceptions of place and movement – except for Avempace's, reported by Averroes in the latter's *In Libros Physicorum Aristotelis*, I. IV, fol. 160C – these questions and developments were internal to medieval thought, as were the new requirements to which thinkers had to respond, requirements that favored a certain surpassing of the Aristotelian paradigm. Medieval thinkers from the thirteenth century onward were, however, very attached to this paradigm, as Richard Sorabji has observed (see Sorabji 1987, 15: "What is surprising is that the medieval Latin West was less robust in rejecting Aristotle's account of place, and was prepared to go through many contortions to preserve it"). The relationship of medieval thinkers to the paradigm

genuine laboratory of thought experiments that allowed medieval thinkers to handle innovative concepts and to open new perspectives – perspectives that announced *in nuce* the coming of a new way to see and understand the physical world.

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of Aristotelian physics – one of faithfulness, innovation and 'reinvention' – is clearly shown by Nicolas Weill-Parot, in relation to the issue of magnetic attraction; cf. Weill-Parot 2014, 70–71. For the reception of medieval cosmological approaches by Galileo see Palmerino 2011, 103–125.

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