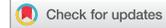


ARTICLE



## Robert Grosseteste on motion, bodies, and light

Nicola Polloni 

Institute of Philosophy, KU Leuven, Leuven, Belgium

### ABSTRACT

The article dissects Grosseteste's theory of the origin of bodily motion discussed in *De motu corporali et luce*. The first section examines Grosseteste's discussion of the metaphysical structure of body qua body and the postulation of a kind of original motion (motion qua motion) as a common feature to all bodies. The second section discusses how Grosseteste's stance on the ontological structure of bodies is connected to his claim that motion qua motion is originated by the apprehensive power as such. The latter is a generic feature common to the apprehensive powers of celestial intelligences, humans, and animals. Finally, the last section of the article analyses Grosseteste's identification of light with the cause of five kinds of change. Stressing the tensions within his treatment of this problem, I argue that Grosseteste elaborates a remarkably original theory of the ontological structure of the bodies, which stems from his blending of Aristotelian natural philosophy with metaphysical assumptions inherited from the Platonic tradition.

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Living in the first half of the thirteenth century, Robert Grosseteste (d. 1253) was the first Latin thinker to comment on Aristotle's *Posterior Analytics*, and probably the first to comment on Aristotle's *Physics*. From a chronological point of view, his manifold interests seem to have been first focused on scientific themes, to later be developed into a much more philosophical approach that eventually shifted toward theology with Grosseteste's episcopal activity.<sup>1</sup> As a consequence, the earliest stage of Grosseteste's reflection is

**CONTACT** Nicola Polloni  [nicola.polloni@kuleuven.be](mailto:nicola.polloni@kuleuven.be)

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<sup>1</sup>The exact order in which Grosseteste's three treatises were written is still debated. McEvoy tended to posit *De luce* as the first treatise to be written, followed by *De motu corporali et luce*, while *De lineis* would have been written even later in Grosseteste's production. However, Cecilia Panti's studies have convincingly proposed a different chronological order, based on systematic and genetic (= use of sources) considerations, by which the three 'light treatises' are deeply connected as attempts by Grosseteste to substantiate his theory of light. Accordingly, I will treat *De motu corporali et luce* as shortly preceding *De luce*. See McEvoy, *The Philosophy of Robert Grosseteste*, 516–518; Panti, "Robert Grosseteste and Adam of Exeter's Physics of Light"; and Panti's introduction to Grosseteste, *La luce*, 1–13.

characterized by an intertwining of philosophical and scientific interests. Among the texts written during this period, the most curious and well-known treatise is *De luce (On Light)*. This work is deeply connected, both thematically and chronologically, to two further treatises written by Grosseteste: *De motu corporali et luce* and *De lineis, angulis, et figuris*. These three works follow a precise theoretical shift in Grosseteste's examination of nature: the claim that, broadly considered, physical causation can be explained by means of the propagation, reflection, and refraction of light. Among them, *De luce* focuses on the role played by light in the cosmic institution, while *De lineis, angulis, et figuris* examines how geometrical laws equally govern both the phenomenon of light and the realm of physical causation. In turn, *De motu corporali et luce* aims to provide Grosseteste's physics of embodied light with its metaphysical foundation.<sup>2</sup>

In this article, I want to focus on Grosseteste's attempt to found and justify his theory as presented in *De motu corporali et luce*. Written around 1220, Grosseteste's short treatise examines the origin of bodily motion as such (or motion qua motion, 'motus simpliciter'). With this term, he means the most general motion common to the bodies. This motion can be considered, pace Aristotle, as a sort of genus of the motions predicated within the accidental categories. Far from regarding motion qua motion simply as a logical abstraction, Grosseteste considers the reception of this generic motion as a defining feature of bodily existence. Magnitude (*magnitudo*) is the main characteristic distinguishing the corporeal (or bodily) from the incorporeal. Through its extension into dimensions, the body is receptive of motion. Accordingly, since extension corresponds to the physical property providing bodies with their own bodiliness, motion qua motion corresponds to the foundation of the characteristic of bodiliness: its constant change. This happens through the species of motions of the accidental categories: alteration, locomotion, increase and diminution. However, if such an original and general motion exists, it must be the effect of an equally original and general cause. The inquiry into this cause is the main aim of *De motu corporali et luce*.

The treatise can be divided into three thematic sections. A first section is dedicated to the position of motion qua motion as object of philosophical inquiry and offers a preliminary analysis of the ontological structure of the bodies. The second section is centred on the examination of the ultimate cause of motion qua motion in living and non-living natural beings and argues that the apprehensive power as such is that cause. Finally, the third section claims that light is what bestows motion upon the bodies. I shall proceed following the structure of Grosseteste's exposition. As it will become clear, Grosseteste's analysis of motion qua motion is grounded on

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<sup>2</sup>Edited by Neil Lewis, a new critical edition of Grosseteste's *De motu corporali et luce* is in preparation for the Ordered Universe project.

his treatment of a fundamental problem faced by medieval natural philosophers: what is the basic ontological configuration of the natural world? Grosseteste's answer expands from the examination of the hylomorphic constituents to the discussion of how light interacts with matter to exert motion. *De motu corporali et luce* also provides a wider justification of how motion is produced within the different realms of nature. However, the central core of Grosseteste's theory and his most original contribution to the history of philosophy is the employment of light as fundamental ontological entity. Such ontological fundamentality of light allows Grosseteste to justify both the emergence of natural bodiliness from prime matter and the exertion of categorial motions as two classes of causation originated by the same agent: light. Although Grosseteste engages directly with cosmogonical problems in *De luce*, I will show that the central tenets of his ontology are to be found in the functionality of light interacting differently with different substrates expounded in *De motu corporali et luce*.

## 1. Motion and bodies

The first lines of *De motu corporali et luce* argue that there is an unqualified motion which is internal and common to all bodies:

One qua one is the efficient cause of only one effect. By this, I do not exclude that there are many efficient causes of which one is closer and the other is further within the same order, similarly to when I say just "animal" and I do not exclude "substance" or any other particular substance. Therefore, of motion, insofar as it is one, there is one efficient cause. Yet motion from an intrinsic principle – which is called natural motion – is found in every bodily thing. And as a consequence, the efficient cause corresponding to motion as such is found in every bodily thing.<sup>3</sup>

Inasmuch as it is one, something can be the efficient cause of only one effect, although there may be more efficient causes that are hierarchically placed in the same order. Hardly, an opening statement could be more puzzling. In order to appreciate its meaning, we have to take a step further and follow Grosseteste's line of reasoning. Immediately afterwards, he clarifies this statement through an analogy between the predication of 'animal' and that of 'motion'. Neither animal nor motion exclude either a reference to their origin or to their instantiations. Grosseteste's reference is implicit but evident: the Porphyrian tree. Since there are different kinds of motions and different instantiations of those kinds, one can assume that there is a more

<sup>3</sup>Grosseteste, *De motu corporali et luce*, 90: "Unum in quantum unum unum solum efficiens est. Nec sic excludo plura efficientia, quorum unum est propinquius et alterum remotius in eodem ordine. Sic, cum dico solum 'animal' non excludo substantiam vel particularem substantiam aliam. Igitur motus in quantum est unus unicum efficiens est. Sed motus a principio intrinseco, qui naturalis dicitur, reperitur in omni corpore. Igitur et efficiens proportionatum motui simpliciter reperitur in omni corpore".

common type of motion. This motion is said of its species in a way analogous to how 'animal' is said of all animals, all giraffes, and this giraffe here. Different kinds of animals are said to be animal because they share some common generic traits. Different kinds of motions, too, can be considered to be grounded on one sort of motion, generically considered, i.e. abstracted from its specific actualizations.

Needless to say, by assuming a generic motion which is logically – and, one would say, ontologically – prior to the categorial motion Grosseteste makes a perilous step. Such assumption goes against Aristotle's claim, in *Physics* V 1, that the four categorial motions are first and unreducible to a more essential kind of motion. According to Grosseteste, this generic motion is 'motion qua motion' (*motus simpliciter*). The species of motion of which we have experience are specifications of this generic motion. Grosseteste is following a Platonic line of reasoning. Leaving aside generation and corruption, which are not mentioned by Grosseteste, he assumes that the differences among accidental motions are nullified into a higher order motion. In fact, Grosseteste's train of thoughts is based on a principle of conformity, which can be enunciated as follows:

*Principle of conformity* (PC): Differences among members of the same order are nullified at a higher level of metaphysical ordering, in which they agree.

Since the kinds of motion express different classes of the same order, there must be something more radical in and because of which they agree: motion qua motion. And since motion qua motion is the most generic type of motion, it does not have other types of motions at the same level. It is therefore one, like the genus 'animal' is said to be one, although it contains all the specifications pertaining to it as its species.<sup>4</sup>

Two main questions arise from here. Firstly, should we consider motion qua motion in logical or ontological terms? Considering that Grosseteste dedicates its treatise to the inquiry into the *cause* of this motion, one would be tempted to consider motion qua motion as a *real* kind of motion. Nevertheless, his application of PC makes clear that Grosseteste is not talking about primary substances but higher order entities. He says explicitly that motion

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<sup>4</sup>Grosseteste displays the same attitude at the beginning of his commentary on Aristotle's *Physics*. See for instance, Grosseteste, *Commentarius in VIII libros Physicorum Aristotelis*, 1. For an overall examination of Grosseteste's commentary, see also Lewis, "Robert Grosseteste's *Notes on the Physics*". According to PC, the reference to 'animal' is much clearer. 'Animal' does not exclude either 'substance' or 'individual animal' because they both correspond to qualifications in the ontological structure of animal, respectively upwards (substance) and downwards (individual animal) in Porphyry's tree. In virtue of this metaphysical application of Porphyry's tree, the simple reference to 'animal' implies the individual animal (species to individual relation) and its substance (species to genus relation). As substance is predicated of animal and 'animal' is predicated of all individual animals, so motion qua motion is predicated of all types of motions and these are predicated of every individual motion. Therefore, the status of motion qua motion is coincides with that of 'animal' – a generic feature which is common to all its individuations.

qua motion is present in all bodies inasmuch they are capable of motion. However, the presence of motion qua motion in bodies is to be taken in analogy to the presence of 'animal' in a giraffe, which is included in its essence as generic characteristic. In other words, motion qua motion seems to be grounded within the ontological structure of a body in a similar fashion to the status that generic forms have in pluralist hylomorphic systems. As a consequence, the logical examination of a body (according to Grosseteste's application of the Porphyrian tree) is a reflection of its complex ontological structure where acts instantiate species which, mediately, are the actualization of their genus.<sup>5</sup>

These remarks are useful also in consideration of a second question: what does it mean that one cause has only one effect? Grosseteste appears to claim that a cause C can be the cause per se of *one* and only one effect x. This would express his commitment toward a principle of causal unicity (PCU) claiming that every individual cause has only one effect. However, what does Grosseteste mean by this? Considering that PCU is introduced in order to examine the cause of motion qua motion, one should assume that this causation is referred to higher order entities (i.e. generic features). As a consequence, it seems to me that Grosseteste is thinking of a kind of causal unicity that considers the essential identity of these higher order entities rather than their instantiations. In other words, Grosseteste seems to be considering cases of efficient causality among generic classes, like the movement of the heavens is said to cause generation and corruption (considered collectively) and the father is said to cause the son (considered generically).<sup>6</sup> Consistent with this line of reasoning, Grosseteste passes on to discuss the ontological constitution of bodies and how motion qua motion is related to it. And he observes that:

No common feature, however, can be found in every bodily being apart from prime matter, the first form, and the magnitude that necessarily follows from them, and other things that simply follow from magnitude, like position and shape.<sup>7</sup>

Bodies are compounds of matter and form. At their most basic ontological level, bodies are made of prime matter and the first form.<sup>8</sup> This *first*

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<sup>5</sup>If this is the correct horizon of Grosseteste's reflection in *De motu corporali et luce*, motion qua motion would be expressed by the types of accidental motions which, in turn, are instantiated and actualised by the individual motions of bodies. Consequently, motion qua motions is the result of a logical abstraction from the types of accidental motion, yet it is also grounded, ontologically, on their instantiations.

<sup>6</sup>It might be the case that Grosseteste is implying a stronger reading of PCU applicable to primary substances as well. However, he does not refer to such application anywhere in *De motu corporali et luce* – or elsewhere, to my knowledge. In turn, he applies PC repeatedly in the text, which points at a weaker reading of PCU as referred primarily to higher order entities.

<sup>7</sup>Grosseteste, *De motu corporali et luce*, 90: "Sed nihil est commune repertum in omni corpore, nisi materia prima et forma prima, et magnitudo, quae necessario consequitur haec duo, et si qua consequuntur magnitudine simpliciter, ut situs et figura."

<sup>8</sup>See Polloni, "Early Robert Grosseteste on Matter".

hylomorphic union causes the emergence of three-dimensionality (*magnitudo*) – the extension of prime matter, which per se has no magnitude at all. Hence, the first union of matter and form causes an extended substrate, which is the third feature common to the bodies: as such, a body must be extended into dimensions. These features are all referred to the generic ontological structure shared by every single body. The emergence of dimensions brings about other fundamental features of the bodies, starting with position and shape.

Grosseteste explicitly refers to prime matter (*materia prima*) and the first form (*forma prima*) as bodily constituents. The reference to a first form seems to imply an order of non-incidental forms within the body that gradually qualifies it. In his early works, Grosseteste seems to assume that there is more than one and at least two substantial forms within any individual body.<sup>9</sup> *De motu corporali et luce*, too, envisions a plurality of non-incidental forms within the hylomorphic composite. As a consequence, the first form carries out a fundamental ontological function:

(f<sub>1</sub>): the first form extends prime matter into the three-dimensions.

Function (f<sub>1</sub>) governs the ontological dynamics from which the three-dimensional extension of matter originates. Established by the first hylomorphic union, the body corresponds to the emergence of a second substrate upon which motion – categorial motions and, therefore, motion qua motion – is exerted. Grosseteste further expands on this point by observing that:

By magnitude, however, the body is able to receive motion qua motion, which is made sufficiently clear by Aristotle, where he points out that everything that is moved is divisible. As a consequence, it is not according to magnitude or something that follows magnitude that a body is able to effect motion qua motion. Nor can prime matter effect motion, since prime matter is passive. Therefore, the only necessary solution is that motion qua motion comes from the first form, as from an efficient cause.<sup>10</sup>

Before examining this passage, it should be noted that I have expunged a 'non' from the first line of the quoted text. Indeed, I suspect that the manuscript tradition has been contaminated in relation to this term, which seems to imply a contradiction within the text. Grosseteste would seem to imply that magnitude is neither receptive nor effective of motion. While the latter is evident, the former is less so, since the body is what is moved primarily.

<sup>9</sup>See Polloni, "Early Robert Grosseteste on Matter".

<sup>10</sup>Grosseteste, *De motu corporali et luce*, 90: "Sed per magnitudinem, <non> est corpus receptivum motus simpliciter, quod satis patet, ubi ostendit Aristoteles, quod omne, quod movetur, est divisibile. Non igitur secundum magnitudinem, vel aliquid, quod consequitur magnitudinem, est corpus effectivum motus simpliciter. Nec materia prima est efficiens motum, quia ipsa est passiva. Solum igitur necesse est, quod motus simpliciter sit a forma prima, sicut ab efficiente".

It is also in tension with the reference to Aristotle's *Physics* IV 4, where the reference to divisibility appear to imply a substrate of motion which is extended *partes extra partes* into the three-dimensions.<sup>11</sup>

In order to uncover the efficient cause of motion qua motion, Grosseteste focuses on the three metaphysical components of body as such – prime matter, the first form, and magnitude. Evidently, magnitude per se cannot be the efficient cause of motion, nor can prime matter be so. The latter is completely passive. In turn, the former corresponds to a main feature of the moved body, which is primarily apt to receive rather than exert motion. Once all other possibilities have been excluded, Grosseteste argues that the first form gives rise to the considered motion:

If the motion proper to some species is the proper nature of that species, while proper nature is nothing but the form ordered to the proper motions and actions of that species, therefore motion as such, which is common to every motion, proceeds from what is common to every proper species. And this can only be from the first form.<sup>12</sup>

Grosseteste observes that the proper motion of any specific thing is provided by its nature which, in turn, corresponds to its form, which is ordered to its proper movement and action. If this is true, it is evident (for Grosseteste) that the same structure that we find in a thing *z* can also be found at the basic level of bodily substance as such, according to PC established by the previous passage. Being rooted in the most common feature of substance, this ontological structure is valid for all bodies. Therefore, it must be admitted that there is a simple nature proper to the body qua body (= generic consideration of body) which is the cause of motion qua motion (= generic consideration of motion). That nature corresponds to a form proper to the bodies, which is ordered to its specific motion and functions: the first form. As a consequence, the first form has a second fundamental function:

(f<sub>2</sub>): the first form is the intrinsic cause of motion qua motion in bodies.

Two delicate questions arise from Grosseteste's discussion. Firstly, considering that Grosseteste is talking about body and motion in general terms, is he referring to the first form as *one individual form* joined to prime matter

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<sup>11</sup>Indeed, by keeping the 'non' in the text, Grosseteste would claim that magnitude (= three-dimensions) cannot be either agent or patient of movement, since it is neither receptive nor effective of movement. This appears a rather odd outcome, philosophically questionable and textually redundant. It would also follow that prime matter is the patient of simple movement, since prime matter would be the only entity able to receive motion. This would further imply that prime matter is already quantified, since Grosseteste explicitly refers to the divisibility of what is moved, leading to the contradiction of positing matter as extended before being extended.

<sup>12</sup>Grosseteste, *De motu corporali et luce*, 90: "Si motus appropriatus alicuius speciei est natura propria illius, natura autem propria nihil est, nisi forma ordinata ad motus proprios et ad actiones illius speciei, motus simpliciter communis in omni moto exit ab eo, quod commune est in omni specie propria. Et hoc non est, nisi a forma prima".

and therefore common to the bodies or to a *generic first form* analogous to motion qua motion? If we accept, as I do, that Grosseteste was a formal pluralist maintaining that a substance can have  $n \geq 1$  substantial forms, the problem is only apparent. Indeed, while body qua body and motion qua motion are higher order entities, the first form is an original ontological constituent that gives origin to all bodily substances and is present in all of them.<sup>13</sup>

The second problem is related to the two functions that the first form is able to carry out: to extend prime matter into dimensions and to exert motion qua motion. Considering that Grosseteste is not establishing any distinction between the form carrying out ( $f_1$ ) and ( $f_2$ ), as he would later do in *De luce*, one should take these functions to be performed by one single entity. Apart from being quite odd to see two different functions performed by a single form, one may wonder how this functional duality can be related to PCU. It seems that a strong reading of PCU considering the causality carried out by the first form as referred to unqualified causation would forbid the form from carrying out these two functions. Nevertheless, one could reply by saying that the first form is not a higher order entity and, accordingly, PCU would not apply to its causality. This position is problematic. Grosseteste accepts and applies PCU to the specific case of motion qua motion and it seems that we should necessarily apply it to the cause of that motion. Another possibility is to focus on the efficiency criterion. Grosseteste establishes PCU in consideration of cases of efficient causation and the extension of prime matter into three-dimensionality does not appear to be such a case. Yet, what kind of causation is that? Can it be even considered as a kind of motion? If that were the case, PCU would imply that motion qua motion is more fundamental than the extension of prime matter and contain it within its generic feature. Nonetheless, claiming that the extension of prime matter into dimensions is a kind of motion is at the very least contentious. I shall come back to this main problem in the third section of this article, after my examination of the remainder of *De motu corporali et luce*.

## 2. Motion and apprehension

The second section of *De motu corporali et luce* is dedicated to the examination of the efficient cause of motion in the different orders of natural beings. It follows Grosseteste's question whether the first form corresponds to the first unmoved mover in each and every motion.

<sup>13</sup>In turn, if we believe that Grosseteste did not accept the theory of a plurality of non-incident forms, his reference to the first form can be considered generically, as the function performed by any substantial form. However, a series of incongruencies appear to be implied by this reading of Grosseteste as a monomorphist.

This delicate point is addressed through three main moves arguing, respectively, that:

- (1) living bodies are moved by their apprehensive powers;
- (2) non-living bodies are moved by natural motion, which is impressed by the apprehensive power of the celestial movers;
- (3) motion qua motion originated by the apprehensive power as such (*simpliciter apprehensivum*) is the cause of motion qua motion.

(1) The first step of Grosseteste's strategy is to demonstrate that there is an apprehensive power (*virtus apprehensiva*) that imparts motion from within in all animated bodies.<sup>14</sup> In the animals, nerves and muscles are moved by a bodily motive power (*virtus motiva corporalis*), which is identified with the motive spirits (*spiritus motivi*) and natural heat. Motive spirits and heat, however, are moved by the appetitive power of the animal. The latter is governed by their apprehension of what is beneficial or dangerous. As a consequence, the apprehensive power must be considered as the cause of the motion of the animal. Applying PC, Grosseteste claims that there must be an unqualified apprehensive power (*simpliciter apprehensivum*), or apprehensive power as such, that is the cause of motion qua motion in animated beings, including among them brute animals, humans, and celestial movers, as we are going to see.

As James McEvoy and Cecilia Panti have underlined, the motive spirits play an important role in Grosseteste's natural philosophy.<sup>15</sup> Following the physiological tradition he had thoroughly engaged with since his early treatises, Grosseteste considers the motive spirits to be a necessary medium in the soul/body relationship.<sup>16</sup> In order to act upon the body, the soul needs an intermediary, something between the bulk of the body and the pure spirituality of the soul. Spirits provide this medium. They are made of a thin body which is able to penetrate nerves and muscles of the body. In his *De intelligentiis*, Grosseteste would present the motive spirits in a very close manner to this short passage of *De motu corporali*, adding a crucial remark: the motive spirits are light (*lux*), the only entity able to mediate between soul and body.<sup>17</sup> McEvoy has signalled that the source of Grosseteste's identification of motive spirits with light is Avicenna's *De medicinis cordialibus*, where the motive spirits are said to have "a bright substance, and then the visible spirit is called ray and light."<sup>18</sup> When their complexion

<sup>14</sup>See Grosseteste, *De motu corporali et luce*, 90–91.

<sup>15</sup>See McEvoy, *The Philosophy of Robert Grosseteste*, 280–284; and Panti, "The Quadrivium and the Discipline of Music", where the author offers a detailed analysis of Grosseteste's use of this theory. See also Chenu, "Spiritus".

<sup>16</sup>See Panti, "The Quadrivium and the Discipline of Music", 144–151,

<sup>17</sup>See Grosseteste, *De intelligentiis*, 116.

<sup>18</sup>See Avicenna, *De medicinis cordialibus*, 190; and McEvoy, *The Philosophy of Robert Grosseteste*, 280–284.

is excellent and their light the greatest, “they are most similar to the substance of the heavens.”<sup>19</sup>

(2) The closeness of the bodily spirits to the substance of the heavens is a fundamental point in relation to Grosseteste’s second move. It corresponds to the *resolutio* – not to be confounded with reduction – of natural motion to the apprehensive power by considering the case of the four elements.<sup>20</sup> Non-living beings have no soul by definition; therefore, they have no apprehensive power. Nonetheless, they move. Their motion is imparted by the celestial spheres through a celestial bodily power (*virtus corporalis caelestis*). The celestial bodily power, in turn, is moved again by an apprehensive power: that of the movers of the spheres, the celestial intelligences.<sup>21</sup> Accordingly, Grosseteste establishes an evident parallelism between the motion of the animal body and that of the spheres, the latter being the main source of sublunary natural motion.

Grosseteste’s *Hexaameron* provides some useful insights into the causality exerted by the movement of the spheres upon the sublunary world. There, Grosseteste claims that the spheres act upon the natural world by means of light and the elemental quality that accompanies it – heat.<sup>22</sup> Supposing that Grosseteste has the same model in mind in *De motu corporali et luce*, the celestial bodily power and the bodily motive power would be two different bodily interactions of light. They perform the same kind of mediation. The bodily motive power mediates between the animal apprehensive power and the body, while the celestial bodily power mediates between the celestial apprehensive power and the sublunary world. From this point of view, it is clear why, at the end of this passage, Grosseteste recalls the cosmological system of both Plato and Aristotle. Grosseteste’s account of the celestial mediating process seems to soften the opposition between Plato’s *anima mundi* and Aristotle’s unmoved mover.<sup>23</sup>

(3) After having considered the case of living and non-living beings, Grosseteste can finally answer the main question of *De motu corporali et luce*: what is the cause of motion as such? Since the movement of non-living beings is ultimately caused by the apprehensive power of the celestial mover, there

<sup>19</sup>See Avicenna, *De medicinis cordialibus*, 194: “Sed in qualitate, hoc est, ut complexio eius sit optima et lux eius sit maxima et sit simillima substantiae caeli”. This point is very close to Galen’s doctrine of light-like pneuma. For instance, see Galen, *De placitis Hippocratis et Platonis*, VII, 7, 24–26. See also Lindberg, *Theories of Vision*, 9–11. It should be noted that Grosseteste’s theory might have been influenced also by Augustine, as Neil Lewis signalled to me and has also been mentioned by McEvoy. See Augustine, *De Genesi ad Litteram*, XII.16; and McEvoy, *The Philosophy of Robert Grosseteste*, 278–289.

<sup>20</sup>See Grosseteste, *De motu corporali et luce*, 91.

<sup>21</sup>It is unclear whether Grosseteste here is referring to one or more unmoved movers, as the text is quite tricky in this regard. Considering his general attitude as exposed in further works, it seems plausible to suppose that there is a plurality of unmoved movers, in accordance to *Physics* VIII.

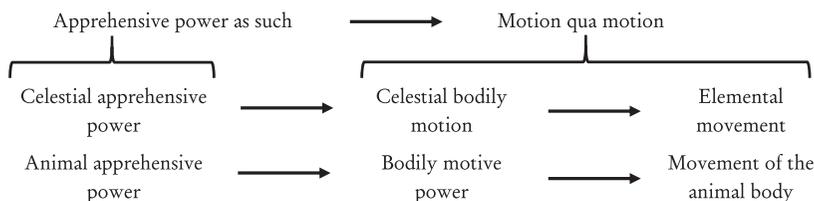
<sup>22</sup>See Grosseteste, *Hexaameron*, 117–120.

<sup>23</sup>See Grosseteste, *De motu corporali et luce*, 91.

is a fundamental link between apprehensive power and motion. Accordingly, the first efficient cause of motion qua motion is the apprehensive power:

Similarly, since both the apprehensive and the bodily power must be posited in the order of the efficient causes of the motion of heavens and animals, it is necessary that one is posited as prior and more distant from motion, and the other as posterior and closer to motion. However, that power which is prior will be the mover of the one which is posterior, not the other way around. Yet it is more suitable that an absolutely incorporeal power be the mover of a bodily power than the other way around. Among these powers, therefore, the apprehensive power is the first mover and, accordingly, the apprehensive power will be the first efficient cause of motion qua motion.<sup>24</sup>

The apprehensive power as such is therefore the first efficient cause of motion qua motion. This apprehensive power as such should not be identified with the apprehensive power of a particular entity, like the first unmoved mover (i.e. God).<sup>25</sup> It should be recalled that Grosseteste is examining the ontological structure of bodily existence. Accordingly, apprehensive power as such should be considered as the power of having apprehension common to every animated being, in accordance with PC. Celestial movers, humans, and animals all have apprehensive power, but in different ways, just as motion considered as the power to change exerted on something apt to be changed is a common feature of the different kinds of motion. Therefore, the apprehensive power is causally related to motion as follows:



After having presented the fundamentals of his position, Grosseteste discusses a possible objection. Different kinds of motion are predicated within different categories (quality, quantity, place). It does not seem to be plausible to suppose a motion qua motion which is common to every kind of motion: motion ends differently in the natural world, something of which we have daily experience. Therefore, how there can be a simple and general motion while we see a plurality of different ends of motions? Grosseteste's reply

<sup>24</sup>See Grosseteste, *De motu corporali et luce*, 91: "Item, cum tam apprehensiva, quam virtus corporalis ponendae sint in ordine efficientium motum caeli et animalium, necesse est, ut altera ponatur prior et remotior a motu, reliqua posterior et propinquior motui. Illa autem, quae prior est, motiva erit posterioris et non e contrario. Sed dignius est, ut virtus incorporalis pura sit motiva virtutis corporalis, quam e contrario. In his ergo est primum motivum apprehensiva. Ergo et simpliciter motus erit apprehensiva primum efficiens".

<sup>25</sup>See Grosseteste, *De motu corporali et luce*, 91- 92.

points out that the end of motion qua motion corresponds to the ‘order and position’ of the moving thing. Accordingly, it can be considered as a common feature of every kind of movement and their ends.<sup>26</sup> In this case, too, Grosseteste’s line of reasoning is grounded on PC.

According to Grosseteste’s description, the universe is a *machina mundi*, well organized and ordered by different kinds of motions impressed at different levels by the apprehensive powers. On the one hand, the celestial mover imparts motion to the spheres through a celestial bodily power (*virtus corporalis caelestis*) that is moved by its apprehensive power and causes the ordered movement of the elements. On the other hand, the apprehensive powers of humans and animals move their own bodies through the bodily motive power (*virtus motiva corporis*), that is, the motive spirits and the heat produced by the body. As Grosseteste states, the apprehensive power allows the animal to discern what is good from what is not – one would say, following Avicenna, to have an intention of the perceived object.<sup>27</sup> As a consequence, motion appears to tend toward a teleological end at both levels of non-living and living beings.

One realm of living beings, however, seems to have been left out of consideration: the plants. Having a mere vegetative soul, plants do not possess any apprehensive power, as they only have the four vegetative powers. It would be quite bizarre to suppose that Grosseteste considered the plants to have some specific power allowing them to have perception or imagination. Probably, Grosseteste thought the plants to be in a sort of middle stage between non-living and living beings. Their motion can be explained by the natural processes caused by the movement of the spheres and the four elemental qualities, upon which the vegetative soul acts in some unspecified way. To cause this action is one of the bodily motive powers mentioned by Grosseteste, namely heat in accordance with sunlight, as Grosseteste himself explains in the *Hexaameron*.<sup>28</sup> However, it is evident that the *scala naturae* misses a step in Grosseteste’s examination, and his account of natural motion is incomplete, since the vegetative soul of the plants cannot be reduced to the effects of elemental and celestial motions alone.

For Grosseteste, the apprehensive power as such is the first cause of motion as such. There are at least two kinds of apprehensive powers: celestial and animal, the latter including also humans. They both cause motion through a medium. The celestial apprehensive power of the mover causes the local motion of the spheres through a celestial bodily power. The

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<sup>26</sup>Grosseteste’s mention of ‘order and position’ of bodies as the end of motion qua motion seems to be a reference to the order of the universe. Unfortunately, he does not expand on this aspect sufficiently as to further substantiate this point.

<sup>27</sup>See Avicenna, *De anima*, I, 86. On the Latin reception of this meaningful passage, see Perler, “Why is the Sheep Afraid of the Wolf?”

<sup>28</sup>See Grosseteste, *Hexaameron*, 109 and 118–119.

movement of the spheres, then, imparts motion to the sublunary elements originating the process of simple elemental transmutation and complex natural change. In turn, animal apprehensive power moves the body through a bodily motive power that for Grosseteste corresponds to either the motive spirits of the medical tradition or to natural heat. By them, the apprehensive power is able to move muscles and nerves and therefore perform movement.

A possible friction looms from here. While *De motu corporali et luce* aims at establishing the cause of the intrinsic motion common to all bodies, the apprehensive power as such corresponds to the *intrinsic* cause of motion only for a rather selected set of bodies. Many other bodies are moved mediatedly by the apprehensive power, since they do not possess it. This is the case of all non-living beings. Moreover, the apprehensive power is incorporeal. The *intrinsic* (i.e. embodied) cause of bodily motion, therefore, is the medium through which the apprehensive power moves the body: the bodily motive power and the celestial bodily power. Through the mediation of these powers, what is spiritual can move the bodies and, as we have seen, the movement imparted by these *virtutes* corresponds to the voluntary movement of animated bodies and the celestial movement of the spheres.

As a consequence, the apprehensive power is only part of the picture and expresses the efficient causality of motion qua motion. Its implementation within the bodies requires the mediation of the bodily motive power and the celestial bodily power. Corresponding to the *pneuma* of the Galenic tradition, one can accept McEvoy's remarks and assume that they are light-like spirits, their nature being like that of light.<sup>29</sup> Such light-like constitution of the spirits is in line with the last section of *De motu corporali et luce*, dedicated to the treatment of light and motion.

### 3. Motion and light

The final section of the treatise is only a few lines long, although with wide implications:

I say indeed that the first bodily form (*forma prima corporalis*) is the first bodily thing moving the body (*primum motivum corporale*). Yet that is light which, when it multiplies and expands itself without moving with itself the bodiliness of matter (*corpulentia materiae*), its passage through the diaphanous medium happens instantaneously and that is not a motion, but a mutation. In turn, when light expands itself in different directions, if it extends the bodiliness of matter with itself, light is embodied in matter and rarefaction of matter or growth happens. But when light is concentrated in itself with the bodiliness of matter, condensation or diminution happens. On the contrary, when light generates itself along a single path carrying matter with itself, local movement

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<sup>29</sup>See McEvoy, *The Philosophy of Robert Grosseteste*, 280–284.

happens. In turn, when light, being within matter, brings outside [what is within] and brings within it what is outside, alteration happens. It is clear, then, that corporal motion is the multiplicative force of light, which is a bodily and natural appetite.<sup>30</sup>

In this passage, Grosseteste makes two fundamental claims:

1. light is the first bodily form (*forma prima corporalis*);
2. light is the first cause of motion in the bodies (*primum motivum corporale*).

These two claims state that light is the first form that gives rise to motion qua motion, therefore performing ( $f_2$ ). Through the specific reference to *forma prima corporalis*, Grosseteste hints again at the functional duality of the first form, which also performs ( $f_1$ ), extending prime matter into dimensions. Finally, Grosseteste also refers to the motions predicated within the accidental categories reducing them to dynamics of light/substrate interactions as presented in the following chart.

a.	multiplication of light <u>without</u> involving the bodiliness of matter	instantaneous propagation of light
b.	extension of the bodiliness of matter	growth and rarefaction
c.	concentration of light and the bodiliness of matter	diminution and condensation
d.	linear replication of light	local movement
e.	outwards/inwards interchange of content by means of light	alteration

The problem I have briefly sketched earlier resurfaces again: how can one single form, light, produce a series of such diverse phenomena, as well as extend prime matter? A first aspect to consider is the crucial difference among the five kinds of motion mentioned by Grosseteste. While four of them – (b) to (e) – have a subject of interaction, the first motion (a) is self-performed. That is to say, growth and rarefaction (b), diminution and condensation (c), local movement (d), and alteration (e) are all the result of light interacting with the bodiliness of matter (*corpulentia materiae*) in different ways. By contrast, instantaneous change (a) is expressly defined as a process of self-multiplication of light that does not involve the bodiliness of matter but only the propagation of light. This point is highly consequential. Grosseteste distinguishes between two classes of motions in relation to their substrate:

<sup>30</sup>Grosseteste, *De motu corporali et luce*, 92: “Dico enim, quod forma prima corporalis est primum motivum corporale. Illa autem est lux, quae cum se multiplicat et expandit absque hoc, quod corpulentiam materiae secum moveat, eius pertransitio per diaphanum fit subito et non est motus, sed mutatio. Quando vero est lux expandens se in partes diversas, ista incorporatur materiae, si corpulentiam materiae secum extendit, et fit rarefactio materiae vel augmentum. Quando vero congregatur lux in se cum corpulentia materiae, fit condensatio vel diminutio. Cum vero lux secundum unam viam se generat secum trahens materiam, fit motus localis. - Cum vero lux, quae est intra materiam, mittatur foras et quod foris est, immittit intus, fit alteratio. Et in hoc patet, quod motio corporalis est vis multiplicativa lucis. Et hoc idem est appetitus corporalis et naturalis”.

Class I – motion (a): light as non-embodied cause of motion.

Class II – motions (b) to (e): light as embodied cause of motion.

As I have recently pointed out, Grosseteste's reference to *corpulentia materiae* appears to be derived from Ibn Gabirol's *Fons vitae*.<sup>31</sup> In that text, Ibn Gabirol refers to the 'bodiliness' that is gradually acquired by matter in its descent from its divine origin into being a body, the last hypostasis of the cosmology described by *Fons vitae*.<sup>32</sup> Following Ibn Gabirol, by the 'bodiliness of matter' Grosseteste means a matter that has acquired the properties essential to bodies (= secondary matter). Accordingly, the main difference between the two sets of motions imparted by light is that the four kinds of motion predicated within the accidental categories are bodily motions (motions acted upon secondary matters), while the instantaneous change referred to by Grosseteste is not acted upon a bodily substrate (i.e. it is not embodied), but refers to light's own behaviour.

In addition, *De motu corporali* stresses that instantaneous change "is not a motion, but a mutation". This passage is a quotation from Aristotle's *Physics V 5* and was used by medieval philosophers to substantiate the claim that substantial change is instantaneous.<sup>33</sup> While commenting on this passage in his *Notes on Aristotle's Physics*, Grosseteste would observe that Aristotle applies the notion of mutation only to specific cases where the substrate is not considered. As Grosseteste points out, this sort of generation may only happen ex nihilo or when the substrate is either not considered or indicated as the opposed privative on what is generated.<sup>34</sup> Although Grosseteste does not expand further on this point, the closeness with the kind of motion (a) recalled in the final paragraph of *De motu corporali* is evident. The self-multiplication of light, indeed, happens instantaneously and infinitely when its dynamic is not affected by a substrate.<sup>35</sup>

At the beginning of *De luce*, Grosseteste refers to instantaneous change in relation to the instantaneous multiplication of light that extends matter into dimensions.<sup>36</sup> Joining prime matter in an extensionless point, light self-multiplies itself extending prime matter instantaneously into the three-dimensions of the universe.<sup>37</sup> The dynamic described by Grosseteste in *De luce* is very close to the instantaneous change mentioned in *De motu corporali*. At the same time, it seems to say something more. While it is clear that motion (a) primarily applies to light, in *De luce* Grosseteste observes

<sup>31</sup>See Polloni, "Early Grosseteste on Matter".

<sup>32</sup>See Ibn Gabirol, *Fons vitae*, 62–63.

<sup>33</sup>On this point, see Trifogli, "Roger Bacon on Substantial Change".

<sup>34</sup>In fact, there is no way to refer to the *materia nuda* ('bare matter') since prime matter is never deprived of forms in nature. See Grosseteste, *Commentarius in VIII libros Physicorum*, 108–109.

<sup>35</sup>On Grosseteste's theory of light, see Dinkova-Bruun et al., *The Dimensions of Colour*, 21–25.

<sup>36</sup>See Grosseteste, *De luce*, 226.

<sup>37</sup>See Grosseteste, *De luce*, 227.

that also the extension of prime matter happens instantaneously. This remark does not appear to be necessarily in contradiction with Grosseteste's remarks on his *Notes on the Physics*. Natural generation is different from instantaneous generation because its substrate is always a body, secondary matter. In turn, prime matter is not a body, and it appears to behave in a rather different fashion when it is joined to light: it establishes the bodiliness of the universe.

This is why, in my opinion, the *cosmological* dynamic expressed by ( $f_1$ ) – the establishment of the bodiliness of the universe – should be considered as a case of class I. As the self-multiplication of light, also the extension of prime matter happens instantaneously. And although prime matter limits the efficiency of light in this process at least in part, it does not do so in a way comparable to the limitations of light's embodiment in the motions of class II. It does not imply any embodiment, because this motion expresses the constitution itself of bodiliness (and that of the bodily universe). Accordingly, it is logically and ontologically prior to the bodies and any of its intrinsic features, which are constituted by it. If this interpretation is correct, evidently, the kind of motion expressed by class I cannot be reduced to any of the accidental motions of class II. If Grosseteste were discussing also the case of substantial change in the terms of enmattered light, one might have been tempted to consider the motion proper to light (its multiplication) as transcending the categories. But there is no room for such a radical claim in *De motu corporali et luce*.

This interpretation provides the text with a coherence it would not have otherwise. In fact, it reconnects the last section of *De motu corporali et luce* to both functions ( $f_1$ ) and ( $f_2$ ) introduced in the first section of the treatise. And it also allows to consider the two classes of motions I and II as the expressions of the functional duality of light, either non-embodied and embodied, as it is represented by the chart below.

$f_1$	the first form is the cause of bodiliness	non-embodied light multiplies itself instantaneously.	Class I
$f_2$	the first form is the intrinsic cause of motion qua motion	embodied light moves the bodies over time.	Class II

This reading resolves the problem of how to relate two rather different phenomena to a single cause in virtue of a strong consideration of PCU. Light causes the emergence of bodiliness (a process that is not a motion, because it is instantaneous). As embodied cause, light also causes motion as such and, therefore, all motions in the accidental categories.

In general, it seems that Grosseteste is still following influential Platonic assumptions in his examination of motion. In particular, the Neoplatonic doctrine of the fragmentation of one effect into a plurality of outcomes in virtue of its substrate of instantiation seems to play a fundamental role in this respect. Light realizes different effects in virtue of the difference of its

substrate of interaction. When the substrate is absent or neutral (i.e. prime matter), light is able to self-multiply itself indefinitely – although the result is not infinite, as it would be if no resistance were exerted by this ‘thin’ substrate. When the substrate is a body, light is embodied to secondary matters and a set of diverse phenomena happen – the motions within the accidental categories. As a consequence, PCU acquires a rather different shade: one cause only has one effect, but that effect is fragmented by its encounter with different substrates resulting in manifold instantiations of a single effect.

#### 4. Conclusions

This examination has shown that the agent of both ( $f_1$ ) and ( $f_2$ ) can be considered to be the same light, which interacts with different substrates, and it does so appropriately to the substrate it joins, being embodied or not. That is why light gives rise to unqualified motion – motion qua motion, as the most generic feature common to all motions. The fragmentation of simple motion into a plurality of motions is given by the diversity of the substrate upon which light acts while, per se, light remains the same.

The fragmentation of simplicity into multiplicity is the outcome of a well-known Neoplatonic principle, the principle of the metaphysical simplicity of the cause (PMSC). It claims that a cause is always higher and simpler than its effect. PMSC can be found in many authors from that tradition, among whom is also one of Grosseteste’s sources, Ibn Gabirol.<sup>38</sup> More strikingly, *Fons vitae* presents a most meaningful example of the process of causal fragmentation into a plurality of instantiations which is focused precisely on light, form, and matter:

The same thing is true about light that is diffused in hyle [matter]. The reason is that the more hyle [matter] descends, it is drawn together and is made bodily, and its middle parts prevent its last parts from being penetrated completely by light ... The same thing should be said about the light that is infused in matter. The reason is that the purer, clearer, and freer from matter it is, the more perfect and stronger it will be. Similarly, it is also true that the more it is mixed with the clearer part of matter, the more it will preserve its own species, and it is stronger and firmer than the light that is mixed with the thicker part of matter ... It will consequently be established that the change that occurs in the light diffused in matter is only because of matter, not because of the light in itself.<sup>39</sup>

<sup>38</sup>See Ibn Gabirol, *Fons vitae*, 118. See also Polloni, *The Twelfth-Century Renewal*, 147–150.

<sup>39</sup>Ibn Gabirol, *Fons vitae*, 243–245: “Similiter et lumen quod est diffusivum in hyle; hoc est quia hyle, quo magis descenderit, constringitur et corporatur, et partes eius mediae prohibebunt ultimas partes perfecte penetrari lumine ... Similiter est dicendum de lumine quod est infusum in materia, hoc est quia, quo fuerit purius et clarius et liberius a materia, erit perfectius et fortius. Similiter etiam, quo magis fuerit commixtum clariori parti materiae, amplius servabit speciem suam, et est fortius et firmius quam illud quod est commixtum crassiori parti eius ... Et secundum hanc considerationem debet ut diminutio luminis substantiarum et diversitas non sit propter lumen in se, sed propter materiam,

The action performed by light (= form) is constant throughout the establishment of the universe and its maintenance. Different effects are only due to the different descent of matter into multiplicity. This descent is marked by matter's becoming bodily and its tendency toward dispersion. In its ontological function, light does not change at all. The diversity in the outcomes of the interactions of light and matter cannot be in any way ascribed to light, but only to matter. The closeness to Grosseteste's process of fragmentation of light is conspicuous, and probably not incidental.

As Grosseteste remarks in *De luce*, the extension of prime matter into dimensions is an instantaneous process which happens out of time. It corresponds to the institution of the physical world. There, Grosseteste would introduce a distinction between *lux* and *lumen*.<sup>40</sup> There, the term *lux* is used in relation to the first union of light and prime matter corresponding to the extension of prime matter. In turn, *lumen* is referred to the next phases of the causation of the universe through the reflection of what results from that union of light and matter (= *lumen*). It should be appreciated that the distinction between *lux* and *lumen* seems to be a sort of result of the tension we have seen in *De motu corporali* among the functions performed by light. Accordingly, if we were to apply this terminological distinction to that treatise, it would follow that:

- (f<sub>1</sub>) is performed by *lux*;
- (f<sub>2</sub>) is performed by *lumen*.

Since *De motu corporali et luce* does not distinguish between *lux* and *lumen*, we shall be content with Grosseteste's distinction between the two classes of motion. And appreciate his description of how one and single effect is fragmented into two different functions in reason of the dissimilar properties of the substrates light encounters, either bodily or not.

In *De motu corporali et luce*, Grosseteste's perspective appears to be more open to a Neoplatonic metaphysics.<sup>41</sup> Although evocative, Grosseteste's theory is open to many doctrinal tensions, from the state of plants to the ontological structure of the apprehensive agent and the object of its apprehensive power. The overall structure envisioned by Grosseteste is however clear. Interacting in different ways with its substrate, light constitutes and interacts with the physical world, establishing the natural order and enacting it, although not completely. It is a universe made of light. This fragmented light – embodied and apprehended, metaphysical and physical, direct and

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quia est corporalis comparatione formae, sicut iam praedictum est". English translation by Laumakis, *The Font of Life*, 207.

<sup>40</sup>See Grosseteste, *De luce*, 231–232.

<sup>41</sup>On whether Grosseteste's theory of light should be interpreted as metaphysical or physical, see Speer, "Physics or Metaphysics?"

concomitant – is the eminent cause of the natural vicissitudes of the created universe.

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## ORCID

Nicola Polloni  <http://orcid.org/0000-0001-5543-8032>

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