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A tract *De maximo et minimo* according to Albert of Saxony

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Abstract

The late medieval treatment of "*maxima et minima*" is one of the typical fields within which the so–called Oxford calculators, especially William Heytesbury and Richard Swineshead, reached their highest degree of "subtility" using logic, philosophy of language and mathematics to discuss how the boundaries of physical powers and capacities, generally called "potencies" (*potentiae*) are to be determined. Their quantitative approach in dealing with these physical issues was soon picked up by the University of Paris and adopted by Jean Buridan and his circle. In particular, Nicole Oresme and Albert of Saxony dealt with *maxima* and *minima* in their respective *Quaestiones* to Aristotle's *De caelo*, where they presented an analysis of the same kinds of problems according, however, to what they called the "circumstances" (*circumstantiae*) within which a potency had to be considered. The following paper presents a text that has not been previously discussed in the literature, a *Tractatus de maximo et minimo* that is transmitted in full in only one manuscript and can be attributed to Albert of Saxony. Other manuscripts and Albert's commentary on Aristotle's *De caelo* are also discussed. The paper includes a critical edition of the text and a general description of its content.[1]

I Introduction

If not because of his originality then surely because of his influence, Albert of Saxony (ca. 1320–1390) belongs among the most significant natural philosophers of the fourteenth century. Born in Rickendorf (Lower Saxony), Albert first studied in Prague and later in Paris during the time of Jean Buridan and his famous group. In Paris, Albert began his academic career first as a *magister artium* and later as rector of the prestigious university, an academic background that made it possible for him to serve as the first rector of the newly founded University of Vienna in 1365. Following his work at the univer-

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sity, however, Albert became Bishop of Halberstadt and spent the rest of his life dealing with administrative and political problems concerning his diocese and the region of Saxony.[2]

Albert's Paris period is the most significant of his scientific career. At Paris, he first became familiar with the new trends in logic and philosophy to which he later contributed as they spread across Europe. These new trends and currents of thought included the new approach in natural philosophy as it was developed by another group of thinkers in England some years before. After the first stages of the Aristotelian reception principally during the thirteenth century, when many of the efforts of the *magistri* were focussed on the translation and understanding of the Aristotelian *Physica*, *De caelo*, *De generatione et corruptione* and other texts belonging to the field of *physica* or "*philosophia naturalis*" in general, the first Oxford calculators – the most famous names being Thomas Bradwardine, Walter Burley, Richard Kilvington, William Heytesbury, Roger and specially Richard Swineshead, and John Dumbleton – insisted from about the third decade of the fourteenth century on the importance of using mathematical techniques to clarify, extend and, ocassionally, correct Aristotelian natural philosophy. To the same end, they developed new tools in the fields of logic and philosophy of language, which they put down in writings that were, of course, clearly connected to the Aristotelian *corpus* but were essentially independent of it. As a matter of fact, the core of the calculators' doctrine on natural philosophy was transmitted less by commentaries on Aristotelian texts – questions on or expositions of the *Physica*, *De caelo*, and others – than by collections of *Sophismata*, such as those by Richard Kilvington and William Heytesbury, author of a comprehensive collection of *Sophismata* and of the more successful *Regule solvendi sophismata*, or such tracts as Bradwardines' *Tractatus de proportionibus velocitatum in motibus* and the *Liber calculationum* by Richard Swineshead some years later.[3] William Heytesbury's and Richard Swineshead's texts, which combine logic and mathematics in the treatment of physical problems, are characteristic of the "calculators' approach".[4] They both include a section

[2]The University of Vienna was not officially confirmed as a full university, including the study of theology, until twenty years later. See Aschbach [5]. Albert was apparently no longer academically active. For Albert's life and academic career see Berger [7], and Sarnowsky [37], pp. 11–34.

[3]Besides these famous names, some anonymous texts such as the *Tractatus de sex inconvenientibus* as well as the *Sophismata* collection "*A est unum calidum*" by Johannes Bode are to be mentioned. See Sylla [40] and Hallamaa [20], pp. 25–53.

[4]As has been pointed out, for many of these authors a clear line that separates logic from mathematics cannot always be drawn. See Murdoch [30], pp. 25–53.

on *maxima et minima*, in which the problem of setting boundaries to potencies is discussed. What is the *maximum* that someone, for instance Socrates, is able to carry? Is it reasonable to attribute a *maximum* to the "power of carrying", i.e. can a clean logical explanation of this fact be given? Or better: are we able to correctly formulate this fact linguistically without falling into contradictions? Heytesbury, Richard Swineshead and others found that there is not always an obvious answer to this type of question, even if it seems to be simple. Sometimes, they argued, it is neither suitable nor even acceptable to speak of a power as having a "*maximum*" which can be overcome (a"*maximum sic*" or "*quod sic*"). So, we cannot always assume an intrinsic boundary. All we can say in such cases, if we do not want to be led into contradictions and paradoxes arising from the "*labyrinthum continui*", is that this power, for instance the power of carrying a weight, can be limited by a "*minimum*" which cannot be overcome ("*minimum quod non*"). Accordingly, we have to establish an extrinsic border. Of course, the same problem and the same two possibilities are to be discussed in the case of a power which is to be limited on the other side.

II Remarks on the text and the manuscripts

It has long been known that Albert of Saxony was thought to continue this kind of problem – which does not mean that he was "repeating" but could also include "correcting" and "expanding" – according to the Oxford calculators' tradition. Pierre Duhem drew attention to Albert's questions on Aristotle's *De caelo*, which were later mentioned and briefly presented by Curtis Wilson in his work on Heytesbury's *Regule*.[5] Wilson gave a much more accurate discussion of the tradition of some medieval authors, analysing not only Swineshead but also Averroes and Thomas Aquinas, and showed the link between the *maxima et minima* treatment by the calculators and the so–called *Juvenilia* of Galileo. Wilson included many relevant authors who presented a similar approach to the problem as Albert, as for instance the anonymous commentary on the *Physica* attributed to Duns Scotus. At the same time, he omitted Nicole Oresme, whose own *Questiones de Caelo*, as we now know from the edition of Claudia Kren, includes a quite extensive analysis

[5]Duhem [17], pp. 26–30; Wilson [41], pp. 57–114 (for Albert of Saxony see pp. 102–105). Focussing on Heytesbury's *De maximo et minimo* and some texts which are directly related to it, see Longeway [23]. For Swineshead's *Liber calculationum*, see Murdoch/Sylla [31] (for Tract 10: *De maximo et minimo*, pp. 197–98).

of *maxima et minima* that is very close to Albert's analysis.[6] According to Stefano Caroti, finally, it seems that a transmission, or even an influence at least regarding particular points of the theory, can be affirmed, extending from Buridan through Oresme and Albert of Saxony up to Marsilius of Inghen.[7] As for Albert of Saxony, if one does not take into consideration many short and sporadic references, the following material seems to contain the core of his treatment of *maxima et minima* with physical or natural philosophical relevance:[8]

1. Albert's *Quaestiones* on the Aristotelian *De caelo*:[9]

Commenting on the Aristotelian passage on the notions of generation, corruption, possible and impossible (*De caelo*, I, 11, 281a18–20), Albert of Saxony deals with *maxima et minima* in questions 14–16 on the first book:

Quaestio 14: utrum quaelibet potentia activa terminetur per maximum in quod potest agere (**E**, pp. 155–183);
Quaestio 15: Utrum quaelibet potentia passiva terminetur per minimum a quo potest pati (**E**, pp. 184–193);

[6]See Kren [32], pp. 295–389.

[7]Holding to a "tradizione non ancora messa in discussione", this is expressed by Caroti as "Buridano → Oresme → Alberto di Sassonia → Marsilio die Inghen" ([11], p. 179). This transmission of ideas and the affirmation of possible mutual influences within the "Buridan circle" – if this denomination may somehow be used – is a difficult issue, because (to my knowledge) there is not yet a definitive dating for the diferent texts which are involved in the discussion, and so it is possible that the lines of influence run according to other vectors.

[8]The distinction between the fields of mathematics, logic – including "philosophy of language" – and phyics is not an obvious one in the fourteenth century. Thus, Albert deals in one of his "*sophismata*" exclusively with *maxima et minima*. The sentence to be discussed runs: "*Infinitum pondus Sortes potest portare*" (number 63 in the Paris edition from 1502: [3], ff. e3^{v}b–e5^{r}b). But after discussing many questions which we would not hesitate to call "physical questions", he points out at the end which kind of approach he has assumed in this text: "Circa istam materiam plures possunt moveri difficultates et dubitationes de quibus supersedeo quia de eius tractavi circa primum celi et etiam *quia tales dubitationes non pertinent ad presens negocium cum sint difficultates naturales et non ex virtute sincathegoreumatum procedentes*" ([3], f. e5^{r}a). The *sophisma* is discussed according to the point of view of the logico–philosophical analysis concerning cathegorematic or syncathegorematic terms, and this is not, Albert emphasizes, a physical problem. For a physical approach he refers to his commentary on *De caelo* (unfortunately without any reference to a special tract on this topic).

[9]For this text, I am going to refer to the new edition by Benoît Patar with **E**. With **Q** I will refer occasionally to the old printed edition from 1492 (see References [2]).

Quaestio 16: utrum omne ens habeat potentiam respectu suae durationis per maximum tempus per quod potest durare (**E**, pp. 194–204).

Preserved in at least forty–two manuscripts and printed several times during the Renaissance, Albert's questions belong to the more diffused and studied texts of late medieval physics. Albert's influence was indeed one of the most important arguments for Duhem's continuity thesis. Albert's connection with Galileo's erroneous conviction in 1604 of a proportionality between the acceleration of falling bodies and the distance traversed, rather than the time elapsed, was still discussed by Stilman Drake and other Galileo scholars (see [16]). This, Albert's *Quaestiones*–Commentary on Aristotle's *De caelo*, is indeed the text which Wilson discussed in his aforementioned work on Heytesbury.

2. Albert's *expositio* on *De caelo*:

Besides the questions, there is still an "*expositio*" to the Aristotelian *De caelo* which has been mentioned in the literature as doubtful. Up to now, only one manuscript containing this text (which, by the way, also contains Albert's questions) has been identified: Ms. Eichstätt, Universitätsbibliothek Eichstätt-Ingolstadt, Cod. st, 766, ff. 95ra–166ra.[10] While this text will not be here the subject of further discussion, it is perhaps useful to indicate that the passage (ff. 120ra–124va) which deals with *maxima et minima* seems to be in consonance with the doctrine Albert sustains in his questions and in the tract which I am editing and presenting here. Therefore, at least regarding this subject matter, there is no apparent objection to an attribution to Albert of Saxony for this exposition.

Further possible materials on *maxima et minima* by Albert, which have been mentioned in the specialized literature, are the following three texts that are preserved in three different manuscripts. One notable difference found by comparing the first and second texts is that they are not transmitted, at least not at first glance, as part of a commentary (although, as we will soon see, this is nevertheless the case for one of these), but as independent texts. I learned about the first two (**A** and **B**) from Harald Berger's bibliography on Albert of Saxony. The third one (=**P**) is a short text which I have more extensively discussed in a previous publication and which I will edit in this

[10]Patar [2], p. 27*. But apparently not by Sarnowsky ([37], p. 443, 13b). I am grateful to Jürgen Sarnoswky for lending me his microfilm of this manuscript many years ago.

article, because I think that, in fact, an attribution to Albert is acceptable.[11]

3. **A** = Ms. Roma, Biblioteca Lancisiana, 158, ff. 226r–232v: *Questio de maximis et minimis inmaterialibus ex lectura excellentissimi Alberti in libro de generatione.*[12]

The entire piece is an Italian manuscript from the mid–sixteenth century that reflects the philosophical and medical discussions of the milieu. It contains texts by Francesco Storella, Giovanni Filippo Ingrassia, Giovanni Benardino Longo, Agostino Nifo, Vincenzo Colle, Giovan Battista Monte, Simone Porta, and Giustiniano Arcella. The author of this text on *maxima et minima*, whose identity must still be established, has been working on *De generatione et corruptione*, perhaps using the edition of Albert's commentary on Aristotle's *De generatione et corruptione* which was printed in Venice (1518) along with the commentaries by Aegidius Romanus and by Marsilius of Inghen. Thus, it is quite certain that the "Albertus" mentioned in the title is, indeed, Albert of Saxony and not Albert the Great (as the online catalogue description suggests), and therefore the mention in Berger's bibliography as a material which deserves further consideration is justified, especially for a reception study of Albert's ideas in Italy. However, since the text is not by Albert of Saxony himself, we can exclude it from the present discussion.[13]

4. **B** = Ms. Roma, Accademia Nazionale dei Lincei, 36 F 6 (= Rossi 415), ff. 70^{r}a–71^{r}b:

Including several late medieval texts on philosophy and science, the full manuscript of **B** is certainly not an unimportant piece for Albert of Saxony studies. According to the brief description given by Petrucci, the manuscript contains a copy of Albert's commentary on Sacrobosco's *De sphaera* and one of his *quaestiones* on Aristotle's *Posterior Analytics*[14]. Petrucci, however, did

[11]See Di Liscia [15]. I relied on microfilms of the relevant pages of the manuscripts. I would like to thank Dr. Valentina Sagaria Rossi (Roma, Biblioteca della Accademia Nazionale dei Lincei), Dr. Patrizia Ricca (Roma, Bibliblioteca Lancisiana) and Francesca Grauso (Perugia, Biblioteca Augusta) for their kind cooperation.

[12]See Berger [7], col. 47.

[13]For a description available online, see www.http://manus.iccu.sbn.it. Here can also be found specific literature about his manuscript, for instance Schmitt [38], though not specifically about this text.

[14][34], pp. 194–195. Apparently, there is only one more known copy of Albert's commentary on Sacrobosco. See Berger [7], col. 54 and Sarnowsky [37], p. 446 (nr. 20).

not mention any text on *maxima et minima*, although a *quaestio* "*utrum quelibet potentia activa terminetur per maximum in quod potest agere*" is conveyed on fols. 70ra and 71rb of the manuscript. Petrucci has also not noticed that this text has a meaningful "title": At the top of folio 70, covering almost the complete width of both columns, the text was provided with an incipit, which is most probably from the same copyist hand and which according to a new catalogue description runs: "*Incipit tractatus de maximo et minimo scriptum per Albertum de Saxonia*"[15]. Such a sentence would be a sure attribution to Albert, but as a matter of fact this reading of the catalogue is quite uncertain: the preposition "*per*" – or, of course, an abbreviation of it – is nowhere to be found and instead of "*scriptum*" we should read "*secundum*". After "*secundum*" occurs an abbreviation for a word which, as far as it has to be declined in the accusative, could be "*nomen.*"[16] The solution is not absolutely definitive because after this abbreviation follows the accusative "*Albertum*", whereas one would prefer the genitive form "*Alberti*". In any case, an acceptable reading would run: "*Incipit tractatus de maximo et minimo secundum nomen Albertum de Saxonia*". I will return below (in section 5a) to the problem of an attribution using "*secundum*", which is also a question concerning the next text. At this point, however, I must remark that, independently of this problem, a "*Tractatus de maximo et minimo*" is attributed to Albert of Saxony by the copyist of this text **B**. Consequently, the next two questions to be solved are whether this text, in fact, can be seen as such a tract by Albert and, of course, whether this text is a further copy of text **P** which, as I have argued in my previous publication, we could attribute to Albert. To answer these questions, let me first discuss some special features of **B**. **B** is, as a matter of fact, a further copy of the corresponding questions of Albert to *De caelo*, where he deals with *maxima et minima*. To put it briefly, despite the very promising incipit, the text of **B** shows no structural features which could allow us to see it as an independent tract. It is rather a further, hitherto unknown copy of the same text which has been edited by Patar (i.e. **E**). Admittedly, it is a copy which in many passages deviates from the text as Patar edited it, but the existing differences are not enough to consider it here a different text. I think it will not be necessary to give here the full transcription of **B**, but only

[15]Petrucci's description might be obsolete for the current state of research. His descriptions are very brief and do not include the *incipit* but the *explicit* of the texts. A much better description is offered by the new catalogue of the Italian libraries [10], pp. 274–77 (I am very grateful to Harald Berger for sending a copy of this description).

[16]An abbreviation which is, in fact, recorded even in Cappelli [9], p. 239a, below. It could be also the abbreviation "noen" in the middle of p. 238b. I would like to thank to Ken Saito for drawing my attention to it.

mention a few aspects that are of importance for this discussion.

Firstly, the structure of **B** follows the structure of the question faithfully. This is a decisive difference from text **P**, which can be seen, in fact, as an independent tract. The beginning paragraph in which Albert sets the problem in the context of the Aristotelian text is lacking (**E**, p. 155, lin. 4–18). After the posing of the question follows the discussion *in medias res* and according to the same sequence: arguments "*quod sic*" and "*ad oppositum*", the "*notanda*" – where the six different "*circumstantie*" are mentioned – and the discussion in "*articuli*", including "*argumenta*", "*dubia*" and "*conclusiones*". The text runs throughout as **E** until the second paragraph of the third article about the "comparison of the active power to the distance" (*de comparatione potentie active ad distantiam*). Then, with the first two words of the next paragraph the text breaks off: "...*dicatur de distantia in qua vel per quam non fit actio et de distantia ultra quam non fit actio. Tunc sic*" (= **E**, p. 167, lin. 61). After collating the full text against the edited text of the questions, one can find some different reading variants – some of them being truly sensible variants – and some additional features to be highlighted. It is, for instance, noteworthy that below, under the two columns of fol. 70r, the copyist gives synoptically the four most important defined terms:

–Maximum in quod sic vocatur illud in quod potentia potest et in nullum maius sed quolibet minori dato in maius potest.
–Maximum in quod non vocatur illud in quod potentia non potest et in nullum maius sed quolibet minori illo dato in maius potest.
–Minimum in quod sic vocatur illud in quod potentia potest et in nullum maius sed quolibet maiori dato in maius potest.[17]
–Minimum in quod non vocatur illud in quod potentia non potest et in nullum maius sed quolibet minori dato in maius potest.

Such additions by the copyist to technical texts that were used at the university as basic texts or lecture guides were not unusual, particularly if the

[17]The word "*potentia*" is written twice in the manuscript. Very often, the manuscript **P** (and sometimes the old edition **Q**) contains the unusual ending in "i" for the ablative singular instead of the "classical" ending in "e" (for instance "a *minori/maiori* distantia", instead of "a *minore/maiore*". In the text edition, I have "normalized" these cases using the ending in "e" to avoid unnecessary differences with the new edition **E**. I would like to express my gratitude to Adelheid Wellhausen (Kommission für die Herausgabe eines mittellateinischen Wörterbuches, Bayerischen Akademie der Wissenschaften) and Antonio Tursi (Centro de Estudios de Filosofía Medieval, Universidad de Buenos Aires) for discussing with me this and many other problems concerning late medieval Latin.

copyist himself was a *magister* or a student interested in the subject.[18] Besides these, there are many other significant differences to the edited text **E**. But these are always differences of reading with one and the same text. There can be no doubt that this is a further fragmentary copy of Albert's *Quaestiones*–Commentary on Aristotle.

Secondly, this text is to a certain extent consistent with **E**, insofar as it includes one self–referring sentence which should not occur if it were an independent text (and which, in fact, does not occur in **P**). This is in the passage of **Q** where Albert, in general "notandum" to the question, clearly establishes the plan to be followed, giving a correspondence between the "circumstance" to be discussed and the article number in which this discussion is to be conducted. Here, he makes clear that "*de comparatione potentie active ad tempus videbitur seorsum in tertia questione*" (fol. 70^{r}b). It is thus clear that this text is referred to in the third of the three questions mentioned above (question 16) and hence that it is itself a part of **E**.

Thirdly and according to the two points mentioned above, text **B** does not include a separate treatment of the passive potencies as a particular part, which is a structural feature of **P**. The reason for this is that the treatment of the passive potencies is to be found in question 15, which is next (and lacking in **B**). The attribution of text **B** to Albert is certainly right; but not the fact that this text belongs to Albert's tract on *maxima et minima*. The fact that this copy **B** of **E** includes such an *incipit* is, nevertheless, possibly an indication that the copyist, having a text that deals with *maxima et minima*, which does not contain the starting remarks of **E** linking the text to Aristotle's *De caelo* and which he knows is by Albert, could have seen such a tract, and thus could have decided to introduce on his own the name of the text as "*tractatus de maximo et minimo*". Such a text was at any rate known in Italy, as we can see in the following case concerning text **P**.

5. **P** = Ms. Perugia Biblioteca Comunale Augusta, H 65 [580] ff. 2^{v}a–7^{r}b.

As I have previously argued,[19] this text is a short but complete tract on *De maximo et minimo* which we may attribute to Albert of Saxony. The attribution is not obvious but possible. Let me now mention some of the points already discussed in my previous publication [15] and add some others to support this opinion or, at least, to weaken the arguments against an attribution to Albert:

a) The *explicit*: "*...Et sic sit finis istius tractatus de maximo et minimo*

[18]For a similar case, dealing with *de primo et ultimo instanti*, see for instance Di Liscia [14].

[19]Di Liscia [15].

secundum magistrum Albertum Archiepiscopum civitatis Sassonie scriptus per me fratrum Franciscum de Force in Monte Sancto M°CCCC° L° *et die* XVIa *novembris jibidem permanentem. Amen*". The text is attributed to Albert. The statement "*secundum*" (which also occurs in **B**) is not ideal for an attribution without objections. One would like to see here "*tractatus editus*" or "*compilatus*" or other, stronger expressions than "*secundum*". But the problem of the occurrence of "*secundum*" cannot be exaggerated to the extent of being a valid argument against an attribution to Albert. For we know that, for instance – to mention here an arbitrary case – the commentaries of Albertus Magnus on Aristotle's *De caelo* and *Physica*, both of which we know for sure are by Albert, include this expression in some of the manuscripts.[20] Furthermore, the characterization of this text as "*tractatus*" is not as trivial as could appear at first glance. It should at least be mentioned that the notion "*tractatus*" may intend not only a "tract", an independent piece of literature, but also part of a larger work such as a commentary. Thus, for instance, the commentary by Albertus Magnus on Aristotle's *Physica* is divided into "*tractatus*", which include many chapters of the commented text. The verb corresponding to the noun "*tractatus*" is "*tractare*", which Albert, although he did not divide his commentary on *De caelo* according to "*tractatus*", uses at the very beginning of question 14, where the treatment of *maxima et minima* starts.[21] This observation on the meaning of the word "*tractatus*" could argue against the attribution of **P** to Albert as a tract by objecting that the expression of the explicit "*tractatus secundum Albertum*" refers to the fact that the copyist is providing a copy of this particular part of **E**. But while this argument is not conclusive at all – the copyist could, nevertheless, have meant that this is a "*tractatus*" in the rather normal sense of a "tract" – it is an argument that can only be applied to a text that could be seen as a copy of **E**. That is the case for **B**, but not for **P**, primarily for the reasons to be explained in (c) and (d).

b) There is a strong correspondence between **P** and **E**, i.e., between the text of this *tractatus* and the *quaestiones* on *De caelo*. As a consequence, there is no doctrinal contradiction between the two texts. All arguments of

[20]So, for instance, with *De caelo* in Ms. Paris, BN, 6509: "*Explicit octavus liber physicorum secundum fratrem Albertum...*" or in Ms. München, BSB, clm 28186, for the *Physica*: "*Explicit octavus liber physicorum secundum fratrem albertum almannum...*". See Albertus Magnus, [1], p. viii. I think that we may assume that this is not an exceptional example but that there are rather further cases of such attributions using the expression "*secundum*" for texts whose authorship is well known and garanteed.

[21]On the contrary, Buridan's *Expositio* to *De caelo*, is organized according to "*tractatus*". See Buridan [21], pp. 5–226.

P are included in **E**. But **P** is not, as is **B**, a further copy of **E**, nor even a summary of the *Quaestiones*–Commentary.

c) The reason for the above is that **P** shows a proper structure that differs strongly from **E**, which is consistent in itself and which is suitable for a tract on *maxima et minima*. In **P**, we find the contents of the three above–mentioned questions organized according to a more suitable division. Firstly, the tract deals with the "active power", secondly – but much more briefly – with the "passive power". Which text, whether the questions or the tract, was written first is difficult to determine definitively. If the two occurrences of "*quaestio*" in the tract are to be referred to a *quaestio* in **E** – as seems to be the case – then we have to assume that Albert first wrote **E**, his *Quaestiones*–Commentary on *De caelo*, and later reorganized the subject of questions 14–16 of the first book as a short tract on *maxima* and *minima*. This seems reasonable.

d) Self–referring sentences: There is a self–referring sentence in **E** that appears in the passage where Albert in the general "*notandum*" to the question clearly establishes the plan to be followed. Giving a correspondence between the "*circumstancia*" to be discussed and the article number in which this discussion is to be conducted, Albert states that "*de comparatione potentie active ad tempus videbitur seorsum in tertia questione*" (fol. 70^{r}b). Thus, it is clear that this text refers to the third of the three questions mentioned above (question 16), and hence that it is itself a part of **E**. This self–reference does not occur in **P**.

On the other hand, it should be noted that in **P** some self–referring statements occur and the word "*questio*" is used, but this does not prevent the attribution to Albert: i) while **E** contains "*in ista questione erunt sex articuli*" (**E**, p 158, lin. 90), **P** remarkably contains "*circa istam materiam*" (II The Text, lin. 3); ii) "*Sed adhuc diceres: licet ista instantia magis pertinet ad aliam questionem*", the same sentence in **P** and **E**, and iii) "*discurrendum per omnia illa sicut factum est in aliqua questione*" for **P**, whereas **E** contains "*in alia quaestione*". In the latter two cases, we may assume that the tract is referring to the questions; iv) finally, it should be noted that the reference "*in alia questione*" does not occur in **P** in the corresponding passage near the end of the tract.

In the passage about the analysis of the active potency according to the time there is a further self–referring statement in both the tract and the edited *quaestiones*. As a matter of fact, the conclusions in the tract correspond to the conclusions of the *quaestiones*, but they present an own sequence which is in itself consistent. Moreover – which is in my opinion a strong argument for the fact that the tract is an independent piece and not a summary copy of the *quaestiones* –, in the fifth conclusion the tract refers back to the *first* conclusion on the affirmation of the sentence according to which "*omnis res*

corruptibilis naturalis terminatur maximo tempore vel minimo quod non..." (lin. 420–21). We can verify that this is correct (see tract, lin. 384-90). In the *quaestiones* this reference occurs as well, but with regard to the *third* conclusion.

III Remarks on the content of the text: The "circumstances" approach to *maxima* and *minima*

The tract is clearly divided into two main parts:[22] a first part regarding the determination of *maxima* and *minima* for active potencies, which is much longer and more detailed, and a second one, which is considerably briefer, on the determination of *maxima* and *minima* for passive potencies. Throughout the tract, the general approach is more closely linked to natural philosophy or "physics" than to the philosophy of language and logic, even if the doctrine of consequences remains an important discussion and exposition tool.[23] The physical approach plainly appears at the very beginning of the tract, where Albert announces the "circumstances" according to which the potencies are to be treated in different articles: 1) the resistance, 2) the distance, 3) the effect, 4) the time, 5) the velocity and, in the local motion, 6) the space (However, two of them, time and space, are taken together in the last article). The second part is also structured according to the circumstances, which are almost the same. In addition, both parts include a first section in which the terms to be used are classified and defined.

For the active potencies, this occurs in the first article on the "term's distinctions and descriptions". This article is made up of a general classification, in which the meaning of some terms are exposed and irrelevant notions are excluded, and of three fundamental statements, which are presented as conclusions.

Consisting in eight distinctions, the classification starts with the general distinction – which is later assumed in the part on passive potencies – between an active and a passive potency. The fact that no definition of the terms "ac-

[22]The following section is not intended to replace the reading of the edited text. I do not pretend to be exhaustive nor to analyse here the existing literature on this topic. (Absolutely decisive is in this case Wilson [41], pp. 94–101 and 102–106). It is, rather, a general guide which may serve as an orientation for sorting the different arguments on *maxima* and *minima* provided in this tract. In a future work, I shall deal with the "circumstances theory" as such, including a discussion on the relationship between the texts of Walter Burley, Jean Buridan, Nicole Oresme, Albert of Saxony, Marsilius of Inghen, Pseudo–Scotus and others.

[23]For a general account of medieval consequences see Pozzi [35]; for an introduction Boh [8].

tive/passive potency" is given in either opening section can be interpreted as evidence for the acceptance of a common unterstanding of such notions, which – according to the investigation of Wilson – were introduced by Averroes in his Commentary on Aristotle's *De caelo*, and which ultimately go back to Aristotles *Metaphysics* (V, 12, 1019a–18-22 and IX, 1, 1046a9–16).[24] Generally speaking, within the framework of fourteenth–century Aristotelian natural philosophy, a natural phaenomenon can be regarded as the result of the action of a body or of a quality upon another body or quality (a "motor" moves a heavenly sphere, for instance, or Socrates has the capacity, the potency, or the power to carry a stone), or as the disposition to be acted upon by another body or quality (the sphere has the capacity to be acted upon, to be moved in this case, by a heavenly "motor", or: the stone has the passive "capacity" to be carried by Socrates). In both cases, we find minimal or maximal boundaries, limits, to be established for the action or passion of the potencies.

At a merely theoretical, i.e. conceptual level, four kinds of boundaries are possible, but, regarding the application of the theory to the physical cases, it is not always possible or meaningful to attribute certain kinds of boundaries. So, for instance, it is reasonable to discuss how the *maximum* of Socrates's power to carry a stone is to be settled (is it the *maximum* that Socrates can carry or rather the *minimum*, i.e. the "immediate greater", or the smaller amount of all those amounts that he cannot carry?), whereas the discussion of a *minimum* for the power of Socrates makes less sense or, at least, not without special qualification. In addition, it may be noted that the core of the theory involves the assumption that – under normal conditions – the boundaries are pairwise possible but the application of one boundary excludes the application of the other. The pairs of the main statements of the theory are disjunctions. That means that where for the maximal power of Socrates – to continue with this standard example – a *maximum quod sic*, i.e. an intrinsic boundary, has been settled, there a *minimum quod non* cannot be affirmed (or the inverse). To put it in the current technical terminology of the time, the "affirmation" of the *maximum* implies the "negation" of the (corresponding) *minimum*.[25]

In the second distinction, Albert makes clear that the tract will deal solely (mainly in the second part, however) with those passive potencies which are not only receptive but also resistive (the "*materia prima*" is an example of pure passivity and the water with respect to fire is an example of resistive passivity, as we are later told in the second part, see tract lin. 446). The third distinction is exclusively about active potencies and the Latin terms are clear enough: these are *motiva*, *portativa* and *productiva*. The productive potencies

[24]Wilson [41], p. 61.

[25]See, for instance, the anonymous tract edited by Longeway [23], p. 101, lin. 19–23.

can be further divided according to three different criteria. Firstly, according to the fourth distinction, the productive potencies are able to produce either a quality or a "subject" (meaning a "body" or a "self existing" entity). If a quality is produced, then, according to the distinction number six, the produced quality can be either a similar (heat produces heat) or a different quality (light in the sense of "*lux*" produces light in the sense of "*lumen*", both qualities being here).[26] In addition, under productive potencies we can distinguish (distinction seven) between those potencies which produce an effect that, in turn, helps to keep on producing ("*coadiuvans*"), or those which produce a "not further helping" effect. Thus, fire produces fire, which in turn is able to produce more fire, whereas a son, having been produced by his father, does not help him by producing a further son. Finally, the productive potencies are divided in the fifth and in the eighth distinctions. According to the fifth distinction, a productive potency can be, as the natural potencies, finite, or, on the contray, as God's power, infinite. From this fifth distinction is derived the final distinction, number eight, which is the most important for the general topic of the tract. In it, the terms "*maximum*" and "*minimum*" are described and set forth. In a rather literal translation – if ever possible –, this passage runs:

> Eighth distinction: a finite power happens to be imagined as being terminated in four ways: (a) either by the "*maximum*" or (b) by the "*minimum*", or (c) by the "*maximum* in which it cannot" (or "by which" or "because of which" it cannot), or (d) by the "*minimum* in which it cannot" (or "because of which it cannot"). (a') "*maximum*" is called in what or by what the potency can act or suffer and nothing greater or by nothing greater. (b') "*minimum*", however, is called in what or by what a certain potency can act or suffer and nothing smaller or by nothing smaller. (c') "*maximum* that not" (or "by which not", or "because of which not" or "in which not") is called that in which it cannot, but for each greater than it a ⟨still⟩ greater is given in which of or because of which it can. (d') "*minimum* that not" is called that what not or "because of not" or "in which not", but for each smaller than it a ⟨still⟩ smaller is given in which or because of which it can. And thus, the descriptions of those four terms are evident.

Albert's attempt to be more complete than some of his colleagues in giving the different expressions for each boundary makes the text less accessible to

[26]For the difference between *lux* and *lumen* see for instance McEvoy's study on Grosseteste [25], p. 154–155. For a critical edition of Grosseteste's *De luce* see Panti [33].

our understanding of these four main notions, which all in all are:

a) A positive *maximum: maximum quod sic.*
b) A positive *minimum: minimum quod sic.*
c) A negative *maximum: maximum quod non.*
d) A negative *minimum: minimum quod non.*

The positive boundaries (a) and (b) are intrinsic and they belong to the bounded magnitude, whereas the negative boundaries (c) and (d) are extrinsic and do not belong to the bounded magnitude. In addition, the boundaries (a) and (d) are usually meant as upper boundaries, whereas (b) and (c) are lower boundaries.

Albert's enummeration of the different expression for (c) and (d) is, furthermore, a good example of the symptomatic fact that medieval natural philosophy does not yet dispose of a logico–mathematical formalized language. We can count ourselves lucky, if we encounter the "language of proportions" at many stages of the discussion, something we can often (with due caution) translate into our own modern symbolic terms.[27] For the rest, as for the general theoretical framework, the Latin language, with its own possibilites and limits, remains binding. Hence, it should not surprise us if the text has a strange effect on the sort of reader who expects a good piece of literature or the intelligibility of ordinary language.[28]

These four terms are to be used immediately in the following three conclusions of the first article. The first conclusion states that an infinite potency, such as God' s power, cannot be limited by a resistance in any of the four senses. The aim of the whole tract is rather to deal with potencies which are natural and thus limited. For them, a general statement is then provided, which should be kept in mind for the remainder of the text. It runs: if each excess is enough to continue a motion already underway (antecedent), then each excess is enough to start it (consequent). Since the antecedent is assumed as true and the consequent is sought, Albert's strategy is logically clear: the

[27]See footenote 29 below.

[28]I think that this is one of the aspects of the more negative impact on the "humanists", as we can appreciate, for instance, in Vives' *Adversus pseudodialecticos* and *De causis corruptarum artium.* Galileo's dialogues, on the contrary, satisfy excellently this requirement. For some aspects of Vives' criticism on the calculators' approach, see Di Liscia [13]. It should, in any case, be recalled that in late Scholastic logic the notion of formal consequence (*consequentia formalis*) is not infrequent and that often enough letters are used to denote atomic sentences or, following Aristotle, the subject and predicate of a sentence. Many examples of this can be found even in Albert's *Logica*; (see below footnote 42 for the references).

implication of the consequent by the antecedent has to be proved; something which, of course, leads to the affirmation of the consequent by a trivial application of *modus ponens*. To this aim, Albert starts a partial argumentation *ad absurdum* by assuming the negation of the antecedent: not every excess suffices to continue a motion. This means that "to start a motion is more difficult than to continue it". Of course, "more difficult" (*difficilius*) has a strong quantitave meaning here: more power or potency is *ceteris paribus* to be applied. For this, there are two possibilities: to initiate a motion is finitely or infinitely harder than to continue it. Because the infinite case may be excluded, the excess must be finite and, consequently, quantifiable. The door to the introduction of the "language of proportions" is now open.[29] For let us suppose that the finite excess of the starting motion is more difficult than the excess of the continuing motion in a double ratio of the ratio a, which is enough to continue the motion but not to start it. Then, since each excess is enough, no matter how tiny, to continue the motion (something that anyone would approve), we may take half, i.e. $a/2$. Now, since the starting ratio was only 2a more difficult, it follows that the double of a to its half is enough to start the motion (since 2 times $a/2$ is obviously a). The same argument can be used for other ratios, the trick always being the same: 1) we assume for the starting motion a determined x ratio between the potency or power and the resistance, 2) then, we take x times n for the continuing motion, 3) since the potency has to be greater than the resistance but the excess can be chosen arbitrarily small, we can take the excess as divided by n, so that we finally arrive at the starting ratio and can affirm that no greater excess is required to start a motion than to continue it.[30]

In addition, Albert offers a second proof of the same statement using the rule of motion, according to which each motion takes place according to a certain proportion between the potency or power and the resistance.[31] Let the ratio a/b be such a proportional relationship which is enough to continue but

[29] In my opinion, this is a very appropriate expression by John Murdoch: proportions are really a further special language within the discussion techniques in the natural philosophy of the fourteenth century. See Murdoch [28].

[30] As Wilson ([41], p. 95) pointed out, this is "one of the neglected observations which might have led to the modern understanding of the role of force, as producing acceleration rather than velocity."

[31] Note that this excludes the famous Avempace's rule V = F–R, often discussed in medieval treatises and still defended by Galileo in his youthful *De motu*. For an excellent discussion of this topic, see the classic paper by Moody [27]. I would like to warn the reader about the fact that for the sake of this summary I am using "*proportio*" and "*ratio*" indistinctly without further consideration. For a valuable discussion of the Euclidean and Boethian tradition behind this, see Murdoch [28] and Molland [26]. For the later period up to Newton, see Sylla [40].

not to start a motion and let c/d be a ratio which is enough to start and to continue the motion or velocity e (standing throughout the entire example the numerators for the "motor" and the denominators for the "mobile", i.e. for the resistance in the most general sense). There must be a kind of proportion between a/b and c/d, because none of these are infinite. Then, just as Aristotle argues in many places of the *Physics*, for each velocity V it is possible to postulate its half V/2, from the assumption that there must be a certain proportion between the potency and the resistance it follows that this velocity V/2 can be expressed in the relationship f/g. But, since $f/g = (c/d)/2$ and a/b also $= (c/d)/2$, it follows that $f/g = a/b$. Now, the ratio f/g produces a velocity $e/2$, hence from a/b comes a motion as well, and thus, the excess a/b is enough not only to continue the motion but also to start it.

After these preliminary explanations, Albert goes on to determine the boundaries according to the different circumstances. In the second article, he deals with the resistance as the first circumstance. Here he states that a resistance, when taken alone, cannot be limited by a maximum, neither "*quod sic*" (first conclusion) nor "*quod non*" (third conclusion). For the negation of an intrinsic *maximum*, Albert resumes a well known argument which occurs in the *Probationes conclusionum* attributed to Heytesbury:[32] let us suppose that there is a power P which is able to overcome a resistance R, and that there is such a *maximum* M for P which is R. Further, let ε be the excess of the potency over the resistance (ε = P–R). Now, since is a continuous magnitude which we can divide *ad infinitum*, let us take a smaller excess $\varepsilon/2$. Because $\varepsilon/2$ belongs to the excess ε as its inferior part, F is able to overcome not only R but also R + $\varepsilon/2$ (for, there is still a further, superior part $\varepsilon/2$ by which $F > R + \varepsilon/2$). But then R is not the *maximum* M for P, but a greater quantity, which is R plus the half of the excess. Since, furthermore, a "*mininum quod sic*" can neither be given for resistances (second conclusion), there remains only the fourth possibility: "it is possible to find a minimal resistance in which the active cannot" (lin. 129–30).

As an upper boundary is valid with the "*mininum quod non*" as the extrinsic boundary, which according to the argument explained above is the smaller quantity of all those quantities which cannot be overcome by the potency (or: "in which it is not able to act upon"). Albert does affirm this statement not only through the exclusion of all other possibilities ("*per sufficientem divisionem*"), but he also offers two independent arguments for it. The last conclusion (sixth) of this article is remarkable, where Albert points out briefly but cleary that – in spite of the first conclusion – a positive, intrinsic *maximum* for a potency as a resistance is nevertheless possible if other

[32]See Wilson [41], p. 57–58.

circumstances are taken together into consideration. In my opinion, this is an important step away from a "casuistic" approach to a more systematic analysis of these physical variables. Albert states that we cannot determine with certainty the *maximum* that Socrates can lift absolutely or in an isolated way (*simpliciter*), but we can do it by fixing some of the terms and considering the others (weight, density of the medium, and velocity).

In the third article, Albert deals with the circumstance of the "distance". By this term is not meant the distance covered in a motion, something that he later analyses as "space", but the distance of the action (or passion) for qualities. How remotely does the action of a potentia spread, or how near should an object be to receive this action? What kind of boundary is to be established here? Taken in its more general sense, the problem concerns a major spectrum of questions for the field of physics from every time period, from the Stoic "pneuma" to modern field theory.[33]

The whole article consists of two main parts in which Albert discusses the possible boundaries for the action of a potency. It should be noted that Albert introduces here a especial terminological distinction, which he does not further elaborate or explain, between the distance "in which" or "through which" ("*in quam*" or "*per quam*" an agent acts and the distance "beyond which" the agent acts ("*ultra quam*").[34] In addition, the discussion "*ad distantiam*" of the boundaries of a potency is interrupted by a new distinction between two kind of agents: some agents are those which, acting "beyond a certain distance" are able to act "beyond each minor distance", while other agents are not. An example of the first kind of agent is fire, or heat; an example of the second is the visibility of an object which cannot be seen if it is placed too near the eyes. The first five conclusions of the article deal with the first kind of agent. In this case, Albert claims that there is only a "minimal distance beyond which the agent cannot act upon the patient" (conclusion 4, lin. 193–94). He defends this thesis only by having excluded the three other possible boundaries (concl. 1: there is not a *maxima distantia sic*, 2: there is not a *minima distantia sic*, and concl. 3: there is not a *maxima distantia non*, always using the expression "*ultra quam*"). Now, the fifth conclusion can sound surprising, for Albert maintains that "it is possible to give a maxima distantia per quam the agent is able to act upon the patient" (lin. 201–2). At first glance, this might

[33]Still useful for Stoic physics is the stimulating work by Sambursky [36]. This work, however, has to be read with caution, since Sambursky's enthusiasm for Stoic physics often leads to a lack of historical perspective.

[34]According to Wilson ([41], p. 102–3), the distance "*in*" or "*per*" is used when "the object acted on is at an intrinsic point of the distance considered", whereas the distance "*ultra quam*" means that the object "is just outside or extrinsic to the distance".

give the impression that Albert contradicts himself, because it is apparently what he has refuted in the first conclusion. But not really. For the"*maxima distantia* through which" is not the same as the "*maxima distantia* beyond which" (a thesis which was, in fact, excluded in the first conclusion). The "*maxima distantia* through which" is rather the "*minima distantia* beyond not", a sentence which has been accepted as the fourth conclusion through exclusion of the other possibilities.[35]

As to the agents of the second type, in the first conclusion Albert holds that there cannot be a *minima* distance beyond which a visible object a cannot produce a vision nor a *minima* beyond which it can. According to the second conclusion, it is possible to find a "*maxima* distance beyond which" an object cannot be seen because of its diminution in size. As in many other conclusions, in the third conclusion Albert argues using the language of "*primum et ultimum instans*" (See still lin. 391–438), supposing that the visible object approaches closer and closer to the seeing eyes. In this case, it is possible to give a first instant of "*non esse*" for the vision, i.e. an instant in which the object cannot be seen any more because it is too near the eyes and then the process of seeing ends. Now, for the ending of vision as a kind of motion there are two possible temporal boundaries: an "*ultimum esse*", i.e. an intrinsic temporal boundary, or a "*primum non esse*", i.e. an extrinsec temporal limit. Since the former cannot be accepted, it remains to take the latter one, i.e. "a first instant for the not–being of the vision". The fourth conclusion is interesting because it offers a more precise determination of the distance "*per*" or "*in*" which a visible object is able to produce a vision. This distance is the distance "between the visible ⟨object⟩, when it ceases to be seen because of an excessive proximity to the eyes and between the visible ⟨object⟩ when it ceases to be seen because of an excessive remoteness from the eyes" (lin. 262–64). Now, according to the fifth and final conclusion of the article, this same distance is the "*minima* distance beyond which the visible object cannot be seen" (lin. 269–70) or, in other words, beyond which the object cannot produce a vision. The reason for that is that this distance is the least of all distances beyond which the object cannot act.

In the fourth article, Albert discusses the boundaries of an active potency

[35]As Wilson declares, it does not seem to be clear to which aim Albert diffentiates between the distance "through" and the distance "beyond" something that he perhaps has adopted from Buridan. This passage in Albert's text fits well with the interpretation of Wilson mentioned above. In my opinion, it is still hard to understand why Albert does not use here for the same purpose the differentiation between intrinsic and extrinsic limits of a quantity, a differentiation which was widespread in calculators' texts and, in general, in the natural philosophy of the fourteenth century. As a matter of fact, Albert uses these categories in similar cases elsewhere.

according to the effect produced by it. The quantification of natural processes in which the notion of power, force or potency are involved from the point of view of the effect caused plays an important role in the later physics of Galileo and Leibniz.[36] Moreover, the double approach in the analysis of the velocity "according to the causes" ("*quoad causas*") and "according to the effects" ("*quoad effectus*"), which have been compared with the modern differentiation between "dynamics" and "kinematics", seems to have supported and even promoted the diffusion of the calculators' approach since the mid–fourteenth century.[37]

Analysing the potencies according to the produced effect, Albert draws on his previous distinction between the effects which "help" by producing a new effect and those which do not. As for the first group, which include fire or heat, he states in the first conclusion that this kind of effect does not offer by itself (*ex se*) a boundary for the active potencies, neither as *maximum* nor as *minimum* (positive and negative), for a fire can be augmented *in infinitum* if there is enough matter. Nevertheless, there is a *maximum* effect which a determined amount of matter is able to produce in a determined time. The second kind of effect can be considered as providing a *minimum quod non* boundary. The third and the fourth conclusions deal with the special condictions of comparison according to the intensity or according to the extension. Albert maintains that in both cases the ratio between the intensity or extension of the effects is not always the same ratio ("*consimilis proportio*") as that between the intensity or extension of the agents (the lack of equal proportion between the intensity effects is especially valid for the second group of effects). According to the fifth conclusion "it is possible that a and b are two agents and that, a being twice as intense as b, a acts up to a double distance in comparison with the distance up to which b acts" (lin.330–32). But in this case, as Albert points out in the sixth conclusion, the effect of a is eight times the effect of b. In

[36]The "*effeto della percossa*" and the "*impeto acquistato*" are significant notions in Galileo's study of falling bodies (see, for instance, *Discorsi*, [19] p. 200 and p. 287 respectively). Leibniz, for his own part, affirms in his "*Brevis demonstratio*" against Descartes and the Cartesians that the power is to be measured by the quantity of the produced effect: "*Ex his apparet, quomodo vis aestimanda sit a quantitate effectus, quem producere potest...* " (Leibniz [22] p. 2029, lin. 8–9).

[37]Rather than any similarity with our modern notions of "dynamics" and "kinematics", I think that from a historical point of view we may find more significant the fact that the categories "*quoad causas/quoad effectus*" (or equivalent categories, like *ut causam/ut effectum* and others) match up very well with the Aristotelian methodological differentiation between "*a priori*" and "*a posteriori*" (and connected categories). Albert used these characteristic notions not only in his *Tractatus proportionum*, but also in his commentary on Aristotle's *Physics*. For a discussion of this issue with quotations from many other authors, see Di Liscia [12].

the fifth article, Albert briefly presents the speed (or velocity, without any vectorial meaning) as a further circumstance for setting boundaries on active potencies. His conclusions are rather negative: with the speed determined by the ratio between the power producing the motion and the resistance acting against it, i.e. stopping or retarding the motion, no limit can be found, neither affirmative nor negative, neither as a *maximum* nor as a *minimum*. For, both intervening factors, the power and the resistance, can be increased or dismished *ad infinitum* and, consequently, the speed and its opposite, the slowness, can become infinitely greater or smaller. However, given a fixed resistance, it is possible to find a *maximum* or a *minimum* for the potency of a natural agent which acts naturally.

The sixth article deals first with space and then with time as the final circumstances to be considered.[38] The first conclusion about space states that none of the four boundaries can be applied to space to determine "*simpliciter*" the action of a natural active potency. It is noteworthy that Albert mentions here, though not elaborating on it, the "motive power downward of the heavy bodies" and, respectively, "of the light bodies upward" ("*potentia motiva gravis deorsum vel levis sursum*"). The reason for not having either *maxima* or *minima* is that, with the motion being regulated for a ratio between resistance and power, the gradual diminution of the resistance produces a longer space, whereas through the augmentation of the resistance, the space of the motion became shorter (until, when resistance and force are equal, it becames zero). As this example in fact shows, here it is also still possible to find a *maximum* space to be transversed if other circumstances, like time, velocity and resistance, are taken into consideration.

The following part of this article deals with the analysis according to the circumstance of time, a main notion of philosophy in general and, as discussed by Aristotle, Augustine and a copious commentary tradition (especially on *Physics* IV, 10–14), a central concept of medieval natural philosphy.[39] Albert's analysis presents at this point a certain thematic displacement. For, following his announced plan, he should now carry out a study of time as a boundary for potencies (for active potencies, to be more precise) So, as he has shown, for instance, that the resistance can act as a boundary for potencies and how this boundary can or cannot be understood, so should he now give an account of time as a boundary for active potencies. That is what he should

[38]It is possible that this article was originally divided into two different articles, one about space and the other about time. See footnote 49.

[39]For the general background see of A. Maier, "Das Zeitproblem", an excellent, unfortunately barely studied chapter of her *Metaphysische Hintergründe der spätscholastischen Naturphilosophie* ([24], pp. 44–137.

do. But, strictly speaking, he does not; at least not according to his original settlement of the discussion. For, instead of questioning how time is to be taken to serve as a boundary of a potency which, of course, is acting in time, he refers the notion of time to the thing itself, to the "carrier" or "bearer" (*res*) of the potency. In this way, he goes a step farther than he should in the analysis and than we, according to the announced plan, may expect. Thus, his starting point is not the fact that the potency acts in time (something he surely accepted as obvious), but the affirmation that the duration itself is a potency, a capacity, which belongs to all natural corruptible things (*ens naturalis corruptibilis*). In any event, "*duratio*" does not represent a further circumstance.[40] Consequently, a natural entity has the potency to endure (*potentia durandi*) and this is the potency which is now to be bounded. This displacement in posing the question enables him to transfer to the discussion of *maxima* and *minima* the language of the first and last instant of being. As the first conclusion asserts, all four usual boundaries are, in principle, possible. The second conclusion states that there is not a *minimum* time for a corruptible thing since, of course, if something is able to endure for a certain time, say a year, it is also able to endure for a shorter time, as for half a year or even less. Reformulating a known argument, Albert affirms in the third conclusion that there is not a *maximum* time "*ultra quod*" a thing could endure. For, if so (the argument runs on *modus tollens* again), we would be constrained to accept a last instant for that thing (*ultimum instans esse*), and that is not possible.

Furthermore, from the fourth conclusion is excluded a *maximum quod non*, since if a thing is not able to endure for a certain time it will neither be able to endure for a longer time. According to the fifth conclusion, it is possible to find a *minimum time ultra quod non* for the duration of a corruptible thing. This statement is obtained by exclusion of the other three possibilities, so that it remains as Albert explains an exclusive boundary as the "first instant of not being". But again, this exclusive *minimum* is the same boundary as the *maximum* time in which the thing can endure and thus, in the sixth conclusion the opinion of Aristotle can be recovered. The seventh and final conclusion merely recalls that for the case of incorruptible things their duration is not limited.

The rest of the tract contains a brief account of the same problem for passive potencies. At the outset, we are given again a classification of the passive

[40] As the edition of the *quaestiones* (**E**, p. 180, lin. 64) seems to assume by including "*velocitas, tempus, duratio*" for the analysis according to space. "Time is the measure of the thing with regard to its natural duration", writes Albert below, expressing a current opinion (see here tract, lin. 427–28).

potencies. According to the first distinction, there are passive potencies which are only receptive and others which are further able to resist by being receptive. This seems to be reformulated in the second distinction between those passive potencies which are only passive and those which are passive and active as well. However, the example Albert offers is more complex since it tacitly includes the circumstance of space. In the first case, it is about "a small (quantity of) cold" which could be influenced or acted upon by "a great (quantity of) warm". But the action cannot take place when the object that is warm is removed by too great a distance.

In the second case, the cold can react upon the warm (this being, we have to assume, closer). According to the third distinction, those passive potencies which are also active can be either cognitive, as the capacity of seeing, or not cognitive, as "cold" in the above example. The fourth distinction explains that the latter potencies can also be divided into two classes: some of those potencies react back onto the agent, as cold onto warm, whereas others react "*in aliud*" (the *medium* which was illuminated acts again upon another body, not upon the sun). According to the fifth distinction, there are some passive potencies which suffer by taking away the opposite potency and others that do not (for there is the opposite cold/warm pair while there is no contrary to light, which is also a physical potency). After this general classification of passive potencies, Albert mentions the circumstances for their analysis. These are nearly the same as for the active potencies. It is clear from the discussion concerning passive potencies that "resistance" is lacking and, instead, the "active potency" has been incorporated as a further factor of comparison. In addition, Albert mentions for some special cases, such as the faculty of seeing ("*potentia visiva*"), the angle under which something can be seen or "suffered" as a further, special circumstance.

The most important circumstance remains the active potency, about which Albert presents the first five conclusions. The first conclusion states that a passive–resistive potency is not bounded by the "*minima potentia activa*" which can be suffered. With a and b for the active and the passive potencies respectively, the argument runs like the parallel argument for the active potencies. For, using the divisibility of the excess of a over b we arrive at the knowledge that there is still another potency which is even smaller than the supposed potency (a in this case) and, hence, that this was not the *minimum* that b could suffer. A passive potency can neither be bounded by a "*maxima potentia activa*", as the second conclusion asserts. For, if a determined potency can be suffered by a, this same potency can also be suffered by $b > a$. Thus, the *maxima potentia* is not suitable to determine the boundary of the passive potency a. The possibility of a "*minimum quod non*" being disproved in the third conclusion, there remains the boundary of an active potency as

"*maximum quod non*" for the passive potencies. Albert explains this assertion, which was obtained "*per sufficientem divisionem*", in an example with a more detailed discussion. Here, in the fourth conclusion, he uses the arms of a balance to compare Socrates's lifting potency with the corresponding resistance, while both of them are set as being equal to each other. It then follows that the lifting power of Socrates is the uppermost power between all lifting powers which cannot move the balance (Albert says "*levare libram*", so we may understand for this expression, "to lift the ⟨other⟩ arm of the balance"). That means that we should understand the term "'*fortissimus*" in a negative sense. At the same time, Socrates is the weakest among all those who are able to lift the arm of the balance. "And thus", concludes Albert, "the active potency which is equal to the resistance is the '*maxima*' ⟨potency⟩ by which this resistive potency cannot suffer, and this same resistive potency is the '*minima*' on which that active potency cannot act" (lin. 506–8). In the fifth conclusion, Albert makes clear that those potencies which, as with the first matter, are merely receptive, can be acted upon by each greater or smaller agent in itself (*quantum ex se*). Passing over to the circumstance of the distance, a first conclusion states that, in itself, a passive non–cognitive potency can be acted upon at each and every distance, however great or small. This depends, nevertheless, on the distance at which the agent can act. A second conclusion affirms that there is a "*minima distantia* beyond which" the patient cannot be acted upon by such an agent. On the contrary, for the case of such passive potencies as vision, a third conclusion points out that a certain distance is required which has to be bounded negatively at both sides; otherwise vision cannot take place. The same kind of boundary is valid concerning the angle of vision, as the fourth conclusion asserts. As for the circumstances of the effect, it is only declared that the passive–receptive potencies are able to receive each effect that the active potencies can produce. For the circumstances of velocity, space and time, Albert refers back to his analysis of the active potencies.

To be sure, we can no longer approach the reading of late medieval texts on natural philosophy with the same perpective as Pierre Duhem a hundred years ago. But we can appreciate the kind of effort that Albert and his colleagues were making, if not to move beyond, at least, by questioning its principles and searching for new cases of analysis, to expand the frame within which Aristotelian natural philosophy "is able to act". Sometimes, as for instance by explaining the difference between the potency required to set in motion and the potency required to continue a motion, or by discussing the several circumstances for comparing physical magnitudes, interchanging distance, power, resistance, effect, velocity and time, we cannot but accept that the 'research spirit' guiding this intellectual work was the same that acted on every other thinker who dealt with the subject, no matter what the *medium*. In other in-

stances, however, as for example in the analysis according to the circumstance of time, we see how deep Albert's ideas are rooted in medieval ontology and its fourteenth–century elaborations by Burley, Heytesbury and others. In any case, it is evident that this tract on *maxima et minima* presents a remarkable attempt to develop a general and compact theory capable of embracing not only all relevant natural phenomena but also all conceivable cases. These, nevertheless, are not studied by enumeration or empirical description but reduced to their logico–mathematical principles.

IV Editing remarks

The text of the *Tractatus de maximo et minimo* is known in only one manuscript, **P**. This is therefore the basis for the following edition. It must be observed, however, that this is a copy of low quality. The copyist, Franceso del Monte, did not do very good work (for the comparison of some passages see Di Liscia [15]). For this reason, the edition requires many corrections that can be done according to the sense and to the edited text of **E**. I have done this in the apparatus or, in the case of simple additions, using brackets ⟨ ⟩ within the text. Occassionaly, I shall refer to **Q** in the apparatus. I should point out that this is a "negative" apparatus, which means that I give in it the readings which I do not assume in the text. So, for instance, for the following remark in the apparatus: velocitas] *om.* **P**, the reader has to understand that in the manuscript **P** the word "velocitas" is lacking (but also that, without other remarks to the contrary, this word occurs in **E** or in **Q**).

In the case of important divergences between **P** and **E** (and **Q**, which **E** mostly follows), I assume in general the policy of accepting **E**, because I suppose that the text of this edition was produced using many manuscripts. For the cases in which I think that this would not be possible, I have introduced some footnotes explaining the meaning of the text according to my reading and interpretation. I did not consider differences of spelling or the many typographical errors in **E**. For the sake of clarity, I have introduced between brackets ⟨ ⟩ short titles for the division of the text. My principal aim has been to help the reader navigate a text which is surely fascinating but occasionally troublesome and even arduous.

In a further apparatus, the sources to which Albert referred are recorded. These are Aristotle's *Physica*, *De caelo* and *De anima*, the commentary by Averroes on *De caelo*, and Euclid's *Elements* (in the version by Campanus, which was the most widespread during the late Middle Ages).

V The Text: *Tractatus de maximo et minimo secundum Albertum de Saxonia*

⟨I: De potentia activa⟩

Notandum ⟨primo⟩ quod potentia activa potest comparari vel ad resistentiam vel ad distantiam vel ad effectum vel ad tempus vel ad velocitatem vel ad spatium in motu locali. ⟨Notandum⟩ secundo circa istam materiam erunt sex articuli: et primo ponam quasdam distinctiones et terminorum expositiones, 2° dicam de comparatione potentie active ad resistentiam, 3° de comparatione potentie active ad distantiam, 4° de comparatione potentie active ad effectum, 5° de comparatione potentie active ad velocitatem, 6° de comparatione potentie active ad spatium et de comparatione potentie active ad tempus. **P** 2^{v}a

⟨Art. 1: Distinctiones et terminorum descriptiones⟩

Quantum ad primum articulum sit prima distinctio: potentiarum quedam est activa et quedam passiva. Secunda distinctio: potentiarum passivarum quedam est receptiva solum, et de illa nihil ad propositum, quedam receptiva et cum hoc resistiva et de hac ad propositum. Tertia distinctio ⟨est⟩ quod potentiarum activarum quedam est motiva, quedam portativa et quedam productiva. Quarta distinctio ⟨est⟩ quod / potentiarum productivarum quedam est productiva qualitatis et quedam ⟨productiva⟩ substantie. Quinta distinctio ⟨est⟩ quod potentiarum activarum productivarum quedam est finita, sicut potentia naturalis, et quedam est infinita sicut potentia dei. Sexta distinctio ⟨est⟩ quod potentiarum productivarum qualitatum quedam est que est productiva qualitatis sibi similis, sicut caliditas est productiva caliditatis, et quedam est productiva qualitatis sibi dissimilis, et sic lux est productiva luminis et color est producens speciem visibilem. Septima distinctio: adhuc potentiarum ⟨productivarum⟩ quedam est productiva alicuius effectus, qui, postquam productus est, iuvat potentiam ad ulterius producendum, et quedam ⟨est productiva alicuius effectus⟩ qui non iuvat ⟨potentiam ad ulterius producendum⟩. Exemplum primi sicut ignis, qui postquam produxit ignem prope se, iuvat ipsum ad producendum ⟨ignem⟩ a se magis remote. Exemplum secundi ut lumen, quod postquam productum est a luce, non iuvat ad ulterius lumen producendum. Similiter filius, qui postquam productus est a patre, non iuvat patrem ad unum alium filium producendum. Octava distinctio: potentiam finitam terminari contingit quadrupliciter imaginari: vel “maximo”, vel “minimo”, vel “maximo in quod non” **P** 2^{v}b

16 activarum productivarum] productivarum vel activarum **P** 20 qualitatis] calliditatis **P** 20 color] calor **P** 20–21 producens speciem visibilem] productivus speciei visibilis **P** 24 qui] que **P** 30 quod] quo **P**

(vel "a quo non" vel "propter quod non"), vel "minimum in quod ⟨non⟩" (vel "propter quod non"). "Maximum" vocatur in quod potest vel a quo potest aliqua potentia agere vel pati et in nullum maius vel a nullo maiore. "Minimum" vocatur autem in quod vel a quo aliqua potentia potest agere vel pati et in nullum minus vel a nullo minore. "Maximum quod non", vel "a quo non", vel "propter quod non", vel "in quod non", vocatur illud in quod non potest sed quolibet maiore illo datur maius in quod vel propter quod sic. "Minimum quod non" vocatur illud quod non, vel propter quod non, vel in quod non, sed quolibet minore illo datur minus in quod vel propter quod sic. Et sic patent descriptiones illorum quattuor terminorum.[41]

Tunc sit ista prima conclusio: quod potentia infinita non terminatur maxima resistentia, nec minima nec maxima in quod non, nec minima in quod non. Probatur quia talis potentia non est terminata, ergo nec sic nec sic postquam ipsa est infinita. Secundo quod ad hoc quod aliqua potentia dictorum modorum terminetur requiritur quod in aliquam resistentiam possit et in aliquam non; modo sic non est de potentia infinita ex eo quod in quolibet potest.

Deinde ante quam ponam conclusiones de potentia finita et naturali pono primo unam conclusionem preambulam quam oportet presupponere in probationibus sequentium, et sit ista: si quilibet excessus sufficit ad continuandum motum inceptum // tunc quilibet excessus sufficit ad motum incipiendum et **P** 3ra
inchoandum. Istius conditionalis antecedens omnes communiter concedunt, licet communiter non omnes concedant consequens.[42] Sed ego probo dictam conditionalem fore veram et ideo, si conceditur antecedens, oportet concedere consequens. Et arguo sic: si non quilibet excessus sufficeret ad continuandum

[41] I have added the brackets to make clear that there are only four main possibilities, the expressions in brackets being variations of one of them. There are here some not unimportant differences between the expressions and formulations used to define these four decisive notions in the text of the tract and those used in the text of the edited *Quaestiones* (= **E**). I think it is a better aid to the reader if, for a comparison, I give the full passage of the *Quaestiones* instead of adding several separate remarks in the critical apparatus. It runs: "Octava distinctio: potentiam finitam terminari contingit quadrupliciter imaginari vel maximo vel minimo, vel maximo in quod non vel a quo non, vel per quod non, etc. vel minimo in quod non, vel minimo per quod non, etc. *Maximum* vocatur in quod potest vel a quo potest aliqua potentia agere vel pati et a nullo maiore sed a quolibet minore, sed *minimum* vocatur in quod vel a quo aliqua potentia potest agere vel pati et in nullum minus vel a nullo minore. Sed *maximum quod non* vocatur quod non vel a quo non vel per quod non sed cuilibet maiori illo datur maius quod sic. Sed *minimum quod non* vocatur illud quod non vel per quod non vel in quod non sed cuilibet minori illo datur maius in quod vel per quod sic. Ecce quattuor descriptiones quattuor terminorum" (= **E**, p. 159, lin. 22–33).

32 quod] quo **P** 39 minore] maiore **P** 46 quolibet] qualibet **E** 51 inchoandum. Istius conditionalis antecedens] inchoandum istius conditionalis. Antecedens **E** 53 fore] esse **P**

motum, hoc videtur esse ex eo quod inchoare est difficilius quam continuare motum. Tunc sic: vel ergo inchoare motum est finite difficilius vel infinite. Non potest dici quod infinite, quia tunc oporteret esse excessus infinitum, nec aliquis excessus finitus sufficeret ad inchoandum motum, cuius oppositum patet per experientiam. Si autem dicatur quod inchoare motum est finite difficilius quam continuare ⟨motum⟩ sit igitur verbi gratia quod solum in duplo, et sit excessus *a*, qui per adversarium non sufficit ad inchoandum, sed bene ad continuandum. Tunc ⟨arguo⟩ sic: quilibet excessus per adversarium sufficit ad continuandum, ergo medietas *a* sufficit ad continuandum. Et, cum inchoare sit solum in duplo difficilius, sequitur quod *a* duplum ad suam medietatem sufficit ad inchoandum motum, quod est propositum. Ex consimili modo argueretur si diceretur quod inchoare motum esset in decuplo difficilius quam continuare, et sic de quacunque alia proportione finita. Nam, si dicas quod in decuplo difficilius est inchoare ⟨quam continuare⟩, sit ⟨tunc⟩ *a* excessus qui per adversarium non sufficit ad inchoandum. Et ⟨sic⟩, si quilibet excessus sufficit ad continuandum, sequitur quod decima pars ipsius *a* sufficit ad continuandum. Et cum solum in decuplo difficilius sit inchoare quam continuare, sequitur quod *a* decuplum ad decimam partem ipsius *a* sufficit ad inchoandum, et sic, si quilibet excessus sufficit ad continuandum motum et, cum solum finite difficilius ⟨sit⟩ inchoare quam continuare, sequitur quod quilibet excessus sufficiat ad inchoandum.

Secundo ad idem et suppono primo quod communiter conceditur quod proportio velocitatis in motibus sequitur proportionem ⟨proportionum⟩[43] potentiarum moventium ad suas resistentias. Hoc supposito sit *a* unus motor qui excedat *b* mobile excessu non sufficiente ad motum / inchoandum secundum adversarium. Tunc, sit unus alius motor *c* qui excedat *d* mobile excessu sufficiente ad motum inchoandum et ad movendum certa velocitate, et sic ille motus *e*. Tunc clarum est quod proportio *c* ad *d* habet certam proportionem ad proportionem *a* ad *b*, cum nulla earum sit in infinitum magna nec in infinitum parva. Sit ergo verbi gratia sic quod sit dupla ad eandem. Tunc, cum ad **P** 3ʳb

[42]The punctuation in **E** (p. 160, lin. 65–66) interrupts the logical argumentation. This is, however, an excellent example of the application of the medieval doctrine of the "consequences" (*consequentiae*) to a physical question. The argument is built up on *modus ponens* and, being the *antecedens* generally accepted, a proof of the implication *antecedens* → *consequens* is needed, to affirm the *consequens*. For further explanation concerning the same physical problem discussed here but in the commentary attributed to Duns Scotus, see Wilson [41], p. 95. In addition, note that Albert discusses this problem in the "*sophismata*" 63 before mentioned ([3], f. e4ʳb). Albert deals in detail with consequences in the fourth tract of his *Logica* [4], pp. 590–949.

64–65 inchoandum] continuandum **P** 67 decuplo] duplo **P** 74 *post* continuare] sufficit *add.* **P** 79–80 sufficiente] *om.* **P** 80 *ante* inchoandum] sufficit *add.* **P**

motum e sit dare motum subduple velocitatis, sicut patet *4° et 6° Physicorum*, sequitur per suppositionem quod iste producetur et inchoabitur secundum proportionem alicuius motoris ad mobile subduplam ad proportionem c ad d. Sit ergo ista proportio ipsius f motoris ad g mobile; ex quo sequitur proportionem f ad g esse equalem proportioni ipsius a ad b, cum utraque earum sit subdupla ad eandem proportionem, puta ad proportionem ipsius c ad d; tunc ultra proportio f ad g est equalis proportioni a ad b. Sed a proportione f ad g provenit motus subduplus ad motum e, ideo etiam a proportione a ad b provenit motus; quare excessus a ad b sufficit ad motum non solum continuando sed etiam inchoando, quod erat probandum. Ista conclusio preambula supposita ponatur conclusiones de potentiis naturalibus.

⟨Art. 2: de comparatione potentie active ad resistentiam⟩

Prima conclusio est ista quod non est dare maximam resistentiam in quam aliqua potentia activa potest. Probatur, nam sit a potentia activa et resistentia b, tunc arguitur: vel a excedit b vel non. Si dicatur quod ⟨a⟩ non excedit b, sequitur quod non potest in b, cum omnis potentia activa debet excedere quantum ad posse agere ipsam potentiam resistivam quantum ad posse resistere, quod supponitur tanquam unum principium in naturali scientia. Si autem dicatur quod a excedit b, vel igitur excedit excessu divisibili vel excessu indivisibili. Si dicatur quod excessu indivisibili hoc non valet, quia nullus est talis. Si autem dicatur quod excessu divisibili, sint igitur partes istius excessus c d. Tunc, si ipsum b augeretur in tantum quod ipsum a moveret / adhuc **P** 3^{v}a excedens solum in d medietate excessus prioris, adhuc a ageret in b, cum quilibet excessus sufficieret ad inchoandum et ad continuandum motum, sicut dicit preambula conclusio. Et cum b tunc sit maius quam ante erat, sequitur quod b non erat tunc maximum in quod potuit a, et ita argueretur de quocunque alio quod adversarius diceret esse maximum in quod potentia activa posset.

[43]This addition occurs also in **E** and **Q**. Although it is not specifically necessary here – for, in this case, the condition of a proportion, i.e. any proportion, can already be satisfied by the Aristotelian rule – it is nevertheless justified by the fact that we know from Albert's commentary on the *Physics* that he was an adherent of Bradwardine's rule, which he formulated in the following way: "*proportio velocitatum in motibus est sicut proportio proportionum potentiarum moventium ad suas resistentias*". See Sarnowsky [37], p. 336.

86 subduplam ad proportionem] ad proportionem subduplam **P** 90 proportioni] proportionis **E** 90 a ad b] b ad a **P** 91 *ante* subduplus] quia *add.* **EP** 104 a] dc **P** 104 moveret] maneret **P** 105 excedens] excessus **P** 105 excessus] excessu **P** 109 *post* posset] et sui posset *add.* **P**

84 *4° et 6° Physicorum*] Aristoteles, *Physica* IV, 215b1–216a11; VI 233b 1–15

Secundo sequitur quod per augmentationem ipsius b esset ultimum instans esse actionis a in b, quod est falsum et impossibile, quia non est dare ultimum instans esse motus. Consequentia tenet per hoc quia b erat maximum in quod a potuit, ideo statim aucto b, a in ipsum non posset.

Secunda conclusio: quod non est dare minimam resistentiam in qua potentia activa potest. Probatur ⟨primo⟩ nam sit ista b, tunc arguitur sic: a potentia activa potest in b resistentiam, igitur potest in suam medietatem, quia quidquid potest in maius potest in minus. Sed, si a potest in medietatem, b et, cum ista sit minor b, sequitur quod b non erat minimum in quod potentia activa a potuit. Secundo sic: nam tunc sequeretur quod esset dare ultimum instans ⟨esse⟩ motus, sed hoc est falsum, igitur etc. Probatur consequentia, quia, si b diminuetur, ultimum instans esse eius diminutionis esset ultimum instans esse actionis a in b, quod erat minimum in quod a potuit.[44] Igitur relinquit conclusio vera.

Tertia conclusio: quod non est dare maximam resistentiam in quam potentia activa non potest. Probatur, nam sit ista b; tunc sic a non potest in b, igitur $\langle a \rangle$ non potest in maius b, saltem in resistendo, quia quicquid non potest in minus non potest in maius. Sed si a non potest in maius b, sequitur quod b non erat maximum in quod a non potuit, cum a in maius non potuit.

Quarta conclusio: est dare minimam resistentiam in quam potentia activa finita non potest. Probatur ⟨primo⟩: omnis potentia activa finita in aliquam

[44] All sources (**P**, **Q** and **E**) include here a negation of "*esse*", as if the text ran "*ultimum instans* non *esse eius diminutionis*". However, I do not think that the argument can be logically reconstructed assuming this negation. The argument runs on *modus tollens* as follows: (a) (i) If a *minima resistentia* is assumed, then (ii) an *ultimum instans esse* of motion must be accepted; but (b) an *ultimum instans esse* cannot be accepted; hence (c) a *minima resistentia* must also be denied. The truth of (b) is assumed as a general statement of Aristotelian natural philosophy which does not have to be discussed here. (The background is the assumption that motion and time are continuous magnitudes which can be divided *ad infinitum*. An intrinsic boundary, called an "*ultimum instans esse*" can therefore not be affirmed.) The main problem is (a), since, for it, the implication that if (i) then (ii) is still to be proved. For the whole argument we have to keep in mind that "diminution" is also a kind of motion, to which we can only attribute a final *extrinsic* boundary. Now, suppose that a acts upon b and that b offers some resistance. If we divide succesively b by two, for instance, in a motion of diminution and take the last instant in which a could act upon b (b being the *minima resistentia*), we have to assume that this instant would be the last instant of a motion of diminution (in which b becames weaker for instance as b/2, b/4, b/8 and so on). In any case, the negation *non esse* seems to make no sense here in my opinion.

111 actionis] augmentationis **P** 112 quod] quo **P** 113 aucto] ante **P** 114 qua] quam **P** 118 quod] quo **P** 121 *ante* esse] non est *add.* **P** 121 esset] esse **P** 122 actionis] augmentationis **P** 128 *a*] etiam **P** 130 aliquam] quam **P**

resistentiam finitam potest et in aliquam non. Ergo per sufficientem divisionem vel datur maxima resistentia in quam potest, vel minima in quam potest, vel maxima in quam non potest, / vel minima in quam non potest. Non potest **P** 3ᵛb
dicit primum, nec secundum, nec tertium, per primam, secundam et tertiam conclusionem. Igitur relinquitur quartum et hoc dicit conclusio. Secundo: data aliqua potentia activa, puta *a*, est dare aliquam resistentiam sibi equalem et sit ista *b*. Sed talis est minima in quam *a* non potest, ex eo quod in illam non potest, ex quo non excedit ipsam, sed cuilibet minori ista datur maior in quam potest, ex eo quod qualibet minore illa datur maior quam *a* potentia excedit et, cum quilibet excessus sufficiat ad motum, sequitur quod cuilibet minori ista, scilicet *b*, datur maior in quam *a* potentia activa potest; et cum in *b* non possit, sequitur per expositionem minimi prius posita quod *b* sit minimum in quod *a* non potest.

Quinta conclusio: potentia activa terminatur per minimum in quo non potest, ad istum sensum quod nos scimus et cognoscimus quanta sit potentia activa secundum fortitudinem sciendo minimum in quod non potest illa potentia vel alia secundum fortitudinem, per quam scimus eam distinguere a potentia fortiore et a potentia debiliore. Probatur: per illud scimus quanta est potentia activa secundum fortitudinem per quod scimus eam secundum fortitudinem distinguere a potentia fortiore et a potentia debiliore, sed hoc est per minimum in quod non potest, igitur etc. Maior est nota de se et minor probatur, quia scire minimum in quod non potest includit tria, scilicet scire quod non tantum potest, et scire quod non in plus potest et per illa distinguimus ipsum a potentia maiore, et ⟨scire quod⟩ quolibet minore illo datur maius in quod potest, et per hoc distinguimus ipsum a potentia minore.

Sexta conclusio: quod cum dictis conclusionibus bene stat quod est dare maximam resistentiam in quam aliqua potentia activa potest cum aliquibus certis circunstantiis, sicut ⟨cum⟩ tanta velocitate vel tanta tarditate in tali medio. Patet hoc quia, licet non sit dare maximum pondus quod Sor potest portare, et hoc simpliciter, tamen bene est dare maximum pondus quod Sor potest portare tanta velocitate in tali medio, et tamen si pondus esset maius et medium grossius et minus dispositum, Sor non posset portare illud pondus tanta velocitate. Et sic patet ista conclusio et omnes conclusiones predicte etc.

131 aliquam] aliqua **P** 132 minima] minimam **P** 133 maxima] maximam **P** 133 minima] minimam **P** 137 *post* talis] ergo *add.* **P** 138 quo] *om.* **P** 138 cuilibet] qualibet **P** 139 datur maior quam *a* potentia excedit] *om.* **P** 140 cum] *om.* **P** 140 cuilibet] qualibet **P** 143 quod] quo **P** 156 conclusionibus] omnibus **P**

⟨Art. 3: de comparatione potentie active ad distantiam⟩

De comparatione potentie active ad suam distantiam sit hec prima conclu-
sio: quod non est dare maximam distantiam ultra quam aliqua // potentia **P** 4ra
activa potest agere nec simpliciter nec cum certa resistentia. Probatur quantum ad primum, nam sit illa distantia *a* et sit resistentia *b*. Tunc, ex quo potentia activa ultra *a* agit in *b* sequitur quod eadem potentia in subduplo ad *b* ageret in *b* ad maiorem distantiam; et sic *a* distantia non erat maxima ultra quam dicta potentia poterat agere. Confirmatur, nam sit *b* pro instanti presenti ultra maximam distantiam ultra quam potentia activa potest agere, et in hoc instanti incipiat elongari ab *a*. ⟨Tunc⟩ sequitur quod in presenti instanti *a* agit in *b* et immediate post hoc instans *a* non agit in *b*, et sic presens instans esset instans ultimum esse actionis; et sic daretur ultimum instans esse motus, quod est impossibile. Deinde probatur eadem conclusio quantum ad secundum, quia, si *a* agens agit in *b* passum cum certa resistentia et gradu velocitatis, idem agens potest agere in idem passum remotius remissiore gradu velocitatis, nam dicta distantia non erat maxima simpliciter nec maxima cum certa resistentia ultra quam dictum agens poterat agere in *b* passum, cum quo bene stat quod dicta distantia erat maxima ultra quam dictum agens poterat agere in *b* passum cum certa resistentia a certo gradu velocitatis.

Secunda conclusio: quod nec est dare minimam distantiam ultra quam agens potest agere in passum. Probatur, quia tunc ultra illam posset et non ultra minorem et sic, si passum inciperet approximari agenti, esset dare ultimum instans esse actionis, quod est inconveniens.

Tertia conclusio: quod nec est dare maximam distantiam ultra quam non agens potest agere in passum, quia tunc ultra illam non et cuilibet maiori illa daretur minor ultra quam sic, que tamen minor esset maior illa ultra quam non. Modo hoc est falsum iuxta illud quod non potest ultra minus non potest ultra maius, saltem propter remotionem; quod notanter addo propter visibile quod ad aliquam parvam distantiam non potest agere in visum, sed hoc est propter propinquitatem, sed ultra maiorem potest.

Quarta conclusio: quod est dare minimam distantiam ultra quam agens
non / potest agere in passum. Probatur a sufficienti divisione, quoniam ultra **P** 4rb
aliquam distantiam agens potest agere in passum ⟨et⟩ ultra aliquam non. Vel igitur est dare maximam ultra quam potest, vel minimam ultra quam potest, vel maximam ultra quam non potest, vel minimam ultra quam non potest.

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168 ultra *a*] ulterius **P** 168 in] *om.* **P** 169 ad] ab **P** 169 in *b*] *om.* **E** 170 sit] *om.* **P** 171 ultra] *om.* **P** 176 et] *c*(!) **E** 177 remotius remissiore] remoto remotiori **P** 179 cum] *om.* **P** 179–181 quo bene stat quod dicta distantia erat maxima ultra quam dictum agens poterat agere in *b* passum cum] *om.* **P** 181 a] et **E** 182 ultra] *om.* **P** 187 cuilibet] qualibet **E** 194 non] *om.* **P**

Non potest dici primum propter primam conclusionem nec secundum propter secundam nec tertium propter tertiam. Igitur relinquitur quartum et hec est quarta conclusio etc.

Quinta conclusio: quod est dare maximam distantiam per quam agens potest agere in passum. Probatur, quia eadem est distantia maxima per quam potest agere ⟨et⟩ minima ultra quam non. Sed est dare minimam distantiam ultra quam non per precedentem conclusionem, igitur ⟨etc⟩. Antecedens probatur, nam data minima distantia ultra quam ignis non potest agere, tunc, quamdiu passum est in aliquo puncto intrinseco illius distantie, ignis potest agere in ipsum et quam cito est in aliquo puncto extrinseco illius distantie vel equivalentis ignis non potest agere in ipsum. Et illud patet, quia, si aliquod passum elongaretur ab igne tamdiu quod primo verum esset dicere "nunc propter distantiam ignis non potest agere in illud passum et immediate ante hoc potuit", tunc tota distantia ab igne usque ad passum esset minima distantia ultra quam ignis non possset agere in passum et esset maxima in quam ignis posset agere in passum sicut, potest patere ex expositione eius quod est distantia minima per quam ultra in qua sic.

Pro istis ⟨conclusionibus⟩ sciendum est quod duplex est agens: quoddam quod sic se habet quod, si potest agere ultra aliquam distantiam, tunc potest agere ultra quamcunque minorem, sicut est ignis vel calor vel aliquod tale. Alia est potentia que, si potest agere ultra aliquam distantiam, non tamen ultra quamcunque minorem, sicut est visibile. Nam, licet visibile ultra aliquam distantiam posset agere non ultra quamcunque minorem, quia posset esse ita prope oculum quod non posset agere in ipsum. Similiter, si esset aliquod luminosum et essent duo foramina recta, et luminosum esset minus quam spatium inter illa duo foramina vel quod spatium medii luminosum, non posset ultra quamcunque distantiam parvam lucere in tales illa duo foramina. / Unde posset esse ita prope quod non posset; et posset esse ita remote quod **P** 4ᵛa non posset; et ideo posset impediri in sua actione vel propter nimis parvam distantiam vel propter nimis magnam. Sed sic non est de agentibus primo modo dictis, quia, licet possint impediri in suis actionibus in passum propter nimis magnam distantiam non tamen propter nimis parvam. Modo debetis scire quod quinque conclusiones iam posite principaliter posite sunt de agentibus primo modo dictis. Sed propter maiorem explanationem ponende sunt conclusiones de agentibus secundo modo dictis.

Et sit ista prima conclusio: quod recedendo ab oculo pro inceptione visionis non est dare minimam distantiam ultra quam visibile *a* non potest agere vi-

202 maxima] *om.* **P** 206 *post* distantie] vel equivalentis *add.* **P** 211 esset] cum **P** 212 in passum et] *om.* **P** 213 quam] qua **P** 213 sicut] *bis* **P** 213 expositione] positione **P** 217 calor] caloris **P** 217 *ante* parvam] propter *add.* **P** 225 esse] esset **P** 226 propter] *om.* **P** 227 propter] *om.* **P**

sionem in visu propter distantie parvitatem, nec minimam ultra quam potest. Primum patet ex eo quod quecunque distantia data ultra quam non potest propter parvitatem est dare minorem ultra quam non potest propter parvitatem: quidquid enim non potest ultra maius propter eius parvitatem non potest in minus. Secunda pars patet quia, sit *a* ista distantia minima ultra quam potest, que, si esset minor ultra ipsam non posset, sequeretur quod in approximatione visibilis ad visum est dare ultimum instans visionis; quod est falsum. Consequentia nota est intuenti.

Secunda conclusio: recedendo ab oculo pro inceptione visionis est dare maximam distantiam ultra quam ⟨*a*⟩ non potest ⟨videri⟩ propter distantie parvitatem. Probatur quia inter omnes distantias ultra quas non potest propter parvitatem est dare unam maximam ultra quam non potest; sed cuilibet maiori illa datur minor ultra quam potest ex eo quod ⟨si⟩ visibile esset precise ultra illam distantiam et in presenti instanti inciperet elongari a visu, illud invisibile nunc non sed immediate post illud instans ageret visionem in visum.

Tertia conclusio: visibile accedente ad oculum pro corruptione visionis propter nimis parvam distantiam visibilis ab oculo est dare primum instans non esse visionis. Ad istum intellectum quod tunc primo erit verum dicere "nunc non est visio *a* visibilis et immediate ante hoc fuit". Et ratio huius est quod ex quo visio desinit esse per talem approximationem visibilis / ad visum **P** 4^{v}b et ⟨ut⟩ non datur ultimum instans esse visionis, oportet quod detur primum instans non esse eius. Quod autem non detur ultimum instans esse visionis, sicut sepe suppositum est, potest sic probari: nam quero utrum visio pro isto instanti sit alicuius intensionis vel non. Si dicatur quod non, hoc non potest esse, quia tunc esset indivisibilis. Si autem dicatur quod sic, oportet quod successive et gradualiter deperdatur et sic post instans presens adhuc erit; et sic instans datum non erat ultimum instans visionis.

Quarta conclusio: distantia que est inter visibile ⟨quando⟩ desinit videri propter nimiam propinquitatem eius ad oculum et inter visibile quando desinit videri propter eius nimiam remotionem ad oculum est maximam distantia in qua seu per quam illud visibile potest agere visionem in istum visum. Probatur, quia quamdiu illud visibile est in aliquo puncto illius distante, ipsum agit in visum visionem sic quod non est defectus propter parvitatem distantie nec propter eiusdem magnitudinem.

Quinta conclusio: eadem distantia est minima ultra quam illud visibile non potest videri seu non potest agere visionem in illum visum, et hoc propter eius distantie magnitudinem. Probatur, quia inter omnes distantias ultra quas non potest propter distantiarum magnitudinem hec est minima, ergo etc.

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239 *a*] *om.* **P** 244 ⟨videri⟩] *om.* **P** 246 maiori] minori(!) **P** 250 accedente] accidente **E** 254 approximationem] appropinquationem **E** 261 sic] si **P** 263 quando] quia **P** 264 nimiam] maximam **P** 264 *post* oculum] que *add.* **P**

⟨Art. 4: de comparatione potentie active ad effectum⟩

Nunc est dicendum de comparatione potentie active ad effectum. Pro quo sit ista prima conclusio: Quod loquendo de potentia productiva effectus qui adiuvatur a suo effectu producto ad ulterius producendum, sicut est ignis vel calor, non terminatur per maximum nec per minimum effectum, et hoc nec affirmative nec negative quantum est ex se. Patet, quia dato aliquo tali agente, sicut est ignis, ⟨iste ignis⟩ potest producere unum alium ignem et iterum unum alium et si quantumlibet quantum est de se ipso si non esset impedimentum ex defectu materie que non est infinita. Et hoc est quod dicit Aristoteles *De anima*, quod ignis est in infinitum augmentabilis si combustibile in infinitum sibi apponeretur. Nihilominus cum hoc stat quod terminatur maximo effectu, puta maximo igni, quem potest producere in istam materiam et in isto tempore.

Secunda conclusio: // quod loquendo de potentia productiva alicuis effectus que non iuvatur ab illo effectu producto ad ulterius consimilem effectum producendum vel priorem intendendum, sicut est corpus lucidum, talis potentia terminatur minimo effectu quod non potest producere. Probatur, quia lumen ita intensum sicut est lux corporis lucidi illud corpus lucidum non potest producere, sed cuilibet remissiori illo dato lumini datur lumen intensius quod potest producere, vel in proposito possumus dicere ⟨quod⟩ quodlibet remissius illo illud corpus lucidum potest producere unum. Verum est tamen quod idem corpus lucidum non semper in quodlibet medium in quod agit producit equalem gradum luminis, scilicet in unum sicut in aliud, sed secundum quod medium est melius vel peius dispositum ad recipiendum lumen, secundum hoc corpus lucidum intensius vel remissius lumen producit in ipsum, cum fuerit ei applicatum. **P** 5ra

Tertia conclusio: quod non semper est consimilis proportio effectuum in intensione qualis est proportio agentium etiam in intensione. Et hoc est verum maxime de potentiis que non iuvantur a suis effectibus in earum actione. Patet conclusio, quia sint *a* et *b* duo corpora lucida, *a* duplum ad *b* in intensione, et agant in duo media, puta *c* et *d* uniformia, et incipiant ista duo media puta *c* et *d* uniformiter intendi et equaliter in opacitate; tunc priusquam *a* desinat agere lumen in medio *c* et desinat *b* agere in medio *d* propter huiusmodi intensionem opacitatum istorum mediorum.[45] Modo, si continue per horam talis intensionis opacitatis mediorum lumen ipsius *a* esset duplicatum ad lumen ipsius *b*, sicut *a* erat duplum ad *b*, tunc equaliter cito per huiusmodi intensionem opacitatis et remissionem luminis *a* desineret agere sicut *b*, quod tamen est falsum.

275 effectu] affectu **P** 282 terminatur] determinatur **Q** 283 in isto tempore] *om.* **P** 286 priorem] possibilem **P** 288 est] *post* lux *scr.* **P** 290 ⟨quod⟩] et **E** 291 *post* producere] unum *add.* **P** 291 Verum] *om.* **P** 303 *post* et] *d add.* **P** 305 esset duplicatum] fuisset duplum **E**

280–281 *De anima*] Aristoteles, *De anima* II, 416a15–16

Consequentia nota est de se, nam si essent dua quanta quorum unum esset duplum ad aliud et inciperent decrescere in prima parte proportionali quodlibet ad subduplum et in secunda similiter et sic ultra, eque cito inciperent esse non quanta. Similiter si lumen actum ab *a* continue per horam remissionis lumen fuisset duplum ad lumen actum a *b*, ita cito *a* desinisset sicut *b*.

/ Quarta conclusio: quod nec quantum ad extensionem oportet esse consimilem proportionem effectuum sicut est proportio causarum agentium. Probatur quia si aliqua superficies circularis potest videri ab aliqua distantia, oportet quod ista que aliquis videt a dupla maiore distantia sub equali angulo habeat in duplo maiorem dyametrum; et, si sic, sequitur quod ipsa est quadrupla in extensione ad primam, et per consequens non est eadem proportio effectum in extensione sicut est proportio causarum agentium, ex quo proportio effectuum est dupla in extensione et proportio causarum est quadrupla. Quod autem oportet talem superficiem circularem esse quadruplam ad aliam cuius dyameter est in duplo maior, patet per unam propositionem in *12° Geometrie* que sic dicit "que est proportio dyametrorum talis, est proportio circulorum duplicata", et ideo si proportio dyametrorum aliquorum circulorum est dupla tunc proportio talium est quadrupla, ex eo quod quadrupla est dupla duple. Etiam ad notandum est quod cum dico "effectum esse duplum in extensione" ad illum intelligo lineam mensurantem extensionem istius effectus, sicut est dyameter totius effectus acti per unum agens duplum ad lineam mensurantem extensionem alterius effectus acti per aliud agens. **P** 5^{r}b

Quinta conclusio: possibile ⟨est⟩ quod *a* et *b* sint duo agentia et quod *a* sit duplum ad *b* in intensione, et quod *a* agat ad duplam distantiam ad quam agit *b*. Patet, nam sit *a* unum corpus luminosum sphericum cuius dyameter sit pedalis quantitatis et sit duplum intensive ad *b* corpus et non curo cuius quantitatis sit *b*. Tunc clarum est et certum quod *b* potest tantum dividi in extensione, non tamen in qualitate, quod *a* agat in duplo remotius quam agat *b*. *b* enim posset tantum dividi quod vix agat ad tantam distantiam quanta est distantia unius grani milii et, si sic, etiam possibile est quod potest dividi

[45]The punctuation in **E** ("... priusquam *a* desinat agere lumen in medio, *c b* desinat agere ...") cumbers the understanding of this passage.

307 luminis] luminum **P** 309 *post* decrescere] versus non quantum *add.***E** 311 lumen] luminum **E** 312 ita cito *a* desinisset sicut *b*] ita dico *d c* similem(?) sicut *b* **P** 323 dyametrorum] duorum **P** 324 circulorum] circulis **P** 324–325 dupla tunc proportio talium est] *om.* **P** 333 intensive] *om.* **P** 334 dividi] diminui **EQ** 336 dividi] diminui **EQ**

322 *12° Geometrie*] Euclides, *Elements*, XII, 2: Omnium duorum circulorum est proportio alterius ad alterum tanquam proportio quadrati sue diametri ad quadratum diametri alterius. Euclides–Campanus: *Opus elementorum Euclidis megarensis in geometriam artem...*, Venice [E. Ratdolt], 1482, f. 105v; ed. Busard [18], p. 431–32.

tantum in extensione et non in intensione seu in luce, ipso a non dimisso vel districto nec ⟨in⟩ extensione nec in intensione quod ipsum a agat per duplam distantiam in quam agat b, a existente duplo ad b, et hoc erat intentum.

Sexta conclusio: quod si a agit ad duplam distantiam ad quam agit b, tunc effectus a est octuplus ad effectum b. Patet /quia tunc a agit unum **P** 5va effectum spericum cuius dyameter est duplum ad dyametrum effectus acti a b; igitur effectus ipsius a est octuplus ad effectum ipsius b. Consequentia tenet ex eo quod qualis est proportio dyametrorum talis est proportio sperarum illarum dymetrorum triplicata. Cum igitur proportio octupla sit tripla duple ex eo quod componitur precise ex tribus duplis, sequitur proportionem talium effectuum sphericorum esse octuplam, postquam proportio dymetrorum talium effectuum est dupla. Ex his conclusionibus sequitur quod possibile est quod a agens sit duplum intensive ad b agens et effectus a agentis sit octuplus in extensione ad effectum b agentis.

⟨Art. 5: de comparatione potentie active ad velocitatem⟩

Nunc dicendum est de comparatione potentie ad velocitatem. Et sit ista prima conclusio: quantum est de se nulla potentia naturalis terminatur per maximam velocitatem quam potest facere nec afirmative nec negative nec etiam per minimam. Probatur quia velocitas consequitur proportionem potentie ad resistentiam ⟨ut⟩ patet per Commentatorem *2° De celo*. Sed huiusmodi proportio in infinitum potest diminui, igitur in infinitum tarditas potest augmentari. Similiter in infinitum huiusmodi proportio potest augeri per diminutionem resistentie; patet per Aristotelem *4° Physicorum*, igitur in infinitum velocitas potest augeri.

Secunda conclusio: respectu certe date resistentie potentia naturalis naturaliter agens terminatur per maximam et per minimam velocitatem quam potest producere, rebus sic stantibus. Patet ex eo quod lapis in aere dato secundum suum totum conatum nec potest moveri maiore velocitate nec mi-

337 dividi] diminui **EQ** 338–339 dimisso vel districto] diminuto **Q** 339 *a*] *om.* **P** 342 tunc] *om.* **P** 343 duplum] *corr. ex* dupla **PEQ** 351 ad effectum *b* agentis] *om.* **P** 352 sit] si **P** 355 *ante* velocitas] *a add.* **EP** 357 tarditas] tardius **P** 360 velocitas] velocius **P** 361 resistentie] *om.* **P**

356 *2° De celo*] Quoniam in omni moto est aliquo modo potentia moti diversa a potentia motoris, velocitas enim et tarditas non sunt nisi secundum proportionem potentiae motoris ad potentiam moti. Quanto igitur fuerit maior proportio, tanto magis erit motus velocior; et quanto proportio minor, tanto motus erit tardior", *Aristotelis De coelo, De generatione et corruptione ... cum Averrois Cordubensis variis in eosdem commentariis*, Venetiis apud Iunctas, 1562, f. 119vb (the reference "per Commentatorem *2° De celo*" in the *tractatus* corresponds to "per Commentatorem *2° huius*" in **EQ**) 359 *4° Physicorum*] Aristoteles, *Physica* IV, 215b1–11

nore quam moveatur etc.

Tertia conclusio: quod potentia non terminatur ad suam velocitatem.[46] Igitur non cognoscitur quod ex hoc quod videmus talem potentiam producere tantam velocitatem, nec cognoscimus quantitatem potentie ex eo quod si cum tali resistentia producit tantam velocitatem cum alia puta maiore non produceret tantam. Et ideo ad cognoscendum quantitatem potentie motive non sufficit solum cognoscere velocitatem.

⟨**Art. 6: de comparatione potentie active ad spatium et ad tempus**⟩

Nunc dicendum est de comparatione potentie active ad spatium et sit prima conclusio ista: quod potentia activa naturalis, sicut est potentia motiva gravis deorsum vel levis sursum, non terminatur maximo spacio neque minimo ⟨simpliciter, nec affirmative nec negative,⟩[47] quia quocunque spacio dato per divisionem resistentie potentia talis posset pertransire et per augmentationem resistentie ad gradum equalem / potentie motive non posset pertransire. Unde **P** 5^{v}b a quacunque distantia grave descenderet ad centrum si non esset impedimentum.

Secunda conclusio: quod cum certiis circumstantiis terminatur ad maximum spatium quod potest pertransiri,[48] que circumstantie sunt velocitas ⟨et⟩ tempus, est dare maximum spatium per quod lapis potest moveri in tanto tempore cum tali resistentia vel tali velocitate.

Nunc dicendum est de comparatione rerum per maximum vel minimum

[46] The old edition **Q** conveys a different text and consequently a completely different meaning, which is assumed in the new edition **E** (p. 180, lin. 89). Their text runs: "potentia determinatur per suam velocitatem..." instead of "potentia *non terminatur*". According to this passage – which, by the way, could be understood as a warning to our usual algebraic formulation of the verbal statements of Aristotelian natural philosophy – the potency is not "terminated", i.e. limited, by speed (*velocitas*, of course without vectorial meaning) and hence we cannot *determine* the quantity of the first by the second. In Albert's words at the end of the conclusion: "to know the quantity of the motive potency it is not enough to know only the speed". This idea does not fit the general statement opening the third conclusion in the version of **EQ**. Exceptionally, however, the version of this passage is better in **P**.

[47] The addition between the brackets is grammatically not necessary but it helps to make clear that – as in the *quaestiones* (see **E**, p. 180, lin. 56–57) – Albert is excluding all possible boundaries when the circumstance of space is taken alone. However, as the next conclusion affirms, a boundary is possible when speed and time are also taken into account.

[48] Since the text discusses active and *passive* potencies as well, it is doubtlessly not always easy to

364 suum] sui **E** 366 terminatur] determinatur (!) **EQ** 376 divisionem] diminutionem **E** 380 cum] *om.* **P** 381 pertransiri] pertransire **E** 382 *post* tempus] duratio *add.* **EQ**

tempus per quod potest durare aliquid. Pro quo sit prima conclusio quod cuiuslibet entis naturalis corruptibilis potentia durandi est terminata vel maximo tempore vel minimo per quod potest durare, vel maximo vel minimo per quod non potest durare. Patet, nam ex quo per aliquod tempus potest durare et per aliquod non, oportet quod sit dare maximum tempus vel minimum per quod potest durare vel maximum vel minimum per quod non.

Secunda conclusio quod non est dare minimum tempus per quod res corruptibilis potest durare. Patet, nam quocunque tempore dato per quod res corruptibilis potest durare, eadem per minus tempus potest durare. Unde si aliqua res potest durare per annum, eadem res potest durare per medietatem et etiam per medietatem medietatis etc., et, per consequens, potentia durandi talis rei non est terminata minimo tempore per quod illa res potest durare.

Tertia conclusio: non est dare maximum tempus ultra quod res corruptibilis potest durare. Probatur, nam si sic, sequeretur quod esset dare ultimum instans esse talis rei, sed hoc est falsum. Probatur, quia sit illud tempus a et b sit instans terminans exclusive ipsum; tunc, si a est tempus maximum ultra quod Sor potest durare, tunc usque ad b terminans instans exclusive quod terminat tempus a exclusive Sor potest durare et non ultra, quia, si ultra a, tunc a non esset maximum tempus ultra quod Sor potest durare, ⟨quia ultra magis posset durare⟩. Sed, si Sor durat usque ad b instans inclusive et non ultra, tunc in b instanti verum est dicere quod Sor modo est et immediate post hoc non erit, et sic b instans erit ultimum instans esse Sortis. Sed falsitatem istius probo sic: quia in b instanti potentia Sortis non est indivisibilis, et per consequens non subito corrumpitur, et per consequens tempus est antequam corrumpatur, et per consequens b instans non est ultimum instans esse Sortis. Et ita arguerem de quacunque // alia re corruptibili et de **P** 6ra
quocunque alio instanti quod adversarius diceret esse ultimum instans esse talis rei corruptibilis.

Quarta conclusio ⟨est⟩ quod non est dare maximum tempus per quod res corruptibilis non potest durare. Probatur, nam quocunque tempore dato per

determine when a verb is to be taken in the active or passive form. However, this is one of these seldom cases where we can be sure trying to comprehend the meaning of the passage. Hence, I think that, although we are in the section about *active* potencies, the meaning of the verb must be here passive: *pertransiri*, as it can be read in the manuscript **P** and not *pertransire* (as in the edition of the *quaestiones* see **E**, p. 180, lin. 64. If *pertransire* is however preferred, the subject of the sentence *potentia* should be added). Furthermore, it is to be noted that the edition of the *quaestiones* (see **E**, p. 180, lin. 65) includes besides the time also the notion of *duratio*, as if this was a further circumstance, what seems to be very unlikely.

385 prima] quarta **E** 391 Secunda] Quinta **E** 397 Tertia] Sexta **E** 397 *ante* ultra] per *add.* **P** 398 esset] est **P** 399 tempus] instans **P** 402 tempus] *om.* **P** 403 *a*] *om.* **P** 406 instans] *om.* **P**

quod res corruptibilis non potest durare, est dare maius per quod non potest durare; si enim non potest durare per minus non potest durare per maius. Ideo inter tempora per que res non potest durare non datur maximum. Et hoc vult conclusio, igitur etc.

Quinta conclusio quod bene datur minimum tempus ultra quod res corruptibilis non potest durare. Probatur nam per primam conclusionem omnis res corruptibilis naturalis terminatur maximo tempore vel minimo ultra quod non potest durare vel maximo vel minimo ultra quod non. Sed non terminatur minimo ultra quod non potest per secundam conclusionem, nec terminatur maximo per tertiam, nec maximo ultra quod non per quartam, ergo minimo ultra quod non, ut vult conclusio. Et hoc est illud tempus quod est terminatum exclusive ad primum instans non esse talis rei et inclusive a parte ante primo instanti esse eiusdem rei, quod quidem tempus est mensurativum illius rei quantum ad durationem suam naturalem.

Sexta conclusio: quod rei naturalis corruptibilis datur maximum tempus in quo potest durare. Patet, nam illud tempus ⟨minimum ultra⟩ quod non potest durare est maximum in quo potest durare, quia quamdiu est aliquod instans intrinsecum talis temporis ipsa res potest durare et in nullo instanti extrinseco ipsa potest durare propter hocquod illud tempus dictum est esse minimum ultra quod ipsa res non potest durare, et propter hoc dicto tempore non datur maius tempus in quo illa res possit durare et in quolibet instanti ⟨illius⟩ temporis ipsa res potest durare. Igitur illud tempus est maximum tempus in quo illa res potest durare. Et ista conclusio posita sit pro intentione Aristotelis et conclusionis.

Septima conclusio: quod non omne ens ⟨habet⟩ potentiam sue durationis per maximum tempus per quod potest durare. Patet de rebus incorruptibilis, quarum duratio non est terminata nec terminabilis et sic patet de potentia activa secundum hos sex articulos.[49]

[49]Note that the numeration of the articles has to be changed here. The copyist did not realize that he had already announced at the very beginning of the tract that the treatment of the six circumstances would take place over the course of six articles, the first being an introductory article including the terms distinctions and expositions. His mistake in writing "according to seven articles" (*secundum septem articulos*) could reflect the fact that the final article contains a first part on space and a second part on time. As a result, he could have regarded this last article as two independent

413 Quarta] Septima **E** 419 Quinta] Octava **E** 420 primam] quartam **E** 421 non] *om.* **P** 422 vel maximo vel minimo ultra quod non] *om.* **P** 423 secundam] quintam **E** 424 tertiam] sextam **E** 424 quartam] septimam **E** 426–427 et inclusive a parte ante primo instanti esse eiusdem rei] *om.* **P** 429 Sexta] Nona **E** 433 hoc] *om.* **E** 442 hos sex] septem **P**

⟨II: De potentia passiva⟩

Nunc dicendum est de potentia passiva. Pro quo sit prima conclusio distinctio ista: quarum potentiarum passivarum / quedam est receptiva solum **P** 6ʳb
et quedam dicitur receptiva et cum hoc resistiva. Exemplum primi sicut est materia prima; exemplum secundi est aqua respectu ignis. Secunda distinctio: quod potentiarum passivarum quedam est tantum passiva et quedam passiva et cum hoc activa. Exemplum primi sicut est unum parvum frigidum quod patiatur ab uno magno calido a tam magna distantia quod, licet illud calidum possit agere in illud frigidum, ⟨tamen⟩ propter magnam distantiam non potest reagere. Exemplum secundi sicut est frigidum quod patitur a calido et cum hoc reagit in ipsum. Tertia distinctio ⟨est⟩ quod potentiarum passivarum que cum hoc sunt active, quedam est cognitiva, sicut est potentia visiva, et quedam ⟨est⟩ non cognitiva, sicut frigidum quando patitur a calido reagendo in ipsum. Quarta distinctio ⟨est⟩ quod potentiarum passivarum non cognitivarum que cum hoc sunt active quedam reagunt in agens, ut frigidum in calidum, quedam autem agunt in aliud ab agente, ut medium illuminatum passum a lucido agit, quia calefacit non tamen agens in ipsum, puta solem, sed in aliud ab illo. Quinta distinctio ⟨est⟩ quod potentiarum passivarum quedam patiuntur per abiectionem contrarii, sicut calidum cum patitur a frigido vel equaliter econtra; quedam autem sine abiectione contrarii, sicut medium cum illuminatur a lumine non abiicitur aliquid quod sit contrarium lumini generato, ex eo quod lumini nihil est contrarium, ut manifestum ⟨est⟩.

Nunc prius ponende sunt conclusiones. Unde primus sciendum est quod potentia passiva potest comparari vel ad potentiam activam ex qua potest pati, vel ad distantiam in qua vel ultra quam potest pati, vel ad effectum quem potest pati et recipere, vel ad tempus per quod potest pati, vel ad velocitatem per quam potest alterari vel moveri[50] vel ad spatium super quod potest moveri motu locali. Et praeterea adhuc est aliqua potentia specialis sicut visiva que potest comparari ad angulum sub quo potest pati vel videri. Tunc est discurrendum per omnia illa sicut factum est in aliqua questione.

Sit igitur / ista prima conclusio quod potentia passiva resistiva non termi- **P** 6ᵛa

articles; or perhaps the piece he was copying could have included a division with a sixth article on space and a seventh article on time.

[50]The reading "*mutari*" which **P** conveys is not acceptable, since a mutation is a transformation which takes place *in instanti* and therefore without any kind of speed. On the contrary, speed is a property of motion. Hence, the reading "*moveri*" (from **EQ**) is necessary here.

442] *om.* **P** 449 licet] quodlibet **P** 450 magnam] nimiam **E** 451 patitur] patiatur **P** 458 calefacit non tamen agens] calefacere non tamen est agens **P** 458 puta] *om.* **P** 458 solem] sole **P** 461 *ante* econtra] vel *add.* **P** 468 moveri] mutari (!) **P** 471 aliqua] alia (!) **E**

natur per minimam potentiam activam a qua potest pati. Probatur nam sit ista potentia activa a et ⟨sit potentia⟩ passiva b; tunc si b debet pati ab a, oportet quod a excedat b ex eo quod aliter a proportione equalitatis vel minoris inequalitatis fieret actio, quod est falsum; et etiam quia in omni actione agens debet esse prestantius passo. Sed si a excedit b, non potest ipsum b excedere excessu indivisibili, cum nullus sit talis excessus. Relinquitur ergo quod excessu divissibili. Igitur, cum quilibet excessus sufficiat ad motum, sequitur quod, si a per solam medietatem istius excessus excederet b, adhuc b potest pati ab a; sed tunc a esset minus quam ante erat. Igitur a non erat minimum a quo b potebat pati.

Secunda conclusio: quod nec potentia passiva talis terminatur potentia maxima activa qua potest pati. Probatur quia, quicquid potest pati a magno potest pati a maiore illo et, si sic, nullum est maximum, saltem finite potentie a quo talis potentia passiva potest pati.

Tertia conclusio: quod nec talis potentia passiva terminatur minima potentia activa a qua non potest pati, quia tunc non posset pati a tali sed a minore illa posset pati; sed hoc est falsum, ex eo quod illud quod non potest pati a maiore non potest pati a minore.

Quarta conclusio: talis potentia passiva terminatur maxima potentia activa a qua non potest pati. Probatur per sufficientem divisionem, nam talis potentia passiva ab aliqua potentia activa potest pati et ab aliqua non. Vel igitur datur minima a qua potest pati, vel igitur maxima a qua potest pati, vel minima a qua non potest pati, vel maxima a qua non potest pati. Non potest dici primum per primam conclusionem, nec secundum per secundam conclusionem, nec tertium per tertiam conclusionem. Relinquitur igitur quartum et hoc est quarta conclusio.

Et hoc potest probari et declarari exemplo, quia ponatur quod potentia levativa Sor⟨tis⟩ et resistentia unius libre sint equales, ita quod precise tantum potest Sor in elevando quantum potest libra in resistendo. Tunc statim sequitur quod virtus Sortis est maxima inter omnes potentias levativas que non possunt levare libram, quia nulla minor posset levare et quelibet maior ⟨potest⟩, / ita quod omnium non potentium levare libram Sor est fortissimus, **P** 6^{v}b exponendo ly "fortissimus" negative et tamen ipse est debilior inter omnes potentes levare libram. Et sic potentia activa equalis resistentie est maxima a qua illa potentia resistiva non potest pati et illa eadem potentia resistiva est minima in quam illa potentia activa non potest agere.

Sed contra istud diceres: videtur quod potentia activa equalis resistentie non sit maxima a qua potentia resistiva non potest pati, quia tunc ab illa non et

472–473 terminatur] determinatur **P** 474 et ⟨sit potentia⟩ passiva b; tunc si b debet pati ab a] *om.* **P** 476 quia] quod **P** 481 esset] *om.* **P** 483 passiva] activa **P** 485 et, si] *bis* **P** 488 activa] *om.* **P** 503 levare] levari **P** 507 potentia] *om.* **P** 507 resistiva] positiva **P**

a qualibet maiore potest pati. Sed videtur falsum, quia potentia activa potest augeri insensibiliter et tamen non propter hoc posset in illam resistentiam. Verbi gratia, si potentia levativa Sor⟨tis⟩ est equalis resistentie unius libre ⟨et⟩ augeretur insensibiliter, non tamen propter hoc levaret libram. Respondetur quod, sicut potentia levativa esset aucta insensibiliter, ita posset levari per spatium visibile; et sic forte Sor potest levare sic quod non perciperet se illud posse levare, nec hoc est aliquod inconveniens.

Sed adhuc diceres: licet ista instantia magis pertinet ad aliam questionem si potentia activa terminaretur minima potencia passiva in quam non posset videlicet sibi equali, tunc visibile habeat se sicut potentia activa respectu visus, sicut patet in *2° De anima*, etiam visibile terminaretur minima potentia visiva in quam non potest, sed in minorem et debiliorem illa; et hoc est falsum, quia si aliquod visibile non potest agere in aliquam potentiam visivam, multo minus potest agere in potentiam minorem et ita debiliorem, saltem ceteris paribus sicut de se patet, igitur ⟨etc⟩. Respondetur ⟨ad hoc⟩ quod illud quod dictum de potentia activa respectu potentie passive, intelligitur de potentia activa agente in passivam et non coagentem nec concurrentem ad effectum, nec ad actionem ipsius potentie active. Sed sic non est in proposito de visibili et ⟨de⟩ potentia visiva, quia visibile non solum causat visionem in oculo nec potentia visiva concurrit mere passive ad visionem sed visibile per suam speciem una cum virtute activa visiva concurrente producit visionem in oculo ⟨et⟩ in potentia visiva. Sed diceres, si sic, idem esset agens et patiens respectu eiusdem, sed hoc videtur esse inconveniens. Probo conclusionem, quia respectu visionis potentia visiva esset tam agens quam patiens. Respondetur quod non est inconveniens idem esse partiale agens et totale patiens et recipiens respectu eiusdem, licet esset bene inconveniens idem esse totale agens et totale recipiens respectu eiusdem. Modo dico quod in proposito totale agens non est potentia visiva // licet bene partiale, sed totale agens est aggregatum ex specie visibili et **P** 7ra
specie sensibili et potentia visiva et aliis concurrentibus ad visionem per eorum actionem, sed potentia visiva est totale recipiens, igitur etc.

Quinta conclusio: omnis potentia mere passiva receptiva, sicut est materia prima, potest pati, saltem quantum est ex se a quocunque magno vel parvo agente sine termino. Patet quia statim quodlibet agens talem potentiam passivam excedit. Igitur patet conclusio vera et hoc quantum ad illud sufficit.

Deinde comparando potentiam passivam quantum ad distantiam sit hec prima conclusio: potentia passiva non cognitiva quantum est ex se potest

516 visibile] insensibile (!) **EQ** 516 levare] *om.* **P** 518 pertinet] posset **P** 521 terminaretur] tenetur **P** 527 concurrentem] correspondentem **P** 533 inconveniens] falsum **E** 533 Probo conclusionem] Probatio consequentiae **E** 535–537 licet esset bene inconveniens idem esse totale agens et totale recipiens respectu eiusdem] *om.* **P** 538 licet] sed **P**

521 *2° De anima*] Aristoteles, *De anima* II, 417a2–5, 418a31

pati a qualibet distantia quantumcumque magna vel parva. Probatur: a quacunque distantia agens potest agere, a tali distantia potentia passiva potest pati. Et ideo, si talis potentia passiva potest pati ab aliqua distantia parva, tunc ⟨potentia dupla vel quadrupla⟩ ab aliqua potentia dupla vel quadrupla potest pati, et adhuc a tripla, et sic ulterius. Et sic talis potentia non est determinata distantia quantum ad magnitudinem. Sed etiam probo quod non quantum ad parvitatem, quia talis potentia passiva non cognitiva non desinit pati propter partivatem distantie, sicut bene desinit potentia passiva cognitiva. Unde frigidum non desinit pati a calido propter nimiam propinquitatem calidi ad ipsum, ymo inquantum calidum est propinquius frigido in tantum frigidum plus patitur a calido.

Secunda conclusio: talis potentia passiva respectu date potentie active terminatur minima distantia ultra quam non potest pati et hoc a tali agente. Probatur, nam datum agens terminatur minima potentia ultra non potest agere respectu potentie date passive, igitur etiam econverso potentia passiva data terminatur minima distantia ultra quam non potest pati ab agente dato.

Tertia conclusio: potentia passiva cognitiva sicut est potentia visiva, et etiam alia potentia passiva recipiens vel requirens moderatam distantiam terminatur ab utraque parte ita quod prope visum est maxima distantia omnium illarum in quibus non potest pati propter parvitatem distantie et de longe est minima distantia a qua non potest pati propter magnitudinem. Et illud potest probari ex hiis que dicta erant quantum de potentia activa habitum est, etc.

/ Quarta conclusio: conformiter potest dici de angulo sub quo potest pati cum omnium parvorum angulorum qui non sufficiunt ad visum unus est minor et ille est angulus rectus. **P** 7ʳb

Deinde comparando potentiam passivam ad effectum sit ista prima conclusio: quod potentia passiva receptiva potest recipere quemcunque effectum quem potentia activa potest facere. Ideo quantum est de ⟨se⟩materia prima est infinite receptibilitatis nec sibi repugnat recipere caliditatem in infinitum si esset quod causaret eam et ita de aliis nisi tamen aliquod impediat, scilicet quod cum hoc quod est potentia passiva sit etiam activa sicut est potentia visiva.

De comparatione autem potentie passive ad velocitatem et ad spatium et ad tempus dicatur omnino sicut dictum est de potentia activa, ut supra patet.

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546 passiva] activa (!) **P** 547 quantumcumque] quantamcumque **E** 555 nimiam] minimam **P** 559 quam] *om.* **P** 559 a tali] actu **P** 564 recipiens] *om.* **P** 568 habitum est, etc] in alia questione **P** 580 *post* patet] Et sic sit finis istius tractatus de maximo et minimo secundum magistrum Albertum Archiepiscopum civitatis Sassonie scriptus per me fratrum Franciscum de Force in Monte Sancto MCCCC L et die XVIa novembris jibidem permanentem. Amen *add.* **P**; in precedenti questione *add.* **E**

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