1968

Nicole Oresme and the Medieval Geometry of Qualities and Motions: a treatise on the uniformity and difformity of intensities known as Tractatus de configurationibus qualitatum et motuum (De configurationibus II.i-II.iv)

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Deo, de quo scriptum est in libro Danielis quod "ipse revelat profunda et abscondita, et novit in tenebris constituta."

Incipit secunda pars huius tractatus de difformitate successivorum

[II.i] Capitulum primum de duplici difformitate motus

Omnis motus successivus subiecti divisibilis habet partes et est divisibilis uno modo secundum divisionem et extensionem seu continuitatem mobilis, alio modo secundum divisibilitatem et durationem seu continuitatem temporis, tertio modo saltem ymaginative secundum gradus et intensionem velocitatis. A prima autem continuitate dicitur motus magnus vel parvus, a secunda brevis aut longus, a tertia velox aut tardus. Habet itaque motus duplicem extensionem, unam subiectivam et aliam temporalem, et habet unam intensionem. Due autem extensiones possunt ymaginari quodam modo orthogonaliter seinvicem ad modum crucis intersecare, ita quod extensio durationis diceretur longitudo et extensio subiectiva vocaretur latitudo, intensio vero posset vocari altitudo ipsius motus seu velocitatis. Sed si iuxta premissa in 3° capitulo prime partis intensio velocitatis appellaretur eius latitudo, tunc utraque extensionum ad intensionem comparata poterit dici longitudo et sic velocitas habebit duplicem longitudinem sicut habet duplicem extensionem, et in utraque istarum extensionum potest intensio velocitatis multipliciter variari. Et quoniam difformitas oritur ex eo

28 *post* Danielis *add. [G]* 3° (*l*) capitulo
28–29 *de* ipse...constituta *scr. mg. B* in (*?*) Danl' 2 *et mg. A* Daniel 28 (*l*) / et abscondita *om. B [P]*
29 et *om. L* / et...constituta *om. [C] sed add.* et sic est finis illius capituli et per consequens totius tractatus / *post* constituta *add. [E]* Explicit prima pars huius tractatus deo gratias *et add. [PFM]* Explicit prima pars huius operis *et [A]* explicit prima pars *et [N]* Et sic finitur prima pars principalis *et [G]* Explicit prima pars de intensione qualitatum

Tit. et II. i: BVL
1–3 Incipit (*om. L*)...successivorum *BL[A] om. V[N]* Incipit secunda *[FMP]* Secunda pars de figuratione et potentia successivorum *[G]* Secunda pars particularis *mg. [C]* Incipit pars secunda *[E]* secunda pars *mg. [S]* Secunda pars *[J]*
4 duplici *om. L*

or by good or bad angels, or immediately by God, of whom it has been written in the book of Daniel[2] that "He revealeth deep and hidden things and knoweth what is in darkness."

Here begins the second part of this tract and it treats of the difformity of successive things

II.i On the double difformity of motion

Every successive motion of a divisible subject has parts and is divisible in one way according to the division and extension or continuity of the mobile, in another way according to the divisibility and duration or continuity of time, and in a third way—at least in imagination—according to the degree and intensity of velocity. From its first continuity motion is said to be "great" or "small"; from its second, "short" or "long," and from its third, "swift" or "slow." And so motion has two extensions, one that pertains to the subject and the other that pertains to time, and one intensity. Now the two extensions can be imagined in a certain way as mutually intersecting at right angles in the manner of a cross,[1] so that the extension of duration ought to be said to be "longitude" and the extension in subject ought to be called "latitude," while the intensity could be called the "altitude" of this motion or velocity. But according to what was premised in the third chapter of the first part, if intensity of velocity were to be called its "latitude," then each of the extensions in relationship to intensity could be called "longitude," and so velocity will have a double longitude just as it has a double extension, and in each of these extensions the intensity of velocity can be varied in multiple ways. And since dif-

[2] *Daniel* 2:22.

II.i
[1] See the Commentary, II.i, lines 12–13.

5 subiecti: sive *L*
6 extensionem et divisionem *L* / continuationem *V*
7 et: temporis et *L*
7–8 temporis: eiusdem *L*
10 aut[1,2]: vel *L*
12 Due: que (*?*) *L*
13 ortogonaliter *B[SG]* / se-: seu *L* / seinvicem *tr. V post* crucis
15 posset *BV[AFCM]* potest *L[ENSG]* possit *[P]*
16 intensio: in tempore *[PFM]*

quod intensio varie extenditur, inde sequitur quod motus sive velocitas potest habere duplicem difformitatem vel etiam uniformitatem duplicem: unam secundum partes vel extensionem mobilis, que proprie dicitur uniformitas aut difformitas; aliam vero secundum partes vel durationem temporis, que proprie dicitur regularitas vel irregularitas. Habet ergo motus ratione subiecti uniformitatem vel difformitatem et ratione temporis sive secundum tempus regularitatem vel irregularitatem. Et secundum hoc diceretur quod motus celi est difformis et est regularis, motus vero gravis deorsum potest esse econtrario uniformis et irregularis et etiam potest esse uniformis et regularis vel difformis et irregularis. Sed non est possibile quod motus circularis sit uniformis. Verumptamen in sequendo modum loquendi consuetum vocabo quandoque improprie regularitatem nomine uniformitatis et irregularitatem nomine difformitatis, sed cum determinatione notificante concomitante vel prima.

[II.ii] Capitulum 2^m^ de tempore, quid sit et quod non est difforme

Primum omnium successivorum est tempus—ymmo tempus in una sui significatione est ipsamet successio morosa rerum mutabilium secundum prius et posterius seu earum duratio successiva. Nec tempus sic sumptum est motus sed est successio ipsius motus vel mobilis. Nam et si omnia quiescerent, adhuc esset tempus; aut si omnia mota moverentur velocius quam nunc moventur, non tamen velocitaretur tempus. Est itaque tempus secundum istam significationem quoddam accidens de predicamento quando. Nec est idem quod res temporalis, nec tamen est res separabilis a re temporali, quia sine tali re non potest absque implicatione contradictionis existere, nec ab ea potest separari etiam per divinam potentiam absolutam. Unde proprie loquendo tempus sic sumptum non est aliqua res sed est modus rei,

23 partes *BV[ANG]* partem *L[EPFMCS]*
24 aut: seu *V* / partem *[PFMSC]*
25 ergo *B* igitur *LV*
27-28 dicitur *L*
28 celi *om. B*
29 econtrario *V[PS]* e9° *BL[NG]* econverso *[E]* econtra *[AM]* contrariis *[F]* contrarius *[C]* / *post* irregularis *add. L[N]* seu regularis *et [E]* seu et regularis / potest: posset *V*
29–30 et²...vel: sive *[A]* / uniformis...regularis: regularis et uniformis *L[N]* regularis et difformis *[E]*
30 vel: et etiam *[E]* / vel...irregularis *om. [F] (sed hab. M)*
31 sequendo: sumpto *B*
32 improprie *om. L*
34 –ficante *BV[AG]* –ficate *L* –ficatione *[ESG]* –fi^te^ *[PFNM]* / concomitante vel *VL[ENG]* concomittante vel *[A]* concomitate vel *B* concomitantem vel *[S]* communicant cum *[M]* communicanter cum *[PFC]*

formity arises from the fact that intensity is variously extended, so it follows that motion or velocity can have double difformity or even double uniformity: one according to the parts or extension of the mobile—which is properly called "uniformity" or "difformity"—and the other according to the parts or duration of time —which is properly called "regularity" or "irregularity."[2] Therefore, motion has "uniformity" or "difformity" by reason of subject, and "regularity" or "irregularity" by reason of, or according to, time. And according to this it ought to be said that the motion of the heavens is "difform" and "regular," while the motion of a heavy body downward can be contrariwise "uniform" and "irregular;" and it also can be "uniform" and "regular," or "difform" and "irregular." But it is not possible for circular motion to be "uniform." However, in following the customary manner of speaking, I shall sometimes improperly call "regularity" by the name of "uniformity" and "irregularity" by the name of "difformity," but I shall do so with an accompanying or prior remark acknowledging this.[3]

II.ii On time: its nature and its non-difformity

The first of all successive things is time. In fact, time, in one signification of it, is itself the enduring succession[1] of mutable things according to before and after, or it is the successive duration of these things. But time assumed in this fashion is not the motion but is the succession of the motion or movable thing. For even if all things were at rest, still time would exist; or if all things in motion were moved more quickly than they are now moved, still the time would not be quickened. And so according to this signification time is a certain accident of the category "when." Nor is time identical with a "temporal thing." [But if not identical with a temporal thing] still it is not a thing separable from a temporal thing, for it could not exist in the absence of such a temporal thing without implying a contradiction.[2] Nor can it be separated from a temporal thing even by divine absolute power. Whence properly speaking time so assumed is not some *thing* but is rather a *mode*

[2] *Ibid.*, lines 23–25.
[3] *Ibid.*, lines 33–34.

II.ii
[1] See the Commentary, II.ii, line 4.
[2] *Ibid.*, lines 10–11.

II.ii: BVL
2 est *B[FA; cf. tab. cont.]* sit *VL[G]*
3 ymmo tempus: tamen motus *L* cum tempus *[E]*
4 mutabilium: mobilium *L[E]*
5 eorum *L*
7 mota *om. V*
significationem *BV[FMPSG]* acceptionem *L[EN]* acceptionem seu significationem *[A]* figurationem *?[C]*
10 res² *BV[FMAPCS] om. L[ENG]*

sicut Aristoteles dicit quod accidens non est ens sed est entis, scilicet dispositio entis. Ideo tempus istud dicitur ens vel res equivoce, nec est significabile simpliciter incomplexe ad modum substantie sed est significabile complexe et hoc mentali complexione imperfecta. Quamvis sit de numero eorum que secundum nullam complexionem perfectam dicuntur, ut dicit Aristoteles, et magis proprie convenit sibi significari per sincathegorematica sicut per adverbia temporis quam per nomina, sed propter necessitatem locutionis oportet illud nominaliter appellare.

Huiusmodi igitur duratio sive successio—quomodocunque vocetur—non est aliqualiter intensa sed tantummodo extensa secundum prius et posterius. Et quoniam dictum est in capitulo precedenti quod difformitas provenit ex eo quod intensio diversimode est extensa, idcirco tempus sic dictum nullo modo est difforme nec etiam proprie uniforme, sicut etiam tempus non dicitur velox vel tardum. Verumptamen improprie tempus potest dici uniforme quoniam illa duratio que tempus est modo predicto non mensuratur proprie nisi per motum uniformem, id est, regularem; propter quod in alia significatione apud Aristotelem usitata tempus dicitur de motu illo quo talis morosa duratio prius dicta convenienter mensuratur a nobis, scilicet de motu celi. Ideo quedam nomina significantia revolutiones celi et partes earum dicuntur nomina significantia tempus, sicut hora, dies, mensis, annus, et sic de aliis. Et quoniam per unam talem revolutionem vel partem eius totum unum magnum motum mensuramus vel numeramus ut dicendo "mille anni sunt," "mille dies sunt," et sic de aliis, hinc est quod tempus dicitur numerus motus. Rursum cum idem motus celi sufficiat ad mensurandum omnes durationes rerum mutabilium que sunt simul seu quarum una non est prius quam altera, ideo secundum hoc dicitur quod idem est tempus in celo, in mari, et in terra. Tempus vero isto modo sumptum, licet sit idem quod motus qui est uniformis vel difformis, tamen motus non secundum difformitatem eius mensurat durationem, et propter hoc motus quamvis sit tempus, esto etiam quod nullum aliud tempus esset, tamen quia nomine temporis non connotatur aliqua intensio et intensio requiritur ad uniformitatem et difformitatem, ideo quomodocunque sit tempus nullo modo dicitur difforme, nec proprie uniforme.

14 Aristoteles dicit *BL[AFMN] tr. V[EPCSG]* / est[2] *BL[NSC] om. V[AFMPG]* ens *[E]*
15 ens vel res *L[ENFMCP]* res vel ens *BV[SG]* res aut ens *[A]*
16 modum: nodum *L*
18 que: que etiam *L[EN]*
19–20 sincathe[ca] *V[PM]* sintha[ta] *B[F]* sincathegoreunta *L* sinka[ta] *[EC]* sinca[ca] *[S]* sinca[ta] *[A]* sinchateg[ca] *[N]* sincategreunta *[G]*
22 quomodocunque *B[FMPS]* quocunque modo *L[EAG]* quocunque *V[NC]*
25 diversimode est *tr. L[EN]*
27 vel *BV[NMS]* aut *L[EFPG]* sive *[A]* neque *[C]* / potest: posset *V[AG]*
30 usitata *tr. V ante* apud
31 convenientius *L[EN]*
32–33 nomina...earum *om. L[E]*
33 mensis *LV[NPE] om. B[ASFCG]*

of a thing, just as Aristotle says that an accident is not *being* but is *of being*, that is, a disposition of being.[3] Therefore this "time" is said to be a being or a thing [only] equivocally. Nor is it capable of signification in a completely uncomplex way in the manner of substance, but is rather capable of signification [only] in a complex way and, at that, by an imperfect mental complex. Although it is one of those things which are spoken of according to no perfect complex, as Aristotle says,[4] and it is more properly fitting that it be given signification by syncategorematic terms like the temporal adverbs than by nouns, still because of the exigency of speech it is necessary to speak of it by means of a noun.[5]

Therefore, duration or succession of this kind—in whatever way it might be called—is not somehow increased in intensity, but only extended according to before and after. And since it has been said in the preceding chapter that difformity arises from the fact that intensity is diversely extended, therefore time so stated is in no way "difform" or even properly "uniform," as time also is not said to be "quick" or "slow."[6] However, time can be said improperly to be uniform, since that duration which is time in the aforesaid way is not properly measured except by uniform motion, i.e. regular motion. Accordingly, in another signification used by Aristotle, time is spoken of from the motion by which the previously mentioned enduring duration is conveniently measured by us, namely, from the motion of the heavens.[7] Therefore, certain nouns signifying revolutions or parts of revolutions of the heavens are said to be nouns signifying time, as "hour," "day," "month," "year," and so on. And since by such a revolution or its part we measure or number a complete large motion, as when we say "there are one thousand years," or "there are one thousand days," etc., hence it is that time is said to be "the number of motion." Further, since the same motion of the heavens suffices for measuring all the durations of mutable things which are simultaneous, or of which one is not prior to another, therefore it is accordingly said that the time is the same in the heavens, on the sea, or on earth.[8] But although time assumed in this way is identified with motion which *is* uniform or difform, still motion does not measure durations by reason of its difformity. And according to this, although motion is time and it is assumed also that no other time would exist, still, because by the noun "time" intensity is not connotated and intensity is required for uniformity and difformity, therefore [we conclude that] in whatever way time exists, in no way is it said to be "difform," or, [even] properly, "uniform."

[3] *Ibid.*, line 14.
[4] *Ibid.*, lines 17–19.
[5] *Ibid.*, lines 19–21.
[6] *Ibid.*, lines 26–27.
[7] *Ibid.*, lines 27–32.
[8] *Ibid.*, lines 39–40.

36 mille[1]: tot *L[EN]* / sunt [1] *om. L*
37 Rursum: Rursus *L* / cum: tam *V*
41 tamen: et tamen *L*
42 difformitatem: diversitatem difformitatis *[PFM]* diversitatem difformitas *[C]* / durationes *L[E]*
43 aliud tempus *tr. V*
44 temporis: motus *L[E]*
45 ideo: et ideo *L*
46 proprie: etiam *L[E]* etiam proprie *[MP]*

[II.iii] Capitulum 3^m^ de quantitate intensionis velocitatis

Cum utraque uniformitas motus primo capitulo posita consistat in intensionis equalitate et utraque difformitas ex inequalitate proveniat premittendum est penes quid attendatur quantitas gradualis intensionis ipsius velocitatis. Verumptamen circa velocitatem tria sibi invicem propinqua possunt considerari. Unum est quantitas ipsius velocitatis totalis pensatis intensione et extensione, et de hoc dicetur in tertia parte huius tractatus que erit de mensuris qualitatum et velocitatum. Aliud quoque potest ibi considerari, scilicet denominatio qua subiectum dicitur tale fieri velocius aut tardius, de quo etiam dicetur in capitulo sequenti. Tertium est ipsa gradualis intensio que facit ad istud propositum, et de qua nunc dicendum est. Dico ergo quod universaliter ille gradus velocitatis est simpliciter intensior sive maior quo in tempore equali plus acquiritur vel deperditur de illa perfectione secundum quam fit motus. Verbi gratia, in motu locali ille gradus velocitatis est maior et intensior quo plus pertransiretur de spatio vel de distantia, et in alteratione similiter ille gradus velocitatis est maior quo plus acquireretur vel deperderetur de intensione qualitatis, et ita in augmentatione quo plus acquireretur de quantitate et in diminutione quo plus deperderetur de quantitate vel de extensione, et ita generaliter ubicunque reperiretur motus.

[II.iv] Capitulum 4^m^ de diversis modis velocitatis

Non est pretermittendum quod idem motus vel fluxus multis nominibus diversimode connotantibus appellatur et secundum hoc velocitas denominans diversimode attenditur sive mensuratur, ita quod quantitas intensionis gradualis multis modis assignatur, quibus tamen convenit descriptio prius dicta in capitulo precedenti.

Verbi gratia, primo in motu circulari mobile dicitur moveri et dicitur

II.iii: BVL
1 intensionis velocitatis *tr. L[E]*
2 primo: ex primo *L[EN]* / posita *om. L[E]*
8 quoque: etiam *L*
9 aut: vel *L[G]* sive *[A]*
11 istud *V[ESN]* illud *L[PM]* id *B[AFCG]* / et *B[AFMPCSG] om. LV[EN]* / qua: quod *L* / dicenda *B* / ergo *BV[APCGM]* igitur *L[ENFS]*
11–12 quod universaliter *tr. L[EN]*
12 universaliter *tr. [FMP] ante* est / quo: alio *[FMP]*
14 velocitatis: motus vel velocitatis *[FMP]*
14–15 maior et intensior *B[SG]* maior (quo plus acquiretur aut deperderetur de intensione) et intensior *[A]* maior vel intensior *[FMP]* maior sive intensior *[C]* intensior et maior *L[EN]* intensior sive maior *V*
16 velocitatis *om. V*
17 de: in *B*
18 acquireretur *om. V*
19 reperiretur *BV[AFSG]* reperitur *[ENMP C]* reperiuntur *L*

II.iv: BVL
2 idem: idem est *L*
2–3 nominibus diversimode *tr. LV*
3–4 denominans: denominata *L[E]* denominata nominans *[N]*
4 *post* quod *add. B* quantitas intensionis sive mensuratur ita quod
7 movere *V*

II.iii On the quantity of the intensity of velocity

Since each uniformity of motion posited in the first chapter consists in equality of intensity and each difformity arises from inequality [of intensity] we ought to set out first [the measure of gradual intensity, i.e. we ought to specify] with what the gradual intensity of the velocity is measured. However, in the matter of velocity three closely related ideas can be considered. One is the total quantity of the velocity taking into account both intensity and extension. I shall speak of this in the third part of this tract, which will be concerned with the measures of qualities and velocities. Another thing to be considered in connection with velocity is the denomination in terms of which a subject is said to become such a kind more quickly or more slowly. I shall also speak of this in the following chapter. Third, there is the gradual intensity [of velocity]. This is the subject which must now be considered. Therefore, I say universally that that degree of velocity is absolutely more intense or greater by means of which in an equal time more is acquired or lost of that perfection according to which the motion takes place.[1] For example, in local motion that degree of velocity is greater and more intense by means of which more space or distance would[2] be traversed. In alteration, similarly, that degree of velocity is greater by means of which more intensity of quality would be acquired or lost; and so in augmentation, by means of which more quantity is acquired, and in diminution, by means of which more quantity or extension is lost. And so generally [our definition would hold] wherever motion would be found.

II.iv On diverse ways of [considering] velocity

We must not overlook the fact that the same motion or flux is called by many names that connote a variety of things, and, according to the denomination, velocity is attended or measured in a variety of ways, so that the quantity of gradual intensity is assigned in diverse ways, with which, however, the definition stated earlier in the preceding chapter is in accord.

For example, first, in circular motion a mobile is said "to be moved" and it is

II.iii
[1] See the Commentary, II.iii, lines 11–14.
[2] *Ibid.*, line 15.

circuire. Intensio autem velocitatis motionis attenditur penes spatium lineare quod illo gradu pertransiretur. Sed intensio gradus velocitatis circuitionis attenditur penes angulos circa centrum descriptos. Inde contingit quod aliquod mobile ad aliud comparatum circulariter motum velocius movetur et tamen minus velociter circuit, sicut forsan Mars velocius movetur quam sol et hoc motu proprio propter magnitudinem circuli descripti et tamen sol velocius circuit et velocius revolvitur circa centrum. Contingit etiam ex hoc quod celum movetur difformiter sed circuit uniformiter. Nam partes que sunt versus polos tardius moventur quam alie et tamen equevelociter circueunt sicut et alie. Astrologi vero magis attendunt ad velocitatem circuitionis quam ad velocitatem motionis.

Item in motu recto, verbi gratia, in motu descensus, velocitas motus attenditur penes spatium pertransitum. Velocitas autem descensus attenditur penes appropinquationem ad centrum. Ideo possibile est quod *A* et *B* equevelociter moveantur et tamen non equevelociter descendant, eo quod *A* movebitur per lineam rectam ad centrum et *B* per lineam transversalem, et ideo *A* descendet velocius quam *B* et tamen *B* equevelociter movetur. Similiter cum descensus attendatur penes proportionem approximationis ad centrum, continget quod illud quod uniformiter movebitur sive regulariter per lineam directam a centro difformiter descendet, quia velocius appropinquabit centro de prope quam de longe, semper tamen stante equali velocitate motus.

Rursum in alteratione contingit quod eadem alteratio est dealbatio et assimilatio et tamen subiectum velocius dealbatur quam alteri assimilatur aut econverso. Ymmo aliquando subiectum intenditur in albedine et remittitur in similitudine, et aliquando econtra, et ita de aliis.

Item in augmento velocitas acquisitionis attenditur penes quantitatem acquisiti sed velocitas maiorationis seu augmentationis attenditur penes proportionem magnitudinis que est in principio motus ad magnitudinem que est in fine, et ita proportionaliter de partibus augmentationis. Ideo aliquod mobile quandoque velocius acquirit magnitudinem quam illud aliud

9 illo: isto *V*
12 moveretur *B*
15 sed: et *L*
17 circuentur *L*
20–21 penes...attenditur *om. V*
22 et: et utrunque deorsum et *L[E]* et tamen hoc deorsum *[N]* / eo: scilicet *L[E]*
23 rectam *LV[ENPFMC]* directam *B[ASG]*
24 descendit *V* / et *L[EG]* quod *V[AN]* quoque *B* cum *[FMPCS]* / moveatur *[FMPCS]*
25 descensus: velocitas descensus *L[E]* / attenditur *B* / approximationis: appropinquationis *L[C]*
27 a centro: ad centrum *L[E]*
27–28 appropinquabit centro: centro appropinquat *L*
30 alteratio est: albatio et *L* albatio est *[EN]*
34 Item: Item dicitur *L*
34–35 penes...attenditur *om. [F] sed hab. [M]*
37 proportionabiliter *L*
38 illud *B[N] om. [E]* istud *LV* id *[ASG]* unum *[FMPC]*

said "to circuit." Now intensity of the velocity of motion is attended with [or is measured by] the linear space which would be traversed by [something in motion at] that degree. But the intensity of the degree of circuit velocity [i.e. angular velocity] is attended with [or is measured by] the angles described about the center.[1] So it happens that one body in circular motion in comparison to another "is moved" more quickly yet "circuits" less quickly, as perhaps Mars is moved in its proper [curvilinear] motion more quickly than the sun because of the [larger] magnitude of the circle described and yet the sun circuits and revolves about the center more quickly. It also happens from this that the heavens are "moved" difformly but "circuit" uniformly. For the parts which are near the poles are moved more slowly than the other parts and yet they all circuit with equal velocity. Astronomers in fact pay more attention to angular velocity than to the velocity of [curvilinear] motion.

Also, in rectilinear motion, as in motion of descent, the velocity of "motion" is attended with [i.e. is measured by] the space traversed. But velocity of "descent" is attended by [its] approach to the center.[2] Therefore, it is possible for *A* and *B* "to be moved" with equal speed and yet not "to descend" equally quickly if *A* is moved along a straight line to the center and *B* along a transversal course; and therefore *A* descends more quickly than *B* but *B* has the same velocity of motion. Similarly, when descent is [considered] a function of the proportionate nearness to the center, it [could] happen that something which will be moved uniformly or regularly[3] on a straight line drawn from the center will [however] descend non-uniformly, because it will approach the center [proportionately] more quickly when it is near the center than when it is far from the center, and yet it continues always to have the same velocity of motion.

Again, in alteration it happens that the same [motion of] alteration is a "whitening" and an "assimilation," and the subject is more quickly "whitened" than it is "assimilated," or vice versa. In fact, sometimes the subject is increased in intensity with respect to whiteness but remitted in respect to similitude, and sometimes vice versa, and similarly for other alterations.

In augmentation, moreover, the velocity of acquisition is attended with [i.e. is measured by] the quantity of that which is acquired, but the velocity or [proportionate] increase or augmentation is attended with [i.e. measured by] the ratio of the magnitude in the beginning of the motion to the magnitude at the end, and thus proportionally for the parts of the augmentation. Therefore, one mobile some-

II.iv

1 See the Commentary, II.iv, lines 7–10.
2 *Ibid.*, lines 19–29.
3 For the significance of the expression *uniformiter movebitur sive regulariter*, see my earlier remarks in the Commentary, II.i, lines 23–25, 33–34.

demonstratum et tamen tardius augmentatur, sicut arbor magna que crescit in die de duobus digitis et arbor parva de uno digito, magna enim arbor velocius acquirit magnitudinem et tardius augmentatur. Aliquando autem contingit econverso. Unde patet quod si velocitas acquisitionis quantitatis est uniformis, velocitas augmentationis erit difformis et etiam econverso; et ita conformiter de diminutione. Simili modo in rarefactione idem fluxus est motus partium seu punctorum ipsius mobilis et rarefactio eiusdem et tamen si rarefactio est uniformis motus localis partium vel punctorum erit in velocitate difformis.

Verumptamen universaliter in omnibus ille gradus velocitatis est intensior sive maior quo in tempore equali subiectum fit magis tale secundum illam denominationem qua dicitur velociter acquiri, quecunque sit illa. Verbi gratia, gradus velocitatis descensus est maior quo subiectum mobile magis descendit vel descenderet si continuaretur. Similiter gradus circuitionis est maior quo magis circuiret, et gradus assimilationis maior quo fieret similius, et gradus augmentationis maior quo fieret maius in equali tempore, et sic de omnibus aliis. Et sicut iam dictum est secundum multiplices denominationes multipliciter variatur sive denominatur velocitas, et per consequens diversificatur uniformitas atque difformitas. Verum quia ad quedam est motus per se ut potissime ad qualitatem et ubi, ad alia vero per accidens ut ad alias denominationes premissas sicut sunt proportiones, relationes et similia. Ideo principaliter intendo dicere de uniformitate et difformitate motus localis et alterationis. De aliis tamen posset dici conformiter sicut dicetur de istis.

[II.v] Capitulum 5^m^ de quibusdam aliis successionibus in motu

Preter triplicem divisibilitatem vel successionem repertam in motu et in primo capitulo assignatam adhuc possent ymaginari due alie successiones in

39 demonstratum *B[APFMCS] om. L[N]* demonstratur *V* denominatur *[G]* seu augmentationem *[E]*
44 Simili modo: similiter *L[E]*
45 eiusdem: ipsius *V*
46 vel: seu *L* / erit: est *L*
49 tale: tale aut tantum *L*
50 velociter *BV[ANSG]* velocitas *L[EPFMC]*
51 quo: qua *V* / subiectum: solum *V*
52 vel: vel magis *L[E]* / continuaretur: continuaretur descensus *L*
53 quo: quo subiectum mobile *L[E]*
54 maius *om. L[E]* / tempore: tempore maior proportio ad proportionem *L* tempore maior proportio aut minorem aut priorem

times demonstratively acquires magnitude more quickly than another and yet is augmented more slowly. An example is that of a large tree which grows in one day an amount of two digits and a small tree [which grows in the same time] an amount of one digit. For the large tree more quickly acquires magnitude and [yet] is more slowly augmented. But sometimes the reverse happens. Whence it is evident that if the velocity of acquisition of magnitude is uniform, the velocity of augmentation will be non-uniform and also vice versa. The same thing holds for diminution. Similarly in rarefaction the same flux is represented both by the motion of the parts or points of the mobile and by the rarefaction of the same body, and yet if the rarefaction is uniform the local motion of the parts or points will be difform in velocity.

However, [in spite of all these distinctions it can be said] universally, in all things, that that degree of velocity is more intense or greater by means of which in an equal time the subject becomes more of the kind according to whose denomination the velocity of acquisition is defined—whatever that particular denomination may be. For example, [that] degree of the velocity of descent is greater by means of which a mobile descends more [in the same time], or would descend more if it were continued. Similarly [that] degree of circuiting is greater by means of which something would circuit more [in the same time], and the degree of assimilation is greater by means of which something becomes more like something else [in the same time], and [that] degree of augmentation is greater by means of which something becomes larger in the same time, and similarly for all other cases. And so, as now has been said, velocity is denominated, or is varied in many ways according to many denominations. Consequently uniformity and difformity are diversified. This is true because, with respect to certain things—chiefly quality and place—there is motion per se; while, with respect to others, such as those things with other denominations premised, like ratios, relations, and similar things, there is motion in an accidental way. I intend, therefore, to speak chiefly of the uniformity and difformity of local motion and alteration. However, we could speak in the same way concerning the others as we speak of these.

II.v On certain other successions in motion

In addition to the threefold divisibility or succession found in motion and specified in the first chapter, two further successions in motions can be imagined—

[E]
55 omnibus aliis *L[EFMPSC]* aliis in omnibus *B[AG]* aliis motibus *V* aliis *[N]* / multiplicationes *V*
56 multipliciter *om. L[E]* multiplicitas *V*
58 ubi: ad ubi *V*
59 premissas: predictas *V*
60 principaliter: proportionaliter *V*
62 dicetur *tr. L post* istis

II.v: BVL
1 in motu *L[AFEG] et cf. tab. cap.; om. BV*
2 et *om. L*