70 qualitatum et velocitatum difformium. 8ᵐ de mensura et intensione in infini-
tum quarundam difformitatum. 9ᵐ de quodam [alio] exemplo. 10ᵐ quoddam
aliud exemplum de difformitate composita ex partibus uniformibus et
uniformiter difformibus. 11ᵐ de mensura et extensione in infinitum qualitatis
finite seu velocitatis. 12ᵐ de infinita extensione secundum quid et mensura
75 qualitatis finite et uniformis. 13ᵐ de infinita extensione simpliciter qualitatis
finite atque difformis.

[Capitula prime partis]

[I.i]   Capitulum primum de continuitate intensionis

Omnis res mensurabilis exceptis numeris ymaginatur ad modum quanti-
tatis continue. Ideo oportet pro eius mensuratione ymaginari puncta, lineas
5   et superficies, aut istorum proprietates, in quibus, ut vult Philosophus,
mensura seu proportio per prius reperitur. In aliis autem cognoscitur in
similitudine dum per intellectum referuntur ad ista. Etsi nichil sunt puncta
indivisibilia aut linee, tamen oportet ea mathematice fingere pro rerum
mensuris et earum proportionibus cognoscendis. Omnis igitur intensio
10 successive acquisibilis ymaginanda est per lineam rectam perpendiculariter

70 qualitatum *om.* L | qualitatum et velocita-
tum: velocitatum qualitatis C / difformium:
difformiter difformium E | et² *om.* S | inten-
sione *corr. ex* extensione (*vid. cap. III.8*) |
in *om.* FM

71 difformitatum: difformitatum difformiter
difformibus (!) A qualitatum E | quodam:
quorundam F | [alio] *supplevi, cf. III.ix.1*

71-72 quoddam...de: de quodam alio exem-
plo et N

72-73 de (et N)...difformibus BFMNS *om.*
P difformitatis composite ex partibus uni-
formibus A de difformitate ELC

73 et: seu E

74 seu: vel N sive AE | secundum: propter
EL | quid: quam A

75 uniformis: uniformitatis E | infinita ex-
tensione simpliciter BFM *et cf. III.xiii.1*
extensione simpliciter infinita AELNPSC
| qualitatis² *om.* M

76 atque: et N | *post* difformis *add.* B Expli-
ciunt capitula tertie partis | *post* difformis
add. E Explicit tabula capitulorum deo
gratias | *post* difformis *add.* FM et sic est
(erit M) finis intencionum omnium capi-
tulorum huius libri divisi in tres partes et
cetera | *post* difformis *add.* L Tunc sequitur
prima pars

I.i: AEBVDLNFMPCSG[J]

1 [Capitula prime partis] B, *om. alii* MSS
prima pars tractatus [J]

2 Capitulum...intensionis BVEG *om.*
ADLNMS[J] de continuitate intensionis
capitulum primum F Primum capitulum
prime partis P Prima propositio *mg.* C 1
mg. S

3 Omnes res mensurabiles NC | ymaginan-
tur C

4 mensurationem S mensura [J]

qualities and velocities. 8. On the measure and intension to infinity of certain difformities. 9. Another example of the same. 10. A certain other example of a difformity composed of uniform and uniformly difform parts. 11. On the measure and extension to infinity of a finite quality or velocity. 12. On the qualified infinite extension and measure of a finite and uniform quality. 13. On the absolute infinite extension of a finite and difform quality.

Chapters of Part I

I.i   On the continuity of intensity

Every measurable thing except numbers is imagined in the manner of continuous quantity. Therefore, for the mensuration of such a thing, it is necessary that points, lines, and surfaces, or their properties, be imagined. For in them (i.e. the geometrical entities), as the Philosopher has it,[1] measure or ratio is initially found, while in other things it is recognized by similarity as they are being referred by the intellect to them (i.e., to geometrical entities). Although indivisible points, or lines, are non-existent, still it is necessary to feign them mathematically for the measures of things and for the understanding of their ratios.[2] Therefore, every intensity which can be acquired successively ought to be imagined by a straight line perpendicular-

I.i

[1] See the Commentary, I.i, line 5.   [2] *Ibid.*, lines 7–9.

4–5 lineas et superficies: superficies et lineas *AP*

4 lineas: linea *N*

5 et: aut *G* / ut...Philosophus: secundum philosophum *[J]* / Philosophus *BVLF-MSCGD* Aristoteles *AENP*

6 seu: et *M* / per prius: proprius *GS(?)* prius *E* / autem: aut *A*

7 dum *BVFMSCG* qua *ENL* que *P* qui *A*

/ per intellectum *tr. N post* referuntur / ad ista *tr. N post* qua *quod stat in loco* dum / ista: illa *G* / nichil sunt: non sint *G*

8 mathematice *om. AP* / fingere: sumere *E*

9 proportionibus: proprietatibus et proportionibus *M* / igitur: ergo *G* aut *C*

10 ymaginanda est *tr. FM post* intensibilis *in linea 11*

11 aliquod punctum *BVFMSCG[J]* aliquot

erectam super aliquod punctum spatii vel subiecti illius rei intensibilis, ut, verbi gratia, qualitatis. Nam quecunque proportio reperitur inter intensionem et intensionem de intensionibus que sunt eiusdem rationis similis proportio invenitur inter lineam et lineam et e contra; quemadmodum enim una

15   linea alteri linee est commensurabilis et alteri incommensurabilis, ita est conformiter de intensionibus quod quedam sunt commensurabiles adinvicem et quedam incommensurabiles quomodolibet propter continuitatem earundem. Ergo mensura intensionum potest ymaginari congrue sicut linearum mensura, cum etiam intensio possit eodem modo sicut linea in infinitum diminui

20   et quantum est ex se in infinitum augeri.

Rursum intensio secundum quam aliquid dicitur magis tale, ut magis album aut magis velox; ipsa quidem, secundum quod intensio vel intensio puncti est tantum uno modo divisibilis et in infinitum ad modum continui, igitur non potest convenientius ymaginari quam per illam speciem continui

25   que est primo divisibilis et uno modo tantum, scilicet per lineam. Et quoniam linearum quantitas sive proportio notior est et facilius a nobis concipitur, ymmo linea est in prima specie continuorum, ideo per lineas ymaginanda est intensio talis—maxime vero et convenientissime per illas que subiecto applicate super ipsum perpendiculariter eriguntur, quarum consideratio ad

30   cuiuslibet intensionis notitiam naturaliter iuvat et ducit, prout ex 4^0 capitulo sequenti plenius apparebit. Ideoque intensiones equales per equales lineas designantur et dupla intensio per duplam lineam et sic semper proportionaliter procedendo. Et istud est universaliter intelligendum de omni intensione ad ymaginationem divisibili, sive sit intensio qualitatis active sive non

35   active, sensibilis sive insensibilis subiecti aut obiecti aut medii, ut de luce

punctum *N* aliquod punctum aut (vel *E*) aliquot puncta *AEP* aliquot puncta *LD* / spatii: intensibilis spacii *AP* / subiecti: spacii subiecti *B* / illius...intensibilis *om.* *AP* / rei *om.* *F*

11–12 ut...qualitatis *VSG* ut gratia qualitatis *C* verbi gratia ut qualitas *FM* ut verbi gratia *BLN* verbi gratia *AEP*

12 Nam. *om. LN lac. V* / quecunque: qualiscunque *AELNP* / reperitur: invenitur *E*

13 et intensionem *om. FM* / que: qualitatis (?) que *B* quod quedam *F*

14 invenitur: reperitur *VAE* / et lineam *om. FM* / e contra: e converso *FM* / enim *om. AP* nisi *C*

14–15 una linea *tr. S*

15 linee *om. AL* / est *tr. VM post* linea / et... incommensurabilis *om. C* / et *om. PCFM*

17 quedam: quidem *S* / quolibet *M* / earundem *ABENP* earum *VS* eorum *FMCG*

corundem *L*

18 Ergo: igitur *AVES* / ymaginari congrue *tr. N*

19 possit: posset *M* / possit...modo: eodem modo possit *C* / diminui: dividi et diminui *FM* / diminui *tr. C ante* sicut

20 quantum: quantitas *FM* / ex: de *AP* / in infinitum *om. G*

21 Rursum: Et rursum *AELNP* / *post* intensio *sup. scr. m. rec. C* est / aliquid: aliquod *AP* / dicetur *B* / magis tale: magis clare *A et add. A ante* dicitur / tale: tale aut minus tale *E* / ut magis: et minus *A* ut minus *P*

22 *post* album *add. F* aut niger / aut: vel *V* / magis: minus *E* / intensio[1]: extensio *A* est intensio *S*

22–23 vel intensio puncti *ABVCS om. FM* ut intensio puncti *G* vel extensio puncti *LNPD* ut extensio puncti *E*

23 tantum: cum *L* / et: etiam *G*

ly erected on some point of the space or subject of the intensible thing, e.g., a quality. For whatever ratio is found to exist between intensity and intensity, in relating intensities of the same kind, a similar ratio is found to exist between line and line, and vice versa. For just as one line is commensurable to another line and incommensurable to still another, so similarly in regard to intensities certain ones are mutually commensurable and others incommensurable in any way because of their [property of] continuity. Therefore, the measure of intensities can be fittingly imagined as the measure of lines, since an intensity could be imagined as being infinitely decreased or infinitely increased in the same way as a line.

Again, intensity is that according to which something is said to be "more such and such," as "more white" or "more swift." Since intensity, or rather the intensity of a point, is infinitely divisible in the manner of a continuum in only one way, therefore there is no more fitting way for it to be imagined than by that species of a continuum which is initially divisible and only in one way, namely by a line. And since the quantity or ratio of lines is better known and is more readily conceived by us—nay the line is in the first species of continua, therefore such intensity ought to be imagined by lines and most fittingly by those lines which are erected perpendicularly to the subject. The consideration of these lines naturally helps and leads to the knowledge of any intensity, as will be more fully apparent in chapter four below. Therefore, equal intensities are designated by equal lines, a double intensity by a double line, and always in the same way if one proceeds proportionally. And this is to be understood universally in regard to every intensity that is divisible in the imagination, whether it be an active or non-active quality, a sensible or non-sensible subject, object, or medium. For example, it is to be understood in regard to the light of the body of the sun, to the illumination of a medium, or to a species in the medium, to a diffused influence or power, and similarly to others, with the

24 igitur *VLNS* ergo *BFMG* et ideo *AEP* /
    igitur...continui *om. C* / convenientius
    ymaginari *tr. V*
25 que: qui *A* / est primo *BVFMS tr.*
    AELNPCGD
26 sive: seu *A* / est *om. N*
26–27 concipitur: percipitur *M* corrupitur
    (!) *C sed add. m. rec. mg.* vel concipitur
27 ymmo: ymo *FNA* ideo *C* / linea est: primo est linea *E* / lineas: lineam *S*
27–28 ymaginanda est *tr. N*
28 vero: enim *VS(?)* / per illas *om. G* per illos
    C
29 super ipsum *om. G* / ipsum *om. C* ipsam *L* /
    eriguntur quarum *tr. L* / quarum: quorum
    V quare *A* et *S* / ad: a *P*

30 cuiuslibet: cuiuscunque *BVG* cuiuscuiuslibet *C* / naturaliter iuvat *tr. G* / ex: in
    AELPC / 4° capitulo *tr. N* primo capitulo
    C
31 apparebit: patebit *A, et mg. add. C* conclusio
31–32 per...intensio *om. AP*
32–33 proportionaliter: proportionabiliter
    CG
33 istud: illud *N* / est universaliter *tr. V*
34 divisibilis *A* / sit: sit etiam *V* / intensio
    om. FM
35 *ante* sensibilis *add. AELNP* sive / insensibilis: non sensibilis *C* / aut¹: sive *APM*
    vel *BF* / aut²: vel *BVSG* / de *om. CSG*
35–36 luce corporis: corporis *G* corpore *VC*

corporis solis et de lumine medii, vel de specie in medio, vel influentia aut virtute diffusa, et sic de aliis, excepta forsitan intensione curvitatis, de qua dicetur ad partem in capitulis 20° et 21° huius partis.

Huiusmodi vero linea intensionis de qua nunc dictum est non extenditur
40   extra punctum vel extra subiectum secundum rem sed solum secundum ymaginationem, et ad quamvis partem nisi quod convenientius ymaginatur in sursum perpendiculariter stare super subiectum qualitate informatum.

[I.ii]   Capitulum secundum de latitudine qualitatum

Omnis intensio per predictam lineam designata proprie vocari deberet longitudo illius qualitatis, primo quidem quia in alteratione continua [essentialiter] non exigitur successio secundum extensionem sive secundum partes
5   subiecti [quia potest totum simul incipere alterari] sed ibi requiritur successio secundum intensionem. Ergo sicut in motu locali illa dimensio dicitur longitudo spatii seu vie secundum quam exigitur successio, ita conformiter huiusmodi intensio secundum quam requiritur successio deberet dici longitudo ipsius qualitatis. Item sicut velocitas in motu locali secundum longitudinem spatii mensuratur, ita in alteratione velocitas attenditur penes intensionem. Ergo talis intensio deberet dici longitudo. Item nulla qualitas alteratione acquisibilis potest ymaginari sine intensione seu divisibilitate secundum intensionem, sed bene potest ymaginari sine extensione; ymmo qualitas subiecti indivisibilis, ut anime vel angeli, non habet extensionem.
15   Cum igitur ymaginetur mathematice longitudo sine latitudine et non e converso, et intensio sit referenda ad aliquam dimensionem, ut patet ex

prius (?) corporis *S*

36 et: aut *E* / vel¹: et *VE* / vel²: vel de *E* / aut *om. FM* vel *B*

37 virtute diffusa: divina virtute infusa *FM* / forsitan: forte *N* / de curvitatis *scr. m. rec. C in mg.* vel caritatis

38 ad partem: post *N* partialiter (?) *E* / in *om. S* / capitulo *V* / 20° et: 2° *N* 7° *C* / huius: istius *V* / huius partis *om. G*

39 Huiusmodi: huiusmodi c̄o̅t (?) *C* / vero: vera *C* / extendit *C*

40 extra¹: ultra *M* / subiectum: san¹ (?) *C* / solum *om. AP*

41 in *om. AEP*

42 sursum: situ sive *S* / informatum *VEMNSG* formatum (?)*B, AFLPCD*

I.ii: BV AEDLNFMPCSG

1 Capitulum secundum *BVELPSCD om. ANM, tr. FG post* qualitatum / de... qualitatum *BVE(?)FG om. ANPMS* de latitudine qualitatis *LD* de velocitate qualitatis *C*

2 Omnis *BVSCGM* Omnis igitur *AELPD* Omnis ergo *FN* / designata: ymaginata *FM* distincta *A* / vocari deberet *BLND* vocari debet *VFMSCG* debet vocari *EP* deberet vocari *A*

3 longitudo: eius longitudo *C* / illius *om. F* / quidem: igitur quidem *L* igitur *N* / quia *om. N*

3–4 [essentialiter] *AELNPD om. BVFMSCG*

4 exigitur: requiritur *E* / secundum² *om. N*

possible exception of curvature, concerning which we shall speak in a limited way in chapters twenty and twenty-one of this part [of our work].

Of course, the line of intensity of which we have just spoken is not actually extended outside of the point or subject but is only so extended in the imagination, and it could be extended in any direction whatever except that it is more fitting to imagine it standing up perpendicularly on the subject informed with the quality.[3]

I.ii   On the latitude of qualities

Every intensity designated by the aforesaid line ought properly to be called the longitude of the quality.[1] This is primarily because in continuous alteration succession according to the extension or parts of the subject is not [essentially] demanded, [for the whole subject can begin to be altered simultaneously], but succession according to intensity is required there. Therefore, just as in local motion that dimension according to which succession is demanded is called length of space or path, so similarly intensity of this sort according to which succession is required should be called the longitude of this quality. Also, just as velocity in local motion is measured according to length of space, so velocity in alteration is a function of intensity. Therefore, such intensity should be called longitude. Also, no quality acquirable by alteration can be imagined without intensity or divisibility according to intensity, but it can well be imagined without extension. Nay, a quality of an indivisible subject, such as a soul or an angel, does not have extension. Since, therefore, length is imagined mathematically without breadth but not conversely, and since intensity ought to be referred to some dimension, as is evident in the

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[3] *Ibid.*, lines 40-41.

I.ii

[1] See the Commentary, I.ii, lines 2-24.

5 [quia...alterari] *AELNPD om.*
  BVFMSCG | potest totum *EP tr. LND*
  possunt (?) totum *A* | ibi *om. AEP*

6 Ergo: igitur *LND* ideo *APE* | dicitur
  VFMSG dicetur *BC* diceretur *AELNPD*

7 seu: sive *P*

8 intensio: enim intensio *L* | debet (?) *BC*

9 ipsius: illius *FNMC et tr. N post* qualitatis
  | Item: Et *NS* | locali *om. E*

10 spatii *tr. V post* mensuratur

11 Ergo: igitur *VNSG* | debet (?) *VCE* |
  Item: 3º *N* | *post* qualitas *add. P* neque |
  post qualitas *add. E* in

12 alteratione: alterative *G* | seu: sex (?) *V*
  aut *EAP* sive *S* | divisibilitate: difformitate *A* diversitate *LD*

13 bene potest *tr. AE* | extensione: intensione
  L

14 *post* anime *add. E* intensive | habent *FS*

15 ymaginetur: imaginatur *AEP* | mathematice *tr. AEP post* latitudine | longitudo:
  loquendo *L* | et *om. B*

16 et: et cum *ELNP* et tamen *A* | referenda:
  differenda *A* | ex: in *AELNP*

17 precedenti capitulo *tr. AN* | est: esset
  BSG | non: et non *AELNPG*

caretur latitudo et intensio longitudo. Verumtamen quia extensio est manifestior et palpabilior, ut ita loquitur, et prior cognitione quo ad nos quam sit intensio, et forsan quo ad naturam, ideo non obstantibus predictis ipsa extensio secundum communem usum loquendi attribuitur prime dimensioni, scilicet longitudini, et intensio latitudini. Et quoniam differentia huiusmodi impositionis seu improprietas vocationis nichil facit ad rem sed utroque modo potest idem exprimi, volo sequi modum communem ne propter locutionem inconsuetam illa que dicam minus leviter intelligantur. Extensio igitur qualitatis in nomine dei vocetur eius longitudo et intensio ipsius vocetur latitudo sive altitudo. Sed qualitercunque sit, patet ex dictis quod quidam moderni non bene vocant latitudinem qualitatis ipsam totam, sicut abusio esset per latitudinem superficiei intelligere totam superficiem vel figuram. Nam quemadmodum alique latitudines superficierum sive figurarum inequalium sunt equales ita similiter, sicut postea videbitur, multe latitudines qualitatum inequalium sunt equales aut etiam econverso.

[I.iv] Capitulum 4ᵐ de quantitate qualitatum

Cuiuslibet linearis qualitatis quantitas ymaginanda est per superficiem cuius longitudo seu basis est linea in subiecto quali protracta, ut dicit precedens capitulum, et cuius latitudo seu altitudo designatur per lineam super basim predictam perpendiculariter erectam secundum quod ponit capitulum

15 intensio: intensio vocaretur *N* | Verumtamen *APCE* verum *BVFMSG* verum est tamen *LND* | quia: quod *LND* | extensio: intensio *LND*

16 et² *om. S* | prior: peior *G*

16–17 quam sit intensio *om. D*

17 intensio: extensio *N* | et *om. AP* | ideo: et ideo *FM* ergo *D* | ipsa *om. AP*

18 usum: modum *AEP*

19 scilicet: et i. (id est?) *V* | longitudo *S*

19–22 Et...intelligantur *om. D*

19 Et: Sed *F* | quoniam: quia *AEP* | quoniam differentia *tr. L* | differentia: natura *FM*

20 huiusmodi: huius *B(?)VFM* | seu: vel *AEP* | proprietas *VFM* | vocationis: locationis *P*

21 ne: nec *L*

22 locutionem: modum loquendi *AP* loqua-

tionem *B* | inconsuetum *AP* | illa: ista *N* | intelligitur *N*

23 igitur: enim *V* ergo *S* | dei: domini *NFM*

23–24 eius...vocetur: ipsius *A*

23 eius *om. D*

24 ipsius: eius *LS et tr. S ante* intensio | ipsius *tr. G ante* latitudo | vocetur *ENPFM om. D* vocatur *L* dicatur *BVSCG* | latitudo sive altitudo: altitudo vel latitudo *P* | sive: seu *ED* vel *AP*

24–29 Sed....econverso *om. D*

24 sit *om. N* | ex dictis *om. V*

25 bene vocant *tr. A* quidem bene vocant *S*

26 esset: est *PLN* | latitudinem superficiei *tr. N* | intelligere...superficiem *om. S*

27 vel: sive *FM* aut *A* | Nam quemadmodum: non quemadmodum *S* quia sicut *AEP* quia quemadmodum *N* | alique: quedam *FM* | alique latitudines *tr. V* | sive: aut *A* vel *LP*

should be called latitude and their intensity longitude. Nevertheless, extension as it is thus spoken of is more manifest, more palpable, and prior in our cognition than is intensity.[1] It is perhaps also prior in nature. Therefore, notwithstanding my previous statements, this extension according to the common practice of speech is associated with the first dimension, namely longitude, and intensity with latitude. And since a difference in the application of [a name of] this sort, or an impropriety in naming, actually has no effect and the same thing can be expressed in either way, I wish [accordingly] to follow the common way. I do this so that those things which I say might not be less easily understood because of unaccustomed locution. Therefore, in the name of God let the extension of a quality be called its longitude and intensity its latitude or altitude. But however this might be, it is obvious from the things said that certain moderns do not speak in the best way when they call the whole of the quality its latitude, just as it would be an abuse [of terminology] to understand by the breadth of a surface the whole surface or figure.[2] For just as the breadths of some unequal surfaces or figures are equal, so, as will be seen later, many latitudes of unequal qualities are equal, or vice versa.

I.iv   On the quantity of qualities

The quantity of any linear quality is to be imagined by a surface whose length or base is a line protracted in a subject of this kind, as the preceding chapter says, and whose breadth or altitude is designated by a line erected perpendicularly on the

I.iii

[1] See the Commentary, I.iii, lines 15–17.   [2] *Ibid.*, lines 24–27.

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28 postea videbitur: patebit postea *AEP*

29 aut: vel *P* | aut...econverso *om. FM* | *post* econverso *add. E* et cetera

I.iv: *BV AP FLS D*—collated throughout; [*MENCG*]—also used, but not completely, and then placed in brackets

1 Capitulum...qualitatum *LBV D[CE] om. AS[MN]* 4^m capitulum *P* De quantitate qualitatum capitulum 4^m *F[G]* 4 c *mg. S* 4 *mg. A*

2 linearis (linealis *B*)...quantitas *BFS [GNM]* qualitatis quantitas linealis (linealis *L[ECD]*) *ALP[CDE]* quantitas linealis qualitatis *V* | ymaginanda est *tr. AP[E]*

3 seu: vel *AP[E]* | pertracta *P[M]*

3–4 precedens capitulum *tr. AP[E]*

4 seu *LPDF[EMN]* sive *BV[CG]* sine *S*

5–6 predictam...qualitatem[2]: aliquem *A*

5 predictam: productam *LPD[EN]* | secundum...ponit: sicut dicit *P[E]* ut ponit *[N]* sicut ponit *D*

secundum. Et intelligo per qualitatem linearem qualitatem alicuius linee in subiecto informato qualitate.

Quod enim quantitas talis qualitatis per huiusmodi superficiem possit ymaginari patet, quoniam contingit dare superficiem illi qualitati equalem in longitudine seu extensione et similem in altitudine eidem qualitati in intensione, ut patebit post. Sed quod per hoc debeamus ymaginari qualitatem ut eius dispositio levius cognoscatur apparet quia eius uniformitas atque difformitas citius, facilius, et clarius perpenduntur quando in figura sensibili aliquod simile describitur quod ab ymaginatione velociter et perfecte capitur et quando in exemplo visibili declaratur. Satis enim difficile videtur quibusdam intelligere que sit qualitas uniformiter difformis. Sed quid facilius quam quod trianguli rectanguli altitudo est uniformiter difformis? Certe hoc apparet ad sensum. Cum igitur intensio huiusmodi qualitatis per altitudinem talis trianguli fuerit figurata et ei assimilata sicut fiet in 8° capitulo, tunc de facili cognoscetur huiusmodi qualitatis difformitas, dispositio, figuratio, et mensura, et ita de aliis. Nec alio modo possent species seu diversi modi difformitatis agnosci nec aliter assignari, sicut patebit capitulis 14° et 15° huius partis. Multum enim iuvat ad cognitionem rerum ymaginatio figurarum, propter quod theologi dicunt illud fuisse figuram alicuius rei ex cuius similitudine in illius rei notitiam poterat deveniri et configurari ei et assimilari. Nam ut dicit Apostolus de Christo quod "reformabit corpus humilitatis nostre, configuratum corpori claritatis sue." Glosa dicit "i.e., assimilabimur corpori illius in claritate."

Nunc autem ad propositum revertendo, sicut punctualis qualitas ymaginatur ut linea et linearis per superficiem, ita qualitas superficiei ymaginatur ut

6 per *om. F[M]* / linearem: linealem *P* / qualitatem² *om. P*

8 enim quantitas *tr. A* / talis qualitatis *tr. LD[E]* talis *A* / huiusmodi superficiem *tr. B*

9 quoniam: quia *AP[EN]*

10 eiusdem *S* / quantitati *P* / in *om. L[N]*

11 patebit post *tr. P[N]* patebit *[G]* / debeamus *bis P*

11–15 Sed...declaratur *om. D*

12 dispositiones *ALP[EN]* / cognoscantur *ALP[EN]* / eius uniformitas *tr. F[M]* / atque: et *AP[EN]*

13 citius: citius et *L[N]* / et *om. B*

14 aliquod: ad(?) *S[C]* aliquid *[NG]*

15 et *om. AP* / enim *om. D*

15–16 quibusdam intelligere *om. AP*

16 que: quid *LPD[EC]* quod *A*

16–17 Sed...difformis *BVAPDF[MECN]*, *mg. L, om. S[G] et text. L*

16 quam: enim *A*

17 quod: quo *AP*

17–23 Certe....partis: cui comparatur talis qualitas *D*

17–18 apparet: patet *A[GN]*

18 huiusmodi *om. F[M]*

19 trianguli: triangli rectanguli altitudo est uniformiter difformis *L* / 8°: 9° *AP* / capitulo *om. S*

20 cognoscentur *FB* / qualitatis difformitas *tr. A* qualitatis difformitas et difformis *L*

21 et...aliis *om. APL[EC]* et cetera *[N]* / species: superficies *A* / seu *om. AP* / diversi modi: diversimode *P*

22 agnosci: cognosci *F[M]* / capitulis: in capitulis *APL[E]*

23 enim: si(?) *A*

24 illud *BVFS[MG]* illam *ALPD[ECN]* / alicuius rei *om. A* alicuius *S[M]*

25 notitiam *tr. V post* in / devenire *F[MN]*

aforesaid base in the way that the second chapter proposes. And I understand by "linear quality" the quality of some line in the subject informed with a quality.

That the quantity of such a [linear] quality can be imagined by a surface of this sort is obvious, since one can give a surface equal to the quality in length or extension and which would have an altitude similar to the intensity of the quality, as will be clear later. But it is apparent that we ought to imagine a quality in this way in order to recognize its disposition more easily, for its uniformity and its difformity are examined more quickly, more easily, and more clearly when something similar to it is described in a sensible figure. [This is true] because something is quickly and perfectly understood when it is explained by a visible example. Thus it seems quite difficult for certain people to understand the nature of a quality that is uniformly difform. But what is easier to understand than that the altitude of a right triangle is uniformly difform? For this is surely apparent to the senses. Therefore, when the intensity of a quality of this sort is figuratively represented by the altitude of such a triangle and is assimilated to it in the manner done in chapter eight, then one recognizes with ease in such a quality its difformity, disposition, figuration, and measure[1]; and similarly for other qualities. Now there is no other way by which the species and diverse modes of difformity could be recognized and otherwise assigned, as will be obvious in chapters fourteen and fifteen of this part. For the imagining of figures is a great help in the understanding of things. Accordingly, theologians say that it was from the similarity of the figure of something that one was able to come into knowledge of that thing and to be conformed and assimilated to it. For as the Apostle says concerning Christ, He "will reform the body of our lowness, made like to the body of His glory."[2] A gloss on this passage says: "i.e. we shall be assimilated to His body in glorification."[3]

Now, reverting to the subject at hand, just as the quality of a point is imagined as a line, and the quality of a line by a surface, so the quality of a surface is imagined

I.iv

[1] See the Commentary, I.iv, lines 8–26.
[2] *Epist. to the Philippians* 3:20–21.

[3] The so-called *Glossa ordinaria*. See the Commentary, I.iv, lines 27–28.

25–28 et[1]....claritate *APLS[CEG] om.* *VBF[M]*

25–26 et[1]....Apostolus: configurari enim i. assimilari unde apostolus ait *S*

25 configurari: figurari *A*

26–44 Nam....apparebit *om. D*

27–29 configuratum...revertendo: et cetera dico igitur quod *[N]*

27 Glosa *L[C]* glo[a] diffinitive *A* glo[a] *PS[EG]* | i.e. *S[CG] cf. glos. ord.* ibi *ALP[E]*

27–28 assimilabimur corpori *glos. ord.* assimilari corpori *P[E]* assimilatum corpori *S[G]* assimilatio in corpora *A* assimilatum corpus *L[?C]*

28 claritate *S[CG] cf. glos. ord.* glorificatione *ALP[E]*

29 Nunc autem: Sed nunc *AP[E]* | punctualis: patet talis *F[M]*

30 linea...ut *om. AP*

corpus cuius quidem corporis ymaginati basis est superficies ipsa informata qualitate prout plenius declarabitur in processu. Cum autem in corpore quali infinite sint superficies [equales] et cuiuslibet earum qualitas ymaginetur ut corpus, non est inconveniens, sed oportet, ymaginari unum corpus

35 secundum situm ubi aliud potest ymaginari simul, vel etiam quodlibet simul, per penetrationem vel per mathematicam suppositionem (!superpositionem?) seu simul positionem corporum sic fictorum; que tamen penetratio non est in re. Et quamvis qualitas superficialis ymaginetur per corpus, et non contingat esse vel ymaginari quartam dimensionem, tamen qualitas corporalis

40 ymaginatur habere duplicem corporeitatem: unam veram ad extensionem subiecti secundum omnem dimensionem, aliam vero solum ymaginatam ab intensione ipsius qualitatis infinities replicabilem secundum multitudinem superficierum subiecti, cuius ymaginationis op⟨p⟩ortunitas prius tacta est et in sequentibus plenius apparebit.

[I.v]   Capitulum 5ᵐ de figuratione qualitatum

Omnis qualitas linearis figuratur ad modum alicuius superficiei super subiectam lineam perpendiculariter erecte. Sit enim AB linea informata qualitate [Fig. 1]. Et quoniam per precedens capitulum qualitas ista designa-

5 tur per superficiem, oportet quod ymaginetur figurata sicut superficies per quam ipsa designatur vel ymaginatur. Cuius quidem superficiei altitudo designat intensionem istius qualitatis. Oportet etiam quod istius superficiei

31 superficies ipsa *tr. A*

32 prout...declarabitur: sicut plenius patebit *A* sicut patebit plenius *P[E]* ut post declaratur *[N]* | in processu *om. [N]* | Cum: nunc *F[M]* | autem: igitur *V*

33 sint: sunt *AF[M]* | [equales] *BVAPSL [EGCN], sed delendum est, sicut in F[M]?*

33-34 ymaginatur *F[MN]*

34 sed oportet *om. L* | sed: sed forte *F[MN]* | *post* ymaginari *add. S* sit

35 secundum situm: sic fictum *F[N]* situm *S* sic infinitum *[C]* | ubi...simulˡ: simul esse ubi aliud *AP[E]* | vel: aut *A* | quodlibet: quomodolibet *F[M]* quolibet *S* quotlibet *[E]* | simul²: sive *A*

36 penetrationes *L[C]* | vel: seu *VF* | per *BSF[CGM] om. V* etiam per *AP[EN]* etiam *L* | suppositionem: positionem *V*

37 positionem: possent *V* | sic *om. AL* | fictorum *BVSF[MN]* situatorum *APL[E]* sitorum *[G]* finitorum *[C]* | *post* fictorum *add. L* secundum infinitatem

38 qualitas *om. L* | ymaginatur *P[N]* | et²: tamen *L* et tamen *[N]*

38-39 contingat *BVFS [MGN]* contingᵗ *APL* contingit *[EC]*

39 tamen *VPLS[EGC]* cum *BAF[M,?N]*

40 *post* duplicem *add. S* ipse

41-42 aliam...multitudinem *om. S*

41 vero *om. F[M]* | solum *VAPF[EGC]* solam *BL[MN]* | solum ymaginatam *tr. A*

42 replicata *L*

44 in sequentibus: post *[N]* | in...apparebit: postea plenius patebit *AP[E]*

as a body whose base is the surface informed with the quality. This will be more fully clarified as we go along. Moreover, since in any kind of a body there is an infinite number of equivalent[4] surfaces and the quality of any one of them is imagined as a body, it is not unfitting but necessary that one body be imagined to be at the same time in the place where another body—or even any other body whatever —is imagined to be. [We can think of this taking place] by penetration or by mathematical superposition[5] or the simultaneous placing of the bodies so imagined. However, this penetration is not real. And although a surface quality is imagined by means of a body and it does not happen that a fourth dimension exists or is imagined,[6] still a corporeal quality is imagined to have a double corporeity: a true one with respect to the extension of the subject in every dimension and another one that is only imagined from the intensity of this quality taken an infinite number of times and dependent upon the multitude of surfaces of the subject. The suitableness of this imagined concept has been touched upon before and will be more fully apparent in what follows.

I.v   On the figuration of qualities

Every linear quality is "figured" (i.e., represented in figures) by means of a surface perpendicularly erected upon a subject line. For let AB be a line informed with a quality [see Fig. 1]. And since by the preceding chapter this quality is designated by a surface, it is necessary that it be imagined as "figured" by the surface by which it is designated or imagined. The latitude of this surface designates the intensity of this quality. It is necessary also that any point of this surface or figure out-

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[4] The Latin text appears to have *superficies equales*. Either the *equales* ought to be deleted, or it is used with the meaning of surfaces that are equivalent or equal in thickness. One would suppose that Oresme would have conceived of them as being of infinitely small thickness, syncategorematically speaking, i.e., that they are thinner than any assignable quantity.

[5] All manuscripts except V (which has *positionem*) have *suppositionem*. However, *superpositionem* makes much better sense and so I have rendered it such in my translation.

[6] See the Commentary, I.iv, line 39.

I.v: BV APFLD [ENMCGS]

  1 Capitulum...qualitatum *BVLD[EC] om. A[M]* 5ᵐ capitulum *P* De figuratione qualitatum capitulum 5ᵐ *F[G]* Capitulum 5ᵐ *[NS]* 5 *c mg. S* 6 *mg. A*

  2 lignealis *A*

  3 lineam *om. [S]* ligneaIem *A*

  4 quoniam: quia *AP[EN]*

  6 ipsa *om. LD[N]* / vel: aut *A* / vel ymaginatur *om. D*

  7 intensionem...qualitatis: qualitatem intensionem *A* / istius¹ *om. ALPD[N]* / Oportet: et oportet *AP[E]* / etiam *om. AP[E]* igitur *G* / istius²: illius *AP* iᵘˢ *[E]* alicuius *[S]* / superficie *A*

vel figure quilibet punctus extra lineam AB subiectam stet perpendiculariter super eandem lineam AB, ut patet per primum capitulum, aliter enim in-
10 tensio et qualitas essent extra subiectum, quia illud quod secundum istam ymaginationem est supra subiectum est secundum rem in subiecto, et econverso, propter quod si quid ymaginaretur super subiectum et non perpendiculariter, illud esset secundum rem extra subiectum. Unde patet quod nulla qualitas ymaginanda est per superficiem vel figuram cuius angulus
15 super basim sit maior recto, sicut esset quadrangulus $ABCD$, neque per circuli portionem semicirculo maiorem, sicut esset portio EFG. Sed per quamlibet aliam figuram planam potest ymaginari aliqua qualitas linearis.

[I.vi] Capitulum 6ᵐ de figurarum dearticulatione

Etsi per quamlibet figuram planam aliam a predictis possit recte ymaginari aliqua qualitas linearis, non tamen quelibet potest ymaginari per quamlibet. Nulla siquidem qualitas linearis ymaginatur sive designatur per aliquam fi-
5 guram nisi quorumcunque punctorum ipsius qualitatis in intensione sit proportio sicut proportio linearum super eadem puncta erectarum perpendiculariter et terminatarum in summitate talis figure ymaginate.

Verbi gratia [Fig. 2], sit linea AB divisa qualitercunque in puncto C sic quod intensio sit [in] duplo maior in puncto C quam in puncto A, et sit in
10 puncto B triplo maior quam in puncto C. Ergo per primum capitulum linea perpendiculariter ymaginata super punctum C denotans intensionem illius

8 perpendiculariter *om. F[M]*
9 ut: ultiam (?) *F* ultimam *[M]* / per *om. P* / capitulum: casum *P* / enim: autem *A*
10–12 quia...quod: unde *D*
11 est¹: esse *P* esset *[E]* / supra *BV[SC]* simpliciter *AP* sicud supra *F[M]* / supra... est *om. L*
11–12 econverso: econtra *ALP[ECN]*
12 quod: quid *F* / si quid: sin *L supra* / quid: quis *F[NM]* / ymaginaretur *BF[SMGC]* ymaginetur *ALP[E]* yma² *V* ymaginatur *[N]* / super: supra *F*
13 Unde: Ex quo *D*
14 nulla: nulla talis *F*
15 maior: minor *V* / esset *om. LD* / ABCD: ABDC *B* / neque: remanet (?) *B* / per: secundum *F[M]*
16 semicirculo maiorem *om. F[M]* / portio *om. V*
17 potest ymaginari *tr. A* / aliqua *om.*

ALD[E] / linearis: lignearum *A*

I.vi: *BVAPFL*
1 Capitulum...dearticulatione *BVLP[EC] om. A[MNS]* De articulatione figurarum capitulum 6ᵐ *F* De figurarum dearticulationem capitulum 6ᵐ *[G]* 6 c *mg. S* 7 *mg. A*
2 alia *F* / recte *om. AP* / ymaginari *tr. AP[E] ante* non
3 aliqua...ymaginari *om. F* / potest *om. L*
4 Nulla *om. [C]* nulle *AP[E]*; *lac. L* / qualitates lineares *AP[E]* / ymaginantur *AP[E]* / sive: seu *V* aut *A* vel *P[E]* / designantur *AP[E]*
7 et terminatarum: pertractarum *F* / talis: vel *F*
8 gratia *om. P*
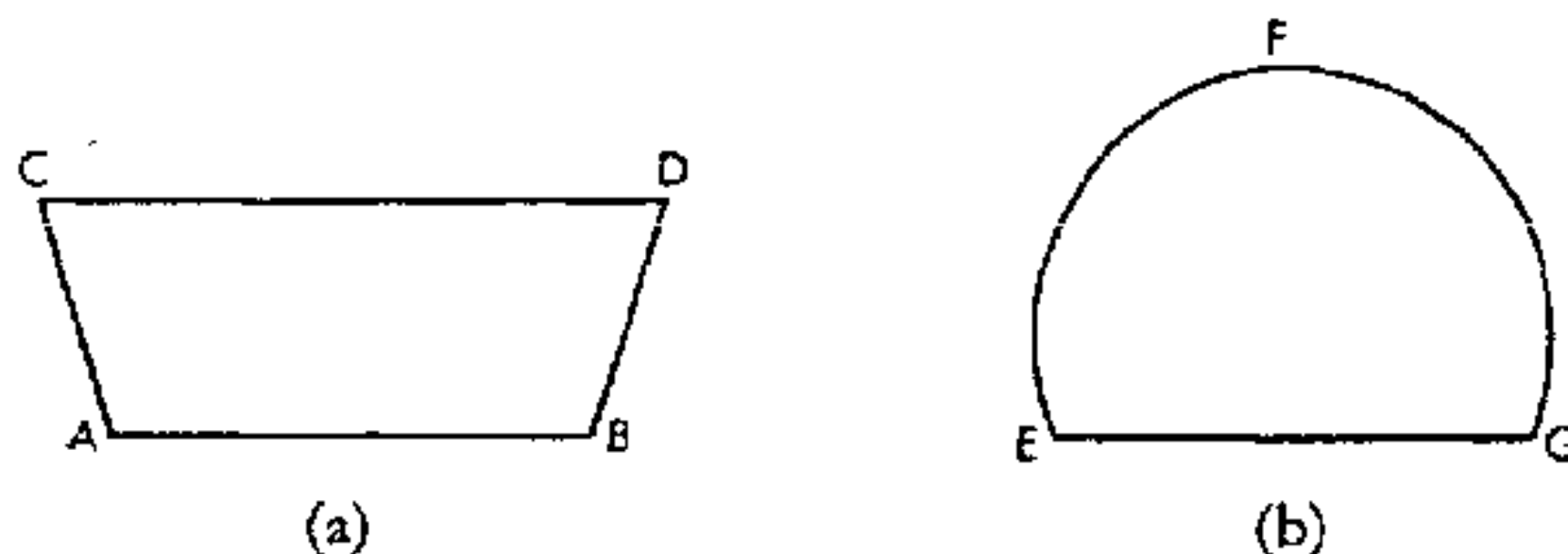9 quod *om. V* / sit *om. BF[SM]* / [in] *om. F[C] cf. comm.* / maior *tr. P ante* sit¹ in

Fig. 1

Figures in MSS *BLDSJCG*. MS *C* interchanges letters *G* and *F*. MS *J* interchanges *D* and *C*.

side of subject line *AB* stands perpendicularly above this same line *AB*, as is obvious in the first chapter, for otherwise the intensity and quality would be [laterally] outside the subject.[1] [This is true] because anything which according to our imagination is above this line is actually in the subject, and vice versa. Accordingly, if anything were imagined as being above the subject but not above it perpendicularly, then it would actually be outside of the subject. Thus it is obvious that no quality is to be imagined by a surface or figure having an angle at the base greater than a right angle, e.g., quadrangle *ABCD*; or by a segment of a circle that is greater than a semicircle,[2] e.g., segment *EFG*. But some linear quality can be imagined by any other plane figure.

I.vi   On the clarification of the figures

Although some linear quality can be correctly imagined by any plane figure other than those mentioned before, still not any quality can be imagined by any figure. Indeed *no linear quality is imagined or designated by any figure except the ones in which the ratio of the intensities at any points of that quality is as the ratio of the lines erected perpendicularly in those same points and terminating in the summit of the imagined figure.*[1]

For example [see Fig. 2], let line *AB* be divided in point *C* in any way such that the intensity in point *C* is double[2] that in point *A*; and in point *B* let it be triple that in point *C*. Therefore, by the first chapter the line imagined as rising perpendic-

I.v

[1] See the Commentary, I.v, lines 9–10.
[2] *Ibid.*, line 16.

I.vi

[1] See the Commentary, I.vi, lines 4–7.
[2] *Ibid.*, line 9.

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linea 9 et tr. A post sit   erit *AP[E]* tunc *L*
10 B *BF[SGM]* B in *LV AP[ENC]* | Ergo:

puncti est duplo maior quam linea ymaginata super A, et linea ymaginata super B est triplo maior quam linea ymaginata super C. Igitur qualitas ista non potest ymaginari nisi per figuram que sit duplo altior vel cuius summitas sit in duplo maior super C quam super A, et triplo maior super B quam super C, cum hoc tamen stat quod huiusmodi figura posset variari in altitudine secundum proportionem intensionis in aliis punctis linee AB. Sed ex hoc apparet quod huiusmodi qualitas non potest designari per quadrangulum rectangulum neque per semicirculum, et ita de aliis infinitis figuris.

[I.vii]   Capitulum 7ᵐ de figurarum coaptatione

Quelibet qualitas linearis per omnem figuram planam designari potest que super ipsam perpendiculariter ymaginata proportionalis est in altitudine eidem qualitati in intensione. Figura autem erecta super lineam informatam qualitate dicitur proportionalis in altitudine qualitati in intensione quando quelibet due linee perpendiculariter erecte super ipsam lineam que est basis usque ad figure vel superficiei summitatem sunt proportionales in altitudine punctis super que stant in intensione.

Verbi gratia [Fig. 3], sit linea AB super quam statuatur superficies $ABCD$ eriganturque super basim due linee EF et GH. Si igitur talis sit proportio EF ad GH qualis est proportio intensionis in puncto E ad intensionem in puncto G, et sic de aliis punctis et lineis correspondenter, dico quod hec superficies vel figura est proportionalis in altitudine huic qualitati in inten-

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12 est: CAP [E] C est [N] / duplo BF[SMC G] in duplo $LVAP$[NE] / maoriem P / quam: quam sit P / ymaginata¹ *tr.* F[M] *post* A *in linea 12* / ymaginata² *tr.* AP[E] *post* B *in linea 13*

13 est: erit AP[E] / triplo BF[$SMCG$] in triplo $LVAP$[NE] / quam linea *om.* F / ymaginata *om.* A / ista *om.* [M] illa P iᵃ [E]

14, 15 duplo BFL [$MNCGS$] in duplo AVP[E]

15 triplo: in duplo P in triplo AVL [G]

16 posset: possit F[EMC] potest [G] / variari *om.* F[M]

17 Sed: sed etiam A

18 apparet: patet A[N] / potest: posset P[EC]

19 infinitis *om.* A in infinitis P

I.vii: $BVAPFL$

1 Capitulum...coaptatione (coaptione P) $BVLP$[EC] *om.* A[SMN] De figurarum coaptatione capitulum 7ᵐ F[G] 7 c *mg.* [S] 7 *mg.* A

2 linearis: lignearum A / planam: plenam A

3 ymaginatura L

4 informata AP

5 in...qualitati: altitudini in qualitate F[M]

6 est basis: a basi A

7 ad: ad extremum P[N] / vel: aut A

8 puncto F[M] / que: quem F[M] quam [S]

9 statuatur: situetur ALP[EN]

10 supra L[C] / talis sit *tr.* F[MG]

12 correspondenter: correspondentibus BA[G] / hec: illa A

13 vel: aut A / huic *om.* L[C]

ularly above point C and denoting the intensity at that point is double the line imagined as rising above point A, and the line imagined as rising above point B is three times the line imagined as rising above C. Therefore, this quality can be imag-
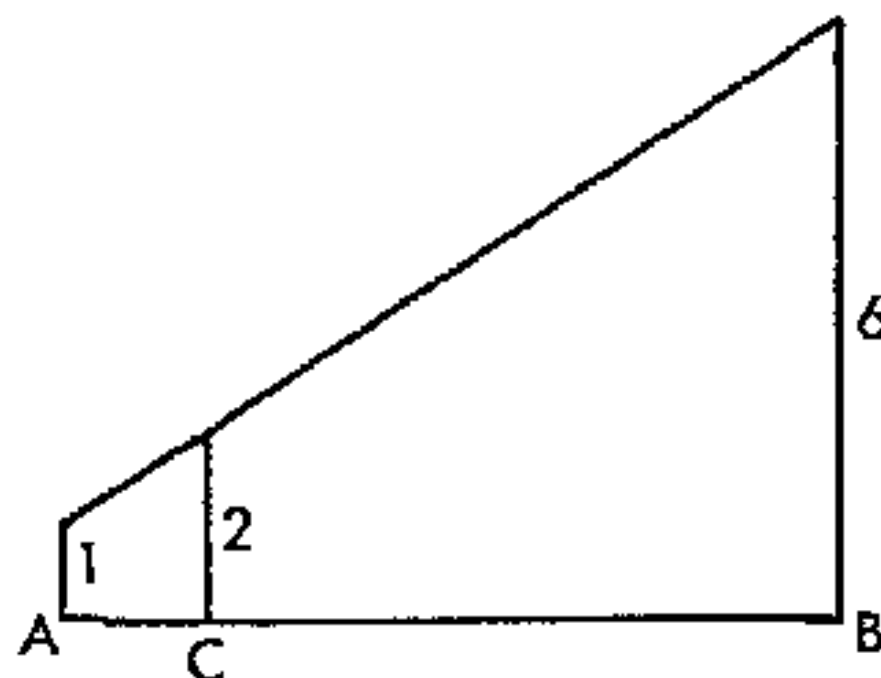

Fig. 2

Figure in MSS *BLGCS*. Letter C is missing in MS L which has at the tops of the altitudes 1^m, 2^m, 3^m, and at the bottoms 1, 2^m, 6. MS L also includes another similar figure with the perpendicular on C toward the middle of the figure.

ined only by the figure which at point C is twice as high as at point A or whose summit at C is double that at point A, and whose summit at point B is triple that at point 'C—with the further stipulation however that the figure of this sort could be varied in altitude according to the ratio of intensities in the other points of line AB. But from this it is apparent that a quality of this sort cannot be designated by a rectangle or by a semicircle; and similarly concerning an infinite number of other figures.

I.vii   On the suitability of the figures

Any linear quality can be designated by every plane figure which is imagined as standing perpendicularly on the linear [extension of the] quality and which is proportional in altitude to the quality in intensity. Moreover, a figure erected on a line informed with a quality is said to be "proportional in altitude to the quality in intensity"[1] when any two lines perpendicularly erected on the quality line as a base and rising to the summit of the surface or figure have the same ratio in altitude to each other as do the intensities at the points on which they stand.

For example [see Fig. 3], let there be line AB on which surface $ABCD$ stands and let the two lines EF and GH be erected on the base. If, therefore, the ratio of EF to GH is as the ratio of the intensity in point E to the intensity in point G, and similarly for the other points and their corresponding lines, then I say that this surface or figure is "proportional in altitude to this quality in intensity," so that the

I.vii

[1] See the Commentary, I.vii, lines 4–8.

sione, ita quod altitudo superficiei similis est intensioni qualitatis istius;
13   quare per talem figuram vel superficiem qualitas ista convenientissime desig-
natur. Cum autem super eandem lineam *AB* plures superficies possint erigi
proportionales vel similes in altitudine, quedam maiores alie minores, verbi
gratia, superficies *ABKL* maior et superficies *ABMN* minor, et quelibet
alie que essent consimilis altitudinis licet inequalis, sequitur quod qualitas
20   linee *AB* poterit indifferenter per earum quamlibet designari; ita tamen
quod si ipsa qualitas ymaginetur per aliquam istarum figurarum signatam
tunc stante ista figuratione qualitas dupla ad istam consimilis intensionis
designabitur per duplo altiorem figuram consimilis altitudinis. Et sic pro-
portionaliter quantumlibet fuerit qualitas maior vel minor, et nichilominus
25   prima qualitas potuit ymaginari in principio per quamlibet maiorem vel
minorem superficiem seu figuram. Iste autem superficies maiores vel minores
sunt simpliciter inequales et dissimiles in figura et etiam in altitudine in-
equales et tamen sunt in altitudine similes sive proportionales. Unde si in
duabus intersectionibus signentur duo puncta *O* et *P* eo modo quo patet in
30   figura nunc posita, tunc si proportio *GH* ad *EF* sit sicut proportio *GP* ad
EO et sic de quibuslibet duabus lineis erectis conformiter super ipsam basim
AB, dico quod superficies *ABCD* et superficies *ABMN* sunt consimilis
altitudinis sive proportionalis.

14 istius *om. ALP[EN]*

15 quare: qualis *F[SM]* | talem *om. B* | vel:
sive *A* | qualitas ista *om. F[M]* | ista: illa
P[EN] i* *[G]*

16 plures superficies *tr. F[M] om. [G]* | su-
perficies…erigi: essent superficies *V* |
possint *AFL[ESMG]* possunt *BP[NC]*

17 vel: aut *A* | consimiles *F[M]* | in altitudine
om. V | alie: quedam *F[M]* | minores:
breviores *V*

18 maior *om. FL[SM]* | minor: brevior *V* |
quelibet: quotlibet *B[SM]*

19 inequalis: equalis *A* | qualitas: ista qualitas
AP[E]

21 ipsa: ista *F[M]* | ymaginatur *B [NC]* |
signatam *om. F[M]* figuratam *[N]*

22 ista: illa *AL[EG]* | figuratione: signata
ista signatione *B* | qualitatis *AL*, ?*P*

23 designatur *F[M]* | per: pro *A* | sic *om. A*

24 minor: brevior *V[MG]* | et *om. P* vel *[M]*

25 prima qualitas *tr. LP[N]* | poterit *[N]* |
vel: aut *A*

26 minorem: breviorem *VP* | seu: vel
FP[EM] aut *A* | vel *VLPECG* et
BF[SMN] aut *A* | minores: breviores *V*

27 sunt *om. L[N]* | et¹: aut *A*

28 sive: seu *AF[EM]*

29 signantur *B[C]* | eo: eodem *A* | quo: duo
A |

29-30 patet… figura *lac. A*

30 nunc *om.[G]* ultimo modo *L* nunc ultimo
[E] ultimo nunc *PA* ultimo *[NC]* | si
om. F[M]

31 de *om. AP* | quibuscunque *F[M]* quibus-
dam *[NC]* | duabus lineis *tr. V* lineis
L[NC]

32 quod: cum *A* | superficies² *om. V*

33 proportionis *APL[ENC]*

altitude of the surface is similar to the intensity of this quality. Therefore, this quality is most fittingly designated by such a figure or surface.[2] Moreover, since on the same line AB a great number of surfaces can be erected which are proportion-

Fig. 3

Figure in MSS $BLGCS$. In MS J there is a scrambled figure, perhaps derived from this figure. In MS B letters O and P are missing. MS L extends EF and GH to meet LK.

al or similar in altitude—some of which are larger and some smaller than $ABCD$, as for example surface $ABKL$ which is larger and surface $ABMN$ which is smaller, and any number of others which would be of similar although unequal altitude—it follows that the quality of line AB can be designated by any one of them indifferently. There is however this provision: if the quality is imagined by some one of these designated figures, then with this figuration retained a quality which is double the original one in intensity and similar to it will be designated by a figure of similar altitude but twice as high.[3] The same thing holds proportionally for any greater or lesser quality, notwithstanding the fact that the first quality could have been imagined in the beginning by a greater or lesser surface or figure. Moreover these greater or lesser surfaces are unequal in area, dissimilar in figure and also unequal in altitude, and yet they are similar or proportional in altitude. Hence, if two points O and P are marked in the intersections as in the accompanying figure, then if $GH/EF = GP/EO$ and similarly in regard to any two lines erected in like fashion on the base AB, I say that surface $ABCD$ and surface $ABMN$ are of similar or proportional altitude.

[2] *Ibid.*, lines 15–16.   [3] *Ibid.*, lines 20–23.

in altitudine. Igitur erit proportionalis cuilibet quadrangulo rectangulo super AB constituto, eo quod omnes tales sunt proportionalis altitudinis quamvis tamen inequalis. Ergo per capitulum 7^m ipsa qualitas est ymagina-

10   bilis per quadrangulum $ABCD$ et similiter per quadrangulum $ABEF$ maiorem sive etiam per minorem. Quelibet autem talis qualitas dicitur uniformis seu equalis intensionis in cunctis partibus eius.

Rursum sciendum quod aliqua qualitas est ymaginabilis per quadrangulum habentem duos rectos angulos super basim et alios inequales, sicut per

15   quadrangulum $ABCD$ [Fig. 6(b)] et per omnem quadrangulum proportionalis altitudinis super basim AB constitutum sive fuerit maior sive minor, ut patet ex 7° capitulo. Quelibet autem talis qualitas dicitur uniformiter difformis terminata utrinque ad gradum, ita quod extremum intensius designatur in angulo C acuto et extremum remissius in angulo D obtuso. Superior vero

20   linea, sicut est linea CD, dicitur linea summitatis, vel in relatione ad qualitatem potest vocari linea intensionis quia secundum varietatem ipsius variatur intensio.

[I.xi]   Capitulum 11^m de qualitate uniformi et difformi

Omnis itaque qualitas uniformis ymaginatur per quadrangulum rectangulum et omnis qualitas uniformiter difformis terminata ad non gradum ymaginabilis est per triangulum rectangulum. Omnis vero qualitas uniformiter

5   difformis terminata utrinque ad gradum ymaginanda est per quadrangulum habentem rectos angulos super basim et alios inequales. Omnis autem alia qualitas linearis dicitur difformiter difformis et est ymaginabilis per figuras aliter dispositas secundum multifariam variationem, cuius aliqui modi postea

7 altitudine: latitudine P

7-8 cuilibet...altitudinis *om.* F *(sed habet* [M])

8 tales: scilicet tales L scilicet [C] | proportionabilis V

9 Ergo: igitur LP [ESM] | 7^m: 9^m L

10 similiter: simpliciter L

10-12 ABEF...seu *om.* $F[M]$

11 minorem: breviorem V

12 cunctis: omnibus $LP[AC]$

13 sciendum $BVF[MSG]$ sciendum est $LP[EANC]$ | est ymaginabilis *tr.* FP [EM]

14 rectos: equales $P[A]$ | rectos angulos *tr.* $V[N]$

15-16 proportionabilis V

16-17 sive¹....dicitur *om.* $F[M]$

16 minor: brevior V

17 ex 7° $BV[ESG]$ in 7° [N] 9° $LP[A]$ in [C]

18 terminata utrinque *tr.* LP | utrinque $B[C]$ utrique $LP[G]$ ubique V utriusque $F[M]$ utrimque [ES] utrobique [A] uterque [N] | ad: per $L[N]$

19 C: DC P de CDC [A]

20 sicut *om.* [M] | est linea *om.* F | linea² $BV[MSG]$ *om.* $LP[EANC]$

21 quia: que P

22 intensio: 7^a F intensio 7^a [M]

I.xi: $BVPFL$

1 Capitulum...difformi *om.* [MAS] capitu-

Therefore, it will be proportional to any rectangle constructed on *AB*, because all such rectangles are of proportional, although unequal, altitude. Therefore, by chapter seven, this quality is imaginable by rectangle *ABCD* and similarly by rectangle *ABEF* which is greater and also by one that is less. Moreover, any such quality is said to be "uniform" or "of equal intensity" in all of its parts.
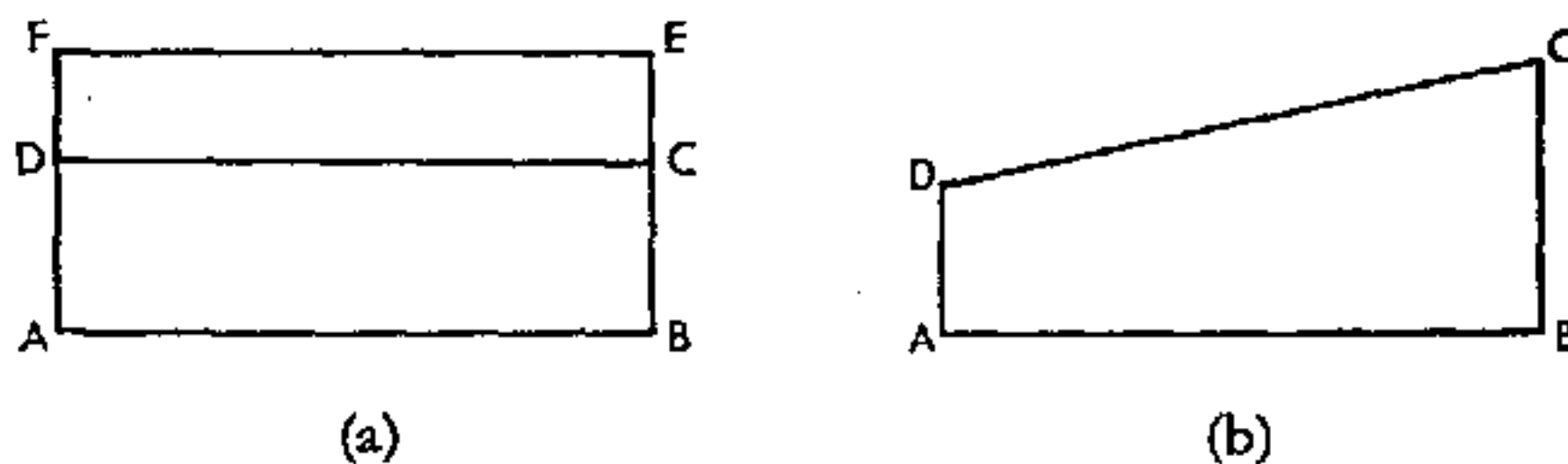

(a)   (b)

Fig. 6

Figures in MSS *BLSCG*. Letters *C* and *D* in figure (a) are interchanged in MS *L*.

Again it ought to be known that some quality is imaginable by a quadrangle having two right angles on the base and the other two angles unequal, e.g., by quadrangle *ABCD* [see Fig. 6(b)] and by every quadrangle constructed on base *AB* which is of proportional altitude, whether it be greater or less, as is clear in chapter seven. Moreover, any such quality is spoken of as "uniformly difform terminated in both extremes at some degree," so that the more intense extreme is designated in the acute angle *C* and the more remiss in the obtuse angle *D*. The superior line, e.g., line *CD*, is called "the line of summit," or in relation to quality it can be called "the line of intensity" because the intensity varies according to its variation

I.xi   On uniform and difform quality

And so every uniform quality is imagined by a rectangle and every quality uniformly difform terminated at no degree is imaginable by a right triangle. Further, every quality uniformly difform terminated in both extremes at some degree is to be imagined by a quadrangle having right angles on its base and the other two angles unequal. Now every other linear quality is said to be "difformly difform" and is imaginable by means of figures otherwise disposed according to manifold variation. Some modes of the "difformly difform" will be examined later. The

lum 11ᵐ *[N]* 11 *mg.* *[SA]* | Capitulum 11ᵐ *tr.* *P*

2 itaque: igitur *P[A]*

2–3 rectangulum *om.* *L*

4 est *om.* *F[MAC]* | Omnis vero: et omnis *F[M]* omnis ergo *[C]*

4–5 uniformiter difformis *om.* *L[N]*

5 utrinque ad *BF tr.* *[N]* utrique ad *P[G]*

utrimque ad *[SE]* utriusque ad *[A]* utrumque ad *[C]* utramque ad *V* ad utrumque *L[M]* | gradum: non gradum *B*

7 qualitas linearis: linealis qualitas *P* linearis qualitas *[E]* lignealis qualitas *[A]* | ymaginabilis: ymaginanda *LP[EANC]*

8 variationem: varietatem *P*

videbuntur. Predicte vero differentie intensionum non melius nec clarius
10   neque facilius notificari possunt quam per tales ymaginationes et relationes
ad figuras, quamvis quedam alie descriptiones seu notificationes possint dari
que etiam per huiusmodi figurarum ymaginationes fiunt note: Ut si dicere-
tur qualitas uniformis est que in omnibus partibus subiecti equaliter est
intensa. Qualitas vero uniformiter difformis est cuius omnium trium punc-
15   torum proportio distantie inter primum et 2^m ad distantiam inter 2^m et 3^m est
sicut proportio excessus primi supra 2^m ad excessum 2^i supra 3^m in inten-
sione, ita quod punctum intensiorem illorum trium voco primum.

Istud primo declaratur de ea qualitate uniformiter difformi que termina-
tur ad non gradum que signetur seu ymaginetur per triangulum *ABC* [Fig.
20   7(a)]. Erectis itaque tribus perpendicularibus lineis *BC*, *FG* et *DE*, protra-
hatur *HE* equedistans linee *DF* et similiter *GK* equedistans linee *FB*.
Fient ergo duo parvi trianguli *CKG* et *GHE* qui sunt equianguli; ergo per
4^{am} 6^i Euclidis proportio *GK* ad *EH* est sicut proportio *CK* excessus ad
GH excessum. Et quoniam *GK* est equalis *FB* et similiter *EH* est equalis *DF*,
25   erit proportio *FB* ad *DF*, que quidem linee sunt distantie trium punctorum
ipsius basis, sicut proportio *CK* ad *GH*, qui sunt excessus altitudinis pro-
portionalis intensioni eorundem punctorum. Cum igitur qualitas linee *AB*
sit talis quod proportio punctorum linee in intensione est sicut proportio
linearum in altitudine super eadem puncta perpendiculariter erectarum,
30   patet evidenter propositum, scilicet quod que est proportio excessus primi
puncti supra secundum ad excessum secundi supra tertium in intensione,
eadem est proportio distantie inter primum punctum et secundum ad distan-

10   neque: nec *FP[MAC]* / notificari: decla-
rari vel notificari *P* / relationes *FLP*
[EMN] relationem *BV[SG]*

11   ad: et *P* / possint dari *BV[LSG]* dari pos-
sunt *P* possent dari *F[M]* possunt dari
[EANC]

12   que: qui *F* / ymaginationes: notificationes
F[M]

13   est¹ *om. F[M]* autem *[N]* / equaliter est
tr. LP[AC] inequaliter *[N]* est qualiter
[G]

14   vero *om. F[M]*

15   est: est proportio *P[EA]*

16   supra¹ *BFL[SMCG]* super *P[EAN]* ad
V / supra²: super *FP[ENG]*

18   primo *BV[SG]* postea *F[M]* ergo *L[A]*
igitur *P[EN]* vero *[C]* / declaratur: de² *B*

19   signetur *om. [EG]* significetur *F[M]* / seu
om. [EG] vel *B*

20   Erectis *om. [N]* erectum *LP[A]* / BC:
BC et *BV* BE *P* AB et *[G]*

21   HE: EH *B[SCG]* / GK: KG *P[E]* /
equedistans linee: equedistanter *LP[EN]*

22   Fiunt *L[N]* / parvi *om. PL[EN]* / CKG et
GHE: GHE et CKG *L[N]* scilicet GHE
et CKG *P[EA]* / qui: que *P* / eque anguli
FP[MA]

23   6¹ Euclidis *om. P[A]* 6¹ *L[EN]*

24   excessum *om. V*

24–25 et²...FB *om. B[A]*

26   que *V*

26–27 proportionalis intensioni *om. L[C]*

27   intensioni *BV* intensionum *F[SMNG]*
intensionis *P[EA]*

31   supra¹: super *V* ad *[N]* / supra²: super
FP[EN] / in intensione *om. L[C]*

32   primum punctum *tr. P[E]* punctum *[A]*

aforesaid differences of intensities cannot be known any better, more clearly, or more easily than by such mental images and relations to figures, although certain other descriptions or points of knowledge could be given which also become known by imagining figures of this sort: as if it were said that a uniform quality is one which is equally intense in all parts of the subject, while a quality uniformly difform is one in which if any three points [of the subject line] are taken, the ratio of the distance between the first and the second to the distance between the second and the third is as the ratio of the excess in intensity of the first point over that of the second point to the excess of that of the second point over that of the third point, calling the first of those three points the one of greatest intensity.

Let us clarify this first with respect to a quality uniformly difform which is ter-

(a)   (b)
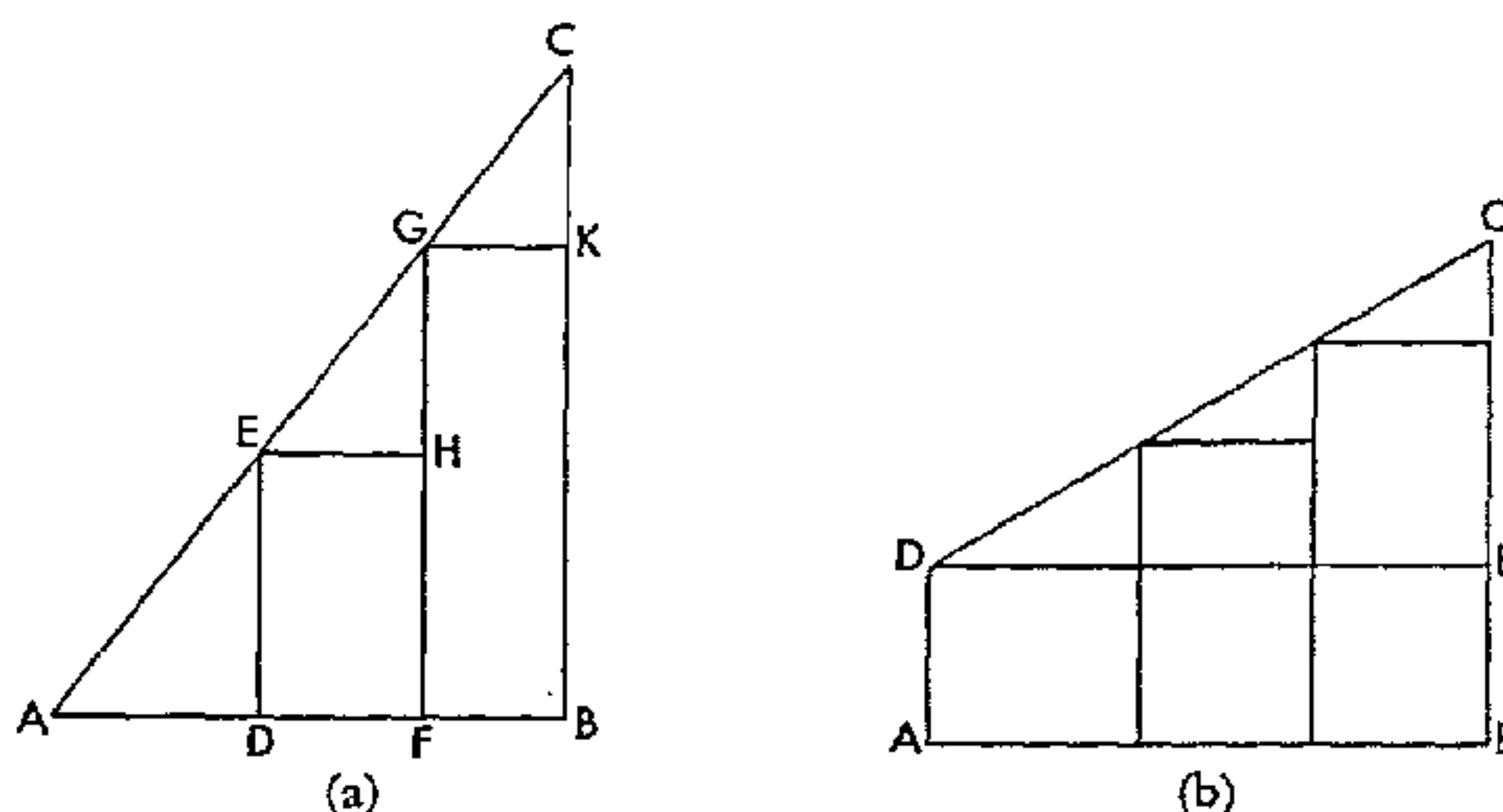
Fig. 7

Figure (a) in MSS *BLEDGSC*, with letters *B* and *C* interchanged in MS *B*. Figure (a) is reversed in orientation in MS *E*. Figure (b) in MSS *BLDCSG*.

minated at no degree and which is designated or imagined by $\triangle ABC$ [see Fig. 7 (a)]. With the three perpendicular lines BC, FG, and DE erected, then let HE be drawn parallel to line DF and similarly GK parallel to line FB. Therefore, the two small triangles CKG and GHE are formed and they are equiangular. Hence, by [proposition] VI.4 of [the *Elements* of] Euclid[1], $GK/EH = CK/GH$, CK and GH being excesses. And since $GK = FB$ and similarly $EH = DF$, so $FB/DF = CK/GH$, FB and DF being the distances on the base of the three points and CK and GH being the excesses of altitude proportional to the intensity of these same points. Since, therefore, the quality of line AB is such that the ratio of the intensities of the points of the line is as the ratio of the altitudes of the lines perpendicularly erected on those same points, that which has been proposed is evidently clear, namely that the ratio of the excess in intensity of the first point over the second to the excess of the second over the third is the same as the ratio of the distance between the first and second points to the distance between the second and the third, and similarly for

I.xi

[1] See the Commentary, I.viii, lines 25, 27.

tiam inter secundum et tertium, et ita de quibuscunque tribus aliis punctis.
Igitur qualitati sic difformi recte convenit quod premittebatur, et ita per
35   talem triangulum bene designabatur.

Per eundem modum predicta descriptio sive proprietas potest ostendi de
qualitate uniformiter difformi terminata utrobique ad gradum, et sic una que
ymaginetur per quadrangulum *ABCD* in quo protrahatur linea *DE* eque-
distans basi *AB* et fiet triangulus *DEC* [Fig. 7(b)]; deinde protrahantur linee
40   altitudinis in quadrangulo et alie transversales equedistantes basi in isto
triangulo faciendo parvos triangulos. Et tunc faciliter poterit argui de illis
excessibus et distantiis in isto triangulo sicut superius arguebatur in alio,
prout intuenti potest leviter apparere.

Omnis autem qualitas se habens alio modo a predictis dicitur difformiter
45   difformis et potest describi negative, scilicet qualitas que non est in omnibus
partibus subiecti equaliter intensa nec omnium trium punctorum ipsius
proportio excessus primi supra secundum ad excessum secundi supra ter-
tium est sicut proportio distantiarum eorum.

[I.xii]   Capitulum 12^m de eisdem aliter

Rursum in notitiam premissarum differentiarum possumus duci ex yma-
ginatione motus, ymaginetur enim punctus *d* regulariter moveri super
lineam *AB* et sit ita quod quicunque punctus linee *AB* super quem venerit
punctus *d* sit eidem puncto *d* similis et equalis in intensione [Fig. 8]. Si
5   igitur in principio motus ipse punctus *d* habeat aliquem gradum vel ali-
quam intensionem et continue sine sui alteratione maneat in eodem gradu
durante illo motu, tunc describet in linea *AB* qualitatem uniformem. Si vero
in principio motus punctus *d* nichil habeat illius qualitatis et durante motu
10   ipse punctus *d* continue alteretur et regulariter intendatur, tunc describet
qualitatem uniformiter difformem terminatam ad non gradum. Si autem *d*

33 tribus aliis punctis *BV[SG]* aliis tribus
    punctis *FL[EMC]* punctis tribus *P[AN]*
34 sic: sicut (?) *F* | ita *FL[EMANC]* illud
    [S] illa *BV[?G]* ita recte *P*
35 bene *om. P* recte *[EA]*
36 sive: seu *F[A]* vel *[M]*
37 sic *om. [C]* sit *[AES]*
38 ymaginetur *BVL[GC]* ymaginatur *FP*
    [ANMES]
39 fiat *P[C]* fiant *[S]* | protrahatur *V[SEC]* |
    linea *[ES]*
40–41 et...triangulos *om. F*
41–42 Et¹...triangulo *om. L[C]*

43 potest leviter *tr. P[A]* leviter poterit *[M]*
    patent *[G]*
44 dicatur *LP[EAD]*
45 negative scilicet *om. F[M]* negative *[S]* |
    non: nec *F[M]*
46 omnium *om. F[M]*
47 primi *om. P* | supra ¹,²: super *P[EAN]*
48 distantie *P[EA]*

I.xii: *BVFLP*
1 Capitulum...aliter *om. [AMS]* capitulum
    12^m *[N]* 12 *mg. [SA]* | Capitulum 12^m
    tr.F[G] post aliter | de...aliter *om. P* | eis-

any other three points. Hence what we have premised in regard to a quality dif-
form in this way is quite fitting, and so it (this quality) was well designated by such
a triangle.

By the same method the aforesaid description or property can be demonstrated
for a quality uniformly difform terminated in both extremes at [some] degree, and
thus for one which we let be imagined by quadrangle *ABCD* in which line *DE* is
drawn parallel to base *AB* forming △*DEC* [see Fig. 7(b)]. Then let lines of altitude
be drawn in the quadrangle and also transversals parallel to the base in this trian-
gle, thus forming small triangles. And then one can easily argue concerning the
excesses and the distances in this triangle just as was argued in the other one.
This will be easily apparent to one who is observant.

Further, every quality which is disposed in [any] other way than those described
earlier is said to be "difformly difform." It can be described negatively as a quality
which is not equally intense in all parts of the subject nor in which, when any three
points of it are taken, the ratio of the excess of the first over the second to the ex-
cess of the second over the third is equal to the ratio of their distances.

I.xii   On these same [qualities considered] in another way

Again, we can be led to a knowledge of the differences which have been premised
by the imagery of motion. For let point *d* be imagined as moving regularly on
line *AB* and in such a way that any point of line *AB* over which *d* comes will be
equal and similar in intensity to that same point *d* [see Fig. 8]. If, therefore, in the
beginning of the motion the point *d* has a certain degree or some intensity and it con-
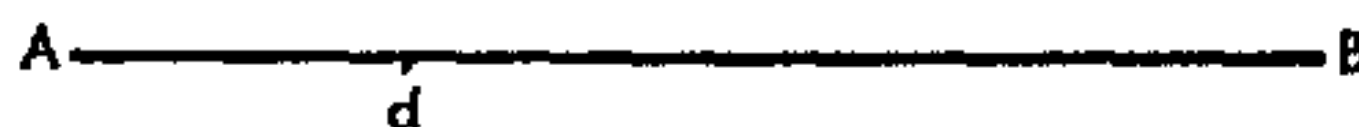

Fig. 8
Figure in MSS *SG* only.

tinually remains in that same degree without alteration throughout the motion,
then it will describe in line *AB* a uniform quality. But if in the beginning of the mo-
tion point *d* has none of the quality and during the motion point *d* is continually
altered and regularly increased in intensity, then it will describe a quality uniformly
difform terminated at no degree. If, moreover, *d* is regularly increased in intensity,

dem: eodem *L*

9–10 nichil…d *om. V*

2 Rursum *corr. B ex* Sursum (*et* sursum *habet*
A) / possimus *L*

10 ipse: tunc ipse *L* / punctus d *tr. P* punctus
L / regulariter: continue [*SG*]

5 sit…d *om. FP[A]* / Si: Tunc *F[M]*

10–12 tunc….intendatur *om. V*

8 describet: describeret *P[A]* describeretur
[*C*]

11–13 ad…terminatam *om. B*

coniungatur basi, qualitas sive difformitas terminatur utrinque ad gradum. Et quoniam talis linea non potest coniungi basi in utroque extremo, quia ipsa est recta et basis recta et sic esset linea una, inde patet quod non potest esse aliqua qualitas uniformiter difformis terminata utrinque ad non gradum.

15   Si vero linea intensionis sive summitatis fuerit curva aut ex multis lineis composita et non una, tunc qualitas per illam figuram ymaginabilis erit difformiter difformis et potest esse quod terminatur utrinque ad gradum vel utrinque ad non gradum vel ad gradum in uno extremo et ad non gradum in altero.

[I.xiv]   Capitulum 14^m de simplici difformitate difformi

Difformis difformitatis de qua nunc agitur duo sunt modi; quedam enim est simplex et alia est composita. Et primo dicendum est de simplici. Est igitur simplex difformitas difformis que designabilis est per figuram cuius

5   linea summitatis sive linea intensionis est una, non composita ex pluribus. Oportet igitur quod sit linea curva; quia si foret recta, iam esset uniformitas simpliciter aut uniformis difformitas, ut patet ex capitulo precedenti. Necesse est etiam quod eius curvitas non attingat ad circuli portionem maiorem semicirculo ita ut angulus super basim sit maior recto, ut patuit ex 4° (*!*5°)

10   capitulo. Potest tamen fieri ut angulus super basim sit minor recto etiam quantumlibet.

    Sit igitur, gratia exempli, linea *AB*, cuius qualitas sit designabilis per semicirculum *ACB* [Fig. 10], quod est possibile, ut patet ex 7° capitulo Nunc itaque dico quod eadem qualitas linee *AB* est ymaginabilis seu designa-

15   bilis per figuram maioris altitudinis ac etiam minoris isto semicirculo etiam quantumlibet. Protrahatur enim linea *CD* perpendicularis super centrum *D*

11 terminatur *tr.* P *post* gradum | utrinque B utrĩque P utrobique *VL[EAN]* ad utrumque *F[MG]* utrimque *[S]* | ad: ad non *P[A]*

12–14 Et...gradum *om.* F[M]

12 non *om.* L | quia: quoniam L[A] nam [E]

13 linea: linea recta L

14 terminata utrinque: utrobique terminata usque *P[E]* terminata usque L terminata utrobique *[AC]* | utrinque *om.* BLF[N] utrĩque *[G]* utrimque *[S]* utrobique *VP[EAC]*

17 difformis: difformis terminata *V* | esse... terminatur: etiam terminari L etiam quod terminari *[E]* | utrinque^{1,2} *BP[N]* utro-

bique *V[C]* utriusque *F[MA]* utrimque *[SE]* utrĩque *[G]* | utrinque...utrinque *om.* L

17–18 vel...gradum³ *om.* [M]

18 altero E a° *B[AN]* alio *FLV[SPMCG]*

I.xiv: BVLPF

1 Capitulum...difformi *[om. MANS]* 14 mg. *[SA]* | Capitulum 14^m *tr.* F *post* difformi

2 ago F[M] | quedam *bis* B quidem *[A]*

2–3 enim est *tr.* P autem est *[A]*

3 est¹ *om.[C]* | et *om.* LP *[EG]* | alia: quedam F[MN] aliaque *[G]* | est² *VLP[ACS]* *om. BF[EMNG]*

and if it is joined to the base in neither extreme the quality or difformity is terminated in both extremes at [some] degree. And since such a line cannot be joined to the base in both extremes—for it is a straight line and thus would form a single line with the base which also is a straight line—it is clear that there cannot be a quality uniformly difform terminated in both extremes at no degree. Further, if the line of intensity or summit line is a curve or is composed of several lines rather than one, then the quality imaginable by that figure will be difformly difform, and it can be that it is terminated in both extremes at some degree, or in both extremes at no degree, or at some degree in one extreme and at no degree in the other.

I.xiv   On simple difform difformity

We now treat of difform difformity; there are two modes of such difformity: simple and composite. We must first talk of the simple mode. Simple difform difformity is that which can be designated by a figure whose line of summit or line of intensity is a single line, i.e. not composed of several lines. It is necessary, therefore, that the line be a curve; because if it were straight, then it would be simply a uniformity or uniform difformity, as is clear from the preceding chapter. Furthermore, it is necessary that the curvature of the summit line does not attain that of a circular segment greater than a semicircle so that the angle[1] on the base is greater than a right angle, as was clear in chapter five.[2] However, it can happen that the angle on the base is less than a right angle by any amount you please.

Therefore, for example, let there be line AB, whose quality can be designated by semicircle ACB [see Fig. 10]. This is possible, as is evident from chapter seven. And so I now say that the same quality of line AB is imaginable or can be designated by a figure having an altitude greater or less than that of the semicircle by any amount you please.[3] For let line CD be drawn as a perpendicular to center D and

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I.xiv

[1] In this case the angle would be a mixed angle composed of the curve and the straight base line.

[2] All the manuscripts have "chapter 4," but this is a clear reference to the penultimate sentence in I.v.

[3] See the Commentary, I.xiv, lines 14–54.

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5 sive: seu *BF[EMC]* | pluribus: partibus *L* partibus pluribus *[N]*

6 quia: que *P[EA]* | foret: esset linea *F[M]* foret linea *[E]* esset *[C]* | esset: foret *P[E]* forent *[A]*

9 ut[1] *BVF[ACGS]* quod *LP[EMN]* | patet *L* | ex *om. P[A]* | 4° capitulo *BVF[MS] tr. LP[EANGC]*

10 etiam: et *P[G]*

13 ACB *BV[FM]* ABC *PL[AENGCS]* | patuit *V* | 7° capitulo *tr. P[E]* 4° capitulo *F[M]* capitulo alio *[A]*

14 linea *B*

15 maioris *om. L* | ac: aut *P[A]* | ac etiam *om. L*

16 supra *LP[M]*

et iterum protrahatur una alia linea perpendicularis, que sit *EF*, super lineam *AB*. Cum igitur sit possibile duas lineas minores istis duabus super eadem puncta perpendiculariter stare se habentes invicem in eadem propor-

20 tione sicut et iste due, que sunt *CD* et *EF*, et conformiter possint fieri linee maiores aut minores super omnia puncta linee *AB* stante semper eadem proportione inter eas que est inter lineas perpendiculares super *AB* in semicirculo *ACB*, sequitur quod super *AB* basim poterit erigi figura minus alta et tamen erit proportionalis altitudinis huic semicirculo *ACB* et pari

25 ratione magis alta etiam quantumlibet. Igitur per capitulum 7^m per quamlibet istarum figurarum potest qualitas linee *AB* recte ymaginari indifferenter.

Unde et nisi ita esset quod qualitas linee *AB* ymaginabilis per semicirculum posset ymaginari per figuram maiorem aut minorem et alteri proportionari, sequeretur quod intensio puncti *D* non posset recte designari per maiorem

30 vel minorem lineam quam sit linea *DC* et sic de aliis punctis nisi intensio variaretur et ita quelibet intensio determinaret sibi lineam certe quantitatis per quam esset ymaginabilis et tunc intensio esset equalis et comparabilis linee vel extensioni in quantitate et per consequens motus localis comparabilis alterationi in velocitate, que omnia videntur nimis absurda.

35 Quelibet tamen figura per quam est ymaginabilis ista qualitas linee *AB* est curva. Utrum autem figura minor quam semicirculus per quam ista qualitas potest ymaginari sit portio circuli discutiendum relinquo. Sed dico

17 una alia linea *P[AESC] om. L* una alia *B[NG]* una linea *V* linea alia *F[M]* | que...EF *BVF[AMSCG]* que sit linea FE *L[MEN] et tr. L[N] post* AB | supra *L*

19 perpendiculariter stare *tr. F[M]*

20 iste: ille *F[M]* | et³ *BVF[MN]* vel *LP[EC]* ut *[SG]* aut *[A]* | possint *BVL[G]* possunt *PF[EMANSC]*

21–22 stante...AB *om. F[M]*

22 lineas *om. P[A]* | perpendiculares: proportionales *B* perpendiculariter erectas *[E]* | AB: AB erectas *P[A]*

23 ACB *LP[EN] om. BVF[MSCG]* ABC *[A] | post* ACB *add. L[N]* erectas

24 altitudinis *om. F[M]* | ACB *BVLF[C]* ABC *P[ASEMNG]*

25 magis: etiam magis *L[N]* | capitulum 7^m *tr. P[EA]*

28 figuram: circulum *P* | aut: et *L* sive *[A]*

29 sequeretur *BPL[EMG]* sequitur *VF[SANC]* | intensio puncti: punctus *F[M]*

30 vel: aut *P[A]*

31 lineam: certam lineam *F[M]* | certe: certe scilicet *F[M]*

32 esset equalis *tr. F[M]* est equalis *[C]* | equalis: ymaginabilis *P[A]*

33 in quantitate: quantumlibet *P*

34 videntur nimis *tr. F[M]* | nimis *om. [N]* valde *P[A]* | nimis absurda *tr. L*

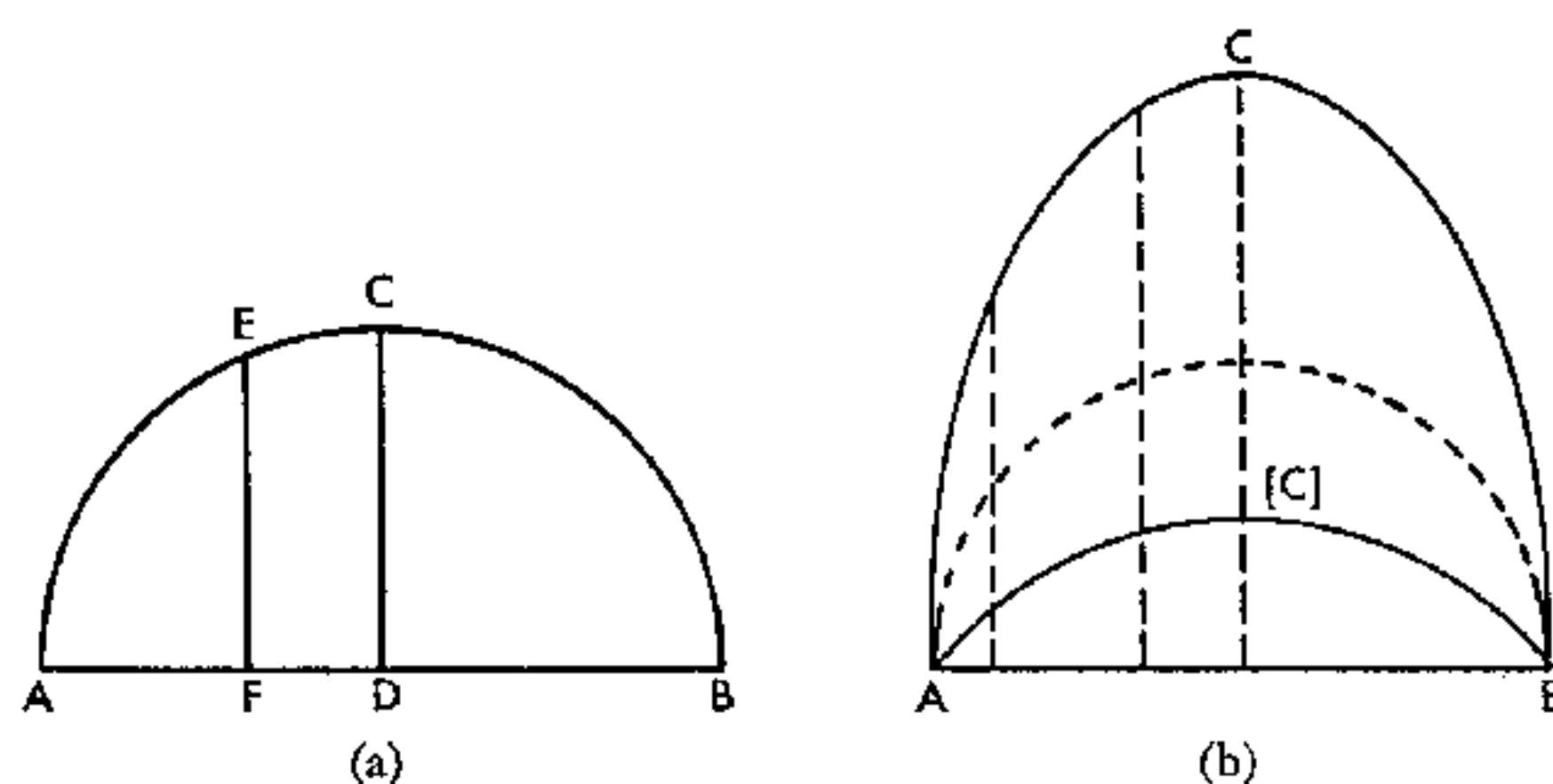35 tamen *om. V* | est ymaginabilis *FLP-[MANC] tr. BV[ESG]*

Fig. 10

Figure (a) in MSS *BLDSCJG*. In MS *J*, *C* is written over *G*, and *E* is replaced by *F* and *F* by *E*. In MS *L*, the arc is greater than a semicircle. Figure (b) is in MSS *BLSCG*. I have added the broken lines and have made the curves resemble ellipses, which they do not in the MSS. In MS *B*, both curves are drawn lower than a semicircle. In *S*, the top curve is a semicircle. In *C*, the figure is very crudely drawn. In *L* and *G*, the curves are lower and higher than a semicircle but are certainly not elliptical. See commentary.

again let another line *EF* be drawn as a perpendicular to line *AB*. Therefore, since it is possible to construct on the same points two other perpendiculars less than *CD* and *EF* but having the same ratio between them as do *CD* and *EF* and in the same way to construct on all the points of line *AB* perpendiculars which are greater or less than the corresponding perpendiculars in semicircle *ACB* constructed on those points of *AB* and having between any two of them the same ratio as the corresponding perpendiculars on *AB* in semicircle *ACB*, it follows that there can be erected on base *AB* a figure of less height but which will be proportional in altitude to this semicircle and with equal reason a figure of greater height by any amount you wish. Therefore, by chapter seven the quality of line *AB* can be correctly imagined by any of these figures without it making any difference [which figure is used].

For if it were not so that the quality of line *AB* imaginable by the semicircle could be imagined by a figure greater or less than the semicircle which is proportional [in altitude to the semicircle] it would follow (1) that the intensity of point *D* could not be correctly designated by a greater or lesser line than *DC*, and similarly for all the points, unless the intensity were varied, and thus (2) that any intensity would in itself determine the definite length of the line by which it would be imaginable, and then (3) an intensity would be equivalent and comparable to a line or to quantitative extension, and as a consequence (4) local motion would be comparable in velocity to [qualitative] alteration, all of which seems excessively absurd.

However, any figure by which this quality of line *AB* is imaginable is curved. But whether the figure less than a semicircle by which this quality can be imagined is a segment of a circle, I leave aside as a matter to be discussed. But I do say that it

quod per nullam maiorem potest designari que sit portio circuli, per nullam
enim figuram potest ista qualitas designari cuius *AB* non sit basis seu corda;
40 sed *AB* non potest esse corda in circulo minore quam circulus *ACB* si es-
set completus, cuius ipsa est dyameter. Ergo qualitas ista non potest ymagina-
ri per maiorem figuram que sit portio circuli minoris quam circulus *ACB*;
sed neque circuli maioris, quia aut illa portio esset maior medietate sui
circuli, ergo per eam nulla qualitas posset designari, ut patet ex 4º [*!5º?*]
45 capitulo; aut esset minor medietate sui circuli. Ergo, cum ista portio minor
medietate maioris circuli haberet eandem cordam cum semicirculo *ACB*,
illa portio esset minor et esset pars illius semicirculi, ut faciliter patet et po-
test probari per ultimam sexti Euclidis. Igitur ista qualitas non potest
designari per figuram que sit portio circuli et que sit maior quam semicircu-
50 culus *ACB* et tamen potest designari per maiorem figuram curvam, ut ante
probatum est. Igitur illius maioris figure curvitas non erit circularis et tamen
terminabit altitudinem figure proportionalem ei quam terminat curvitas
circularis; erunt itaque in altitudine proportionales figure, quarum una est
curvitas circularis et alia curvitas non circularis.

[I.xv]   Capitulum 15ᵐ de quatuor generibus simplicis difformitatis difformis

Omnis igitur simplex difformis difformitas aut est ymaginabilis per figuram
que non est portio circuli nec proportionalis altitudinis alicui circuli por-
5   tioni, sed eius summitas determinatur curvitate irrationali, aut ymaginabilis
est per figuram cuius summitas determinatur curvitate rationali, scilicet,
circulari vel ei proportionali in altitudine, et utroque modo dupliciter:

38 per¹ *om. V* | designari: considerari *F* yma-
   ginari *[M]*
39 non *om. F[M]*
40 circulus: triangulus *F* | ACB: ABC *[EAS]*
40–41 si…dyameter *om. F[M]*
41 ipse *P*
42 circuli minoris *tr. F[MNG]*
43 sed *om. [M]* | neque: ut *F[M]* | aut: vel
   P[EA]
44 ergo…eam: et per talem *[M]*
44–45 ergo…circuli *om. F*
44 potest *P[MAG]* | designari: ymaginari
   [M] | ex *BV[SMG]* in *LP[EANC]*
45 sui circuli *tr. LP*

45–46 minor medietate *LP[EAN]* minor
   BF[SMCG] minoris et *V*
47 pars illius: portio *F[M]* | faciliter *om. [N]*
   | patet et *om. [SNC]* etiam *L* etiam patet
   et *P[A]*
47–48 potest *BLF[AG]* posset *VP[SEM-
   NC]*
48 probari: probari seu posset *F* | ultimam:
   penultimam *[JG]* | Euclidis *om. BV[S]* |
   Igitur: ergo *LP[AN]* | ista qualitas *tr. B*
49 designari: ymaginari *F[M]*
51 Igitur: ergo *B[M]* | illius: istius *F[M]*
   nullius *L* | figure curvitas *tr. V* | erit: est
   [N]

cannot be designated by a greater figure which is at the same time a segment of a circle. For this quality can be designated by no figure of which AB is not the base or chord. But AB cannot be the chord in a circle smaller than circle ACB if that circle were completed, for AB is the diameter of that circle. Therefore, this quality cannot be imagined by a greater figure which is a segment of a smaller circle than circle ACB; nor also of a greater figure which is a segment of a larger circle. [This last is evident,] for then that segment would either (1) be greater than half of its own circle, and therefore no quality could be designated by it, as is clear from chapter five, or (2) it would be less than half its own circle. [But in the case of the second possibility,] since the segment which is less than half of a larger circle would have the same chord as semicircle ACB, the segment would be less [in area] and would be a part of semicircle ACB, as is easily evident and can be proved by the last[4] [proposition] of the sixth [book] of [the *Elements* of] Euclid. Therefore, this quality cannot be designated by a figure which is a segment of a circle and is [at the same time] greater [in altitude and area] than semicircle ACB, and yet it can be designated by [some] greater curved figure, as was proved before. Therefore, the curvature of the greater [curved]figure will not be circular but will bound a figure which in altitude is proportional to that which the circular curvature bounds; and so there will be two figures proportional in altitude, the curvature of one being circular and that of the other being non-circular.

I.xv   On four kinds of simple difform difformity

Therefore, every simple difform difformity either (1) is imaginable by a figure which is not a segment of a circle nor proportional in altitude to some segment of a circle but whose summit is determined by an irrational curvature,[1] or (2) is imaginable by a figure whose summit is determined by a rational curvature, namely, by a circular figure or one proportional to it in altitude. And each of these two kinds

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[4] *Ibid.*, line 48.

[1] See the Commentary, I.xv, line 5.

51–52 non…curvitas *om.* F *(sed habet M)*
53 in altitudine *om.* F[M]
54 alia: alia est F[M] / non *om.* F[M]

I.xv: BVLP
1 Capitulum 15ᵐ *tr.* P / quatuor *om.* L / sim-
plicis *om.* P
4 alicui: alicuius [FM]
5 irrationabili L
5–6 aut…curvitate *iter.* V *et post* curvitate[1] *add.* V irrationali
6 curvitate *om.* P

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

5   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
10   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
15   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 in-
20   tensio velocitatis multipliciter variari. Et quoniam difformitas oritur ex eo

28 *post* Danielis *add.* [G] 3° (!) capitulo
28–29 *de* ipse...constituta *scr. mg.* B in (?) Danl' 2 *et mg.* A Daniel 28 (!) | *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 prin-

cipalis *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-

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

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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]*

[II.iii]   Capitulum 3ᵐ 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 4ᵐ 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*

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

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II.iii
  [1] See the Commentary, II.iii, lines 11–14.

[2] *Ibid.*, line 15.

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*

motu sed tamen reducibiles ad premissas. In motu enim quandoque est
5   successio secundum inceptionem. Verbi gratia, in motu locali possibile est
quod aliquod mobile totum simul incipiat moveri et possibile est quod
incipiat moveri pars post partem, sicut si punctus *D* [Fig. 15] ymaginetur
fluere super mobile *AB* ita quod pars ipsius mobilis *AB* pertransita a
puncto *D* moveatur et pars nundum pertransita quiescat donec pertransea-
10   tur a puncto *D*, sicut esset de virga plicabili que sic inciperet moveri. Hoc
autem precise habet locum in motu alterationis ubi reperitur successio secun-
dum partes quantitativas subiecti ac etiam in generatione forme substan-
tialis materialis; in qua generatione est successio secundum partes quantitati-
vas sive secundum extensionem, non tamen secundum partes graduales et in-
15   tensionem, sicut est in generatione ignis. Huiusmodi vero successio assimila-
tur quodam modo motui locali, sicut patet in exemplo nunc posito de motu
puncti *D*, et quodam modo assimilatur augmentationi secundum hoc quod
continue plus et plus sive maior et maior portio de subiecto movetur, vel
quod plus est generatum de forma. Et omnis successio que in hoc reperitur
20   aut est secundum partes subiecti aut secundum partes temporis aut secun-
dum velocitatem istius successionis secundum quod in exemplo posito
punctus *D* ymaginaretur moveri velocius aut tardius, et sic totum reducitur
ad tres divisibilitates in primo capitulo assignatas. Propter quod omnis
uniformitas sive difformitas que posset in hac successione inveniri reducenda
25   est et continetur sub duobus generibus uniformitatis et difformitatis in primo
capitulo iam positis.

Adhuc autem potest ymaginari alia successio, omnis enim velocitas est
intensibilis et remissibilis. Eius vero continua intensio vocatur velocitatio et
hec quidem velocitatio seu augmentatio velocitatis potest fieri velocius aut
30   tardius. Unde quandoque contingit quod velocitas intenditur et velocitatio
remittitur, quandoque vero utraque simul intenditur. Et similiter huiusmodi
velocitatio aliquando fit uniformiter et aliquando difformiter et diversimode.
Sed quoniam omnis divisibilitas sive successio que in huiusmodi velocita-
tione reperitur est aut secundum partes subiecti aut secundum partes tem-

3 assignatam: ymaginatam *V* / possunt
L[N] / ymaginari *BL[AEPCNSG]* assi-
gnari *V[M]* assignari aut ymaginari *[F]*
4 premissa *V*
5 inceptionem: interruptionem *L[E]*
7 si punctus: penes *[FMPC]*
8 pertransita: pertranseat *[FMPC]*
9 nondum *V*
11 precise *L[ENFC]* precipue *V[AG]* pre-
scise *[M]* precie *B[PS]*
14 sive: materie sive *L[E]*
18 et² *L[AESG]* ac *BV* sive *[FPC]*

19 est generatum *BV[AS]* tr. *[FMP]* gene-
ratur *L[EN]*
21 istius: ipsius *L* / posito *om. L*
22 ymaginatur *L*
23 tres: tres divisiones vel *L*
24 potest *L* / in...successione *om. L*
26 iam *om. L*
27 alia: una alia *L* / velocitas: successio *V*
28 continua *om. V*
31 quandoque: et quandoque *V* / vero *om. V*
32 aliquando¹: quandoque *L* / et *om. V*
33 omnis *om. L* / divisibilitas: diversitas *L* /

these however are reducible to those premised. For sometimes in motion there is succession according to inception. For example, in local motion it is possible that the whole of some body begins to be moved at the same time, but it is possible [at another time] that one part begins to be moved after another. A case in point is if point d [see Fig. 15] is imagined to flow over mobile AB so that the part of mobile

A ————————— d ——————————— B

Fig. 15
Figure in MS B.

AB traversed by point d is moved and the part not yet traversed remains at rest until traversed by point d, as in a pliable rod which would begin to be moved in this way. But this is precisely what happens in the motion of alteration where succession is found according to quantitative parts of the subject and even in the generation of substantial, material form. In such generation there is succession according to quantitative parts, or according to extension, but not however according to gradual parts and intensity. An example is in the generation of fire. Succession of this kind is assimilated in a certain way to local motion, as is evident in the example just posited of the motion of point d, and it is [also] assimilated in a certain way to augmentation since there [i.e., in augmentation] continually more and more, or a greater and greater portion, of the subject is moved or more form is generated. But every succession which is found in this [type] is (1) according to parts of the subject, or (2) according to parts of the time, or (3) according to the velocity of the succession—as, in the example posited, point d would be imagined to be moved more quickly or more slowly. And everything thus is reduced to the divisions specified in the first chapter. Accordingly, every uniformity or difformity which could be found in this kind of succession is to be reduced to, and is contained in, the two kinds of uniformity and difformity already posited in the first chapter.

There can be imagined one further succession, for every velocity is capable of being increased in intensity and decreased in intensity. Now its continuous increase in intensity is called acceleration, and indeed this acceleration or augmentation of velocity can take place more quickly or more slowly.[1] Whence it sometimes happens that velocity is increasing and acceleration is decreasing, while sometimes both are simultaneously increasing. Similarly acceleration of this sort sometimes takes place uniformly and sometimes non-uniformly and in diverse ways. But since every divisibility or succession which is found in acceleration of this sort is according to parts of the subject, or according to parts of the time, or ac-

II.v

[1] See the Commentary, ll.v, lines 27–32.

35　　poris aut secundum intensionem gradualem, ex qua trina divisibilitate
duplex oritur uniformitas sive difformitas, ut ostensum est in capitulo primo,
ideo sicut prius omnis uniformitas atque difformitas que potest ex hoc oriri
reducitur ad duo genera supradicta, scilicet ad uniformitatem secundum
partes subiecti aut ad uniformitatem que est secundum partes temporis, et
40　　ita de difformitate. De ea itaque que est secundum partes subiecti mobilis
primo dicatur.

[II.vi]　　Capitulum 6ᵐ de difformitate velocitatis secundum partes quantitativas subiecti

De uniformitate subiectiva ac difformitate velocitatum quantum ad earum
configurationem et figurarum variationem penitus dicendum est sicut
5　　dictum est in prima parte huius tractatus de uniformitate et difformitate
permanentium qualitatum, quoniam difformitas velocitatis eodem modo
potest ymaginari et eodem modo proportionatur et configuratur et totidem
ac eisdem modis potest diversificari quot et quibus modis prius fuit ostensa
variari difformitas qualitatum, sicut per terminari ad gradum et ad non
10　　gradum, per hoc quod quedam est difformitas simplex, alia composita, et
quod composita multipliciter distinguitur, et sic de omnibus differentiis
supradictis.

　　Verbi gratia [Fig. 16], si linea *AB* moveatur, possibile est quod quilibet
punctus eius alteri comparatus equali velocitate moveatur, scilicet omnia
15　　equevelociter, et hoc vel motu locali vel alteratione, et tunc erit velocitas
secundum partes subiecti uniformis. Similiter possibile est quod velocitas
puncti *A* sit duplo maior quam velocitas puncti *C* dividentis *AB* per me-
dium et velocitas *C* duplo maior quam velocitas puncti *D* dividentis
reliquam medietatem per medium, et sic proportionaliter de aliis punctis, et
20　　quod nulla sit velocitas in puncto *B* terminante; et in isto casu erit velocitas

36 seu *L* | in *L[ENFMPCS] om. BV[AG]*
37 atque: sive *V*
38–39 secundum…uniformitatem *om.*
　　[FMPSC]
39 aut *BV[G]* et *L[EN]* sive *[A]*
41 dicam *L*

II.vi: BVL
　3 ac *BV[FMSCG]* et *L[ENP]* sive *[A]*
　4 configurationem: assignationem *L* figura-
　　tionem *[A]*
　5 tractatus *om. V* | et: ac *L*
　7 modo *om. L* | proportionaliter et configura-

liter *L*
　8 prius…ostensa: ostensa fuit prius *V*
　9 qualitatis *L*
　10 alia: et alia *L* et quedam *[NS]*
　11 distinguuntur *L[G]*
　13 *post* gratia *desinit B* | si…AB: AB linea *L*
　14 punctus *BV[ASG]* ACDB punctus *L[N]*
　　punctus ACDB *[FMPC]*
　16 subiecti uniformis *tr. L* | est *om. V*
　19 proportionabiliter *L*
　20 isto casu *BV[ACG] tr. L[N]* illo casu
　　[FM] iᵒ casu *[S]* alio casu *[P]*

cording to gradual intensity, and from such threefold divisibility arises twofold
uniformity or difformity, as was demonstrated in the first chapter, therefore, as
before, every uniformity and difformity which can so arise is reduced to the two
above-mentioned kinds, that is, to uniformity and difformity according to parts of
the subject or uniformity and difformity according to parts of the time. And so let
us first speak of that which is according to parts of the subject.

II.vi   On difformity of velocity according to the quantitative
parts of the subject

In regard to the configuration and variation in figures representing uniformity
and difformity of velocities with respect to subject, one should speak completely in
the same way as we spoke before in the first part of the tract where the uniform-
ity and difformity of permanent qualities were discussed. This is clear since the
difformity of velocity can be imagined in the same way, can be proportioned and
figured in the same way, and can be diversified in as many and in the same ways, as
it was demonstrated before that the difformity of qualities is varied. These vari-
ations are, for example: (1) in being terminated at [some] degree or at no degree,
and (2) that some difformity is simple and some composite, and (3) that the com-
posite difformity is distinguishable in many ways, and so on for all the differences
mentioned above.

For example [see Fig. 16], if line *AB* is moved, it is possible that any point of it
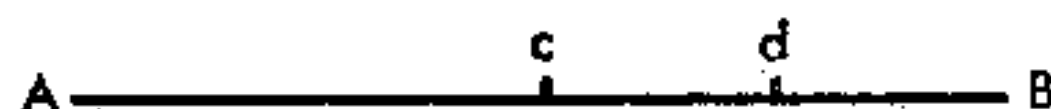is moved with the same velocity as any other point, namely that they are all moved

Fig. 16
Figure in MSS *BLSG*. MS *L* also has a right triangle with base *AB* marked.

equally fast.[1] This is so in either local motion or alteration. And we have then
velocity uniform according to the parts of the subject. Similarly, it is possible that
the velocity of point *A* is twice that of point *c* (dividing line *AB* in half) and the
velocity of *c* is twice that of point *d* (dividing the remaining half in half), and so on
proportionally for the other points, with there being no velocity in terminal point
B. In this case the velocity will be uniformly difform terminated at no degree in

II.vi
    [1] See the Commentary, II.vi, lines 13–23.

40   cordias domini in eternum cantabunt, quo cantico in gloriam gratie Christi
  [...] nichil erit profecto illi iocundius civitati."

Incipit tertia pars
de acquisitione et mensura qualitatum
et velocitatum

[III.i]   Capitulum primum: per quid ymaginanda est
5   acquisitio qualitatis

    Duplici modo potest contingere successio in acquisitione qualitatis,
scilicet secundum extensionem et secundum intensionem, sicut superius
fuit dictum capitulo 4° partis secunde. Acquisitio itaque extensiva qualitatis
linearis ymaginanda est per motum puncti fluentis super ipsam lineam subiec-
10 tivam, ita quod pars pertransita sit qualificata et pars nundum pertransita
non qualificata. Sicut si punctus *c* moveretur super lineam *AB* et quidquid
esset ab eo pertransitum esset album et quidquid nundum esset pertransitum
nundum esset album [Fig. 18(a)]. Acquisitio autem extensiva qualitatis
superficialis ymaginanda est per motum linee dividentis partem superficiei

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40 Christi *om. L*

41 profecto *B[AFMSG] text. Aug.* perfecto
  L[VPC] perfectius *[N]* | illi iocundius
  tr. L[N] iocundius *[A]* | *post* civitati *add.*
  [PM] et sic est finis istius. Explicit secun-
  da pars huius tractatus, *et add. [F]* et sic
  est finis, *et add. [G]* Explicit secunda pars,
  et add. [A] Amen. Explicit secunda pars
  huius tractatus, *et add. [N]* Explicit secun-
  da pars *et add. L* Sequitur (*!*) pars huius
  tractatus, *et add. [S]* et sic explicit pars se-
  cunda

Tit. et III.i: BL

  1–3 Incipit...velocitatum *mg. BL[ANG]*
  (*except for the variants in BAL below*) *om.*
  [VP] Incipit tertia etc. *[M]* Incipit 2ª (*!*)
  pars que est de figuratione et potentia
  qualitatum successivorum *[F]* Tertia pars

seu tractatus altius (alterius?) de acquisi-
tione et mensura qualitatis et velocitatis *[C]*

1 3ª pars *mg. [S], mg. [J]* tertia pars *tr. B*
  tertia pars eiusdem *[A]*

2–3 qualitatis et velocitatis *L*

7 scilicet *om. L[N]*

8 capitulo 4° *[VANFMPSCG] tr. BL* |
  partis secunde *B[VANS] tr. L[G]* prime
  partis *[FMPC]* | extensiva *B[AFMPSG]*
  om. [C] extensive *L[VN]*

9 motum *B[VN]* (*et cf. lin. 14, 15, 17–18, 22,*
  25, 30) modum *L[MACSG]* moᵐ *[P]*
  medium *[F]*

9–10 subiectivam *om. L* subiectam *[C]*

10 nundum *B[ANFMP]* nondum *L[VCSG]*
  hic et alibi

12 esset¹ *tr. L post* pertransitum¹ | esset³ : est *L*

14 superficialis : linearis *L* | est : esset *L[N]*

of God in eternity ... certainly there will be no greater joy in that city than this song to the glory of the grace of Christ."[5]

Here begins the third part
[of this treatise]: On the Acquisition and Measure
of Qualities and Velocities

III.i   How the acquisition of quality is to be imagined

Succession in the acquisition of quality can take place in two ways: (1) according to extension, (2) according to intensity, as was stated in the fourth chapter of the second part. And so extensive acquisition of a linear quality ought to be imagined by the motion of a point flowing over the subject line in such a way that the part
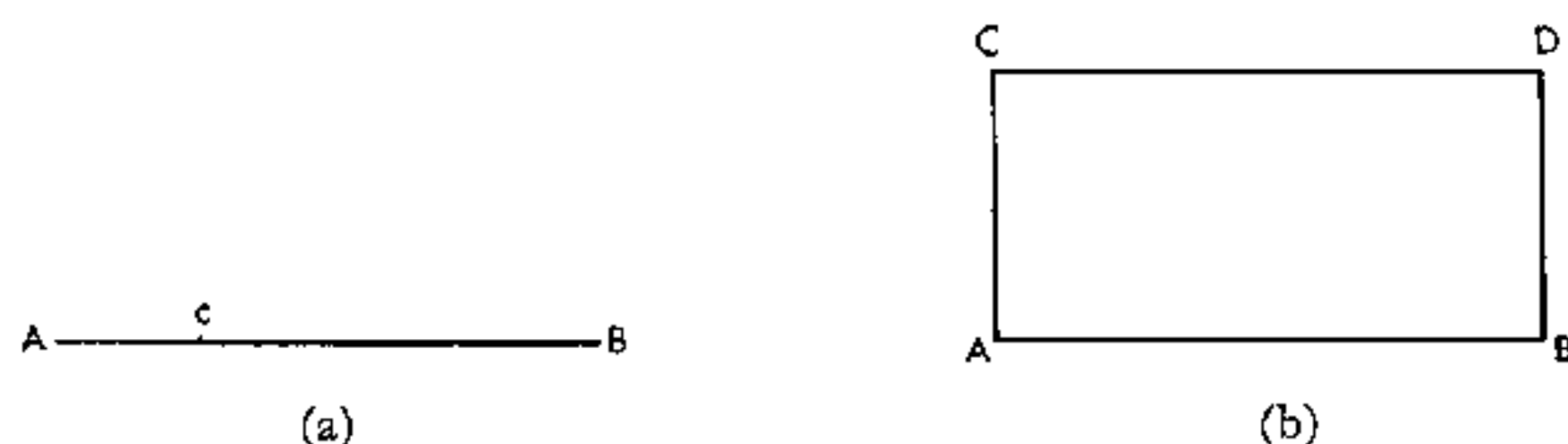

Fig. 18
Figure (a) in MSS *BG*. Figure (b) in MSS *SJGL*. MS *L* merely has two parallel lines *AB* and *CD* close together.

traversed has received the quality and the part not yet traversed has not received the quality. An example of this occurs if point *c* were moved over line *AB* so that any part traversed by it would be white and any part not yet traversed would not yet be white [see Fig. 18(a)]. Further the extensive acquisition of a surface quality ought to be imagined by the motion of a line dividing that part of the surface that

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[5] *De civitate Dei*, XXII, 30 (ed. of Dombart, Vol. 2, 633–34): "Alioquin si se fuisse miseros nescituri sunt, quo modo, sicut ait psalmus, *misericordias Domini in aeternum cantabunt?* Quo cantico in gloriam gratiae Christi, cuius sanguine liberati sumus, nihil erit profecto illi iucundus civitati." Augustine is referring to *Psalms* 88:2.

15   alteratam a parte nundum alterata. Et acquisitio extensiva corporee qualitatis conformiter ymaginanda est per motum superficiei dividentis partem alteratam a parte nundum alterata.

      Acquisitio autem intensiva qualitatis punctualis ymaginanda est per motum puncti continue ascendentis super punctum subiectivum et motu

20   suo describentis perpendicularem lineam ymaginatam super eundem punctum subiectivum. Acquisitio vero intensiva qualitatis linearis ymaginanda est per motum linee perpendiculariter ascendentis super lineam subiectivam et suo fluxu vel ascensu derelinquentis superficiem per quam designatur qualitas acquisita. Verbi gratia [Fig. 18(b)]: Sit AB linea subiectiva. Dico

25   igitur quod intensio puncti A ymaginatur per motum vel per ascensum perpendicularem puncti C et intensio linee AB vel acquisitio intensionis ymaginatur per ascensum linee CD. Acquisitio autem intensiva qualitatis superficialis conformiter ymaginanda est per ascensum superficiei motu suo ymaginato derelinquentis corpus per quod illa qualitas designatur. Et simi-

30   liter acquisitio intensiva corporee qualitatis ymaginatur per motum superficiei quia superficies fluxu suo ymaginato derelinquit corpus et non contingit dare quartam dimensionem sicut dictum fuit 4° capitulo prime partis.

      Et sicut nunc dictum est de acquisitione qualitatis ita conformiter dicendum est et ymaginandum de deperditione, sive deperdatur extensio sive

35   etiam intensio, ymaginatur enim talis deperditio per motus oppositos motibus prius dictis. Sicut etiam nunc dictum est de acquisitione aut deperditione qualitatis ita conformiter ymaginandum est de acquisitione aut deperditione velocitatis tam in extensione quam in intensione.

15 alteratam *om.* L alterate *[FMP]* | a: ab altera L*[N]*

15–17 alterata....alterata *om.* *[C]* | Et...alterata *om.* *[FMP]*

15–16 qualitatis *om.* L*[AN]*

17 alteratam: alteram L

19 subiectum L*[C]*

19–21 et...subiectivum *om.* L*[N]*

21 subiectivum *om.* L subiectum *[C]*

22 subiectivam: summam L

24 subiecta L

25 per² BL*[FMP]* *om.* *[AVNSCG]* | ascensum BL*[VANS]* ascensionem *[FMPCG]*

27 autem *om.* L*[N]* vero *[F]*

29 designatur: ymaginatur *[V]*

30 acquisitio *om.* L*[N]*

30–31 superficiei: superficiei qualitatis L*[N]*

32 fuit: est L | 4° capitulo *tr.* *[VAC]*

34 deperditione BL*[VNSG]* perditione *[AFMPC]* | deperdatur: deperditio L / extensio L*[VNG]* etiam extensio B extensive *[FMP]* intensio *[AS]* intensive *[C]*

35 etiam intensio B*[V]* *om.* L intensio *[NG]* etiam intensive *[F]* etiam extensive *[C]* etiam extensio *[A]* intensive *[MP]* extensio *[S]*

36 etiam *om.* *[G]* enim L*[N]*

36–37 aut deperditione BL*[V]* *om.* *[NFMPC]* de perditione *[A]* et de perditione *[G]* perditione *[S]*

37–38 deperditione: de perditione *[AFP]* perditione *[V]*

38 in extensione quam in intensione B*[VFMPG]* in (*om.* C) intensione quam in (*om.* S) extensione L*[SC]* in intensum quam extensum *[N]* extensive quam intensive *[A]*

has been altered from the part not yet altered. And the extensive acquisition of a corporeal quality in a similar way is to be imagined by the motion of the surface dividing the part altered from the part not yet altered.[1]

The intensive acquisition of punctual quality is to be imagined by the motion of a point continually ascending over a subject point and by its motion describing a perpendicular line imagined [as erected] on that same subject point. But the intensive acquisition of a linear quality is to be imagined by the motion of a line perpendicularly ascending over the subject line and in its flux or ascent leaving behind a surface by which the acquired quality is designated. For example [see Fig. 18(b)], let AB be the subject line. I say, therefore, that the intension of point A is imagined by the motion, or by the perpendicular ascent, of point C, and the intension of line AB, or the acquisition of the intensity, is imagined by the ascent of line CD. Further, the intensive acquisition of a surface quality is in a similar way to be imagined by the ascent of a surface, which (by its motion) leaves behind a body by means of which that quality is designated. And similarly the intensive acquisition of a corporeal quality is imagined by the motion of a surface because a surface by its imagined flux leaves behind a body, and one does not have to pose a fourth dimension, as has been said in the fourth chapter of the first part.

One should speak and conceive of the loss of quality in the same way that we have now spoken of its acquisition, whether that loss is of extension or intensity. For such loss is imagined by movements which are the opposite of the movements described before. Furthermore, one ought to speak of the acquisition or loss of velocity, both in extension and intensity, in the same way we have just spoken of the acquisition or loss of quality.

III.i
[1] See the Commentary, III.i, lines 13–17.

ymaginetur ens successivum. Unde in Ysaia dicitur, "erit lux lune sicut lux solis, et lux solis erit septempliciter sicut lux septem dierum," quia videlicet

30   lux unius diei septempliciter intensa equalis est luci que per septem dierum spatium extenderetur.

[III.vii]   Capitulum 7^m de mensura qualitatum et velocitatum difformium

Omnis qualitas, si fuerit uniformiter difformis, ipsa est tanta quanta foret qualitas eiusdem subiecti vel equalis uniformis secundum gradum

5   puncti medii eiusdem subiecti; et hoc intelligo si qualitas fuerit linearis. Et si fuerit superficialis, secundum gradum linee medie; si vero fuerit corporalis, secundum gradum medie superficiei, semper conformiter intelligendo. Istud ostenditur primo de lineari. Sit igitur una qualitas ymaginabilis per triangulum *ABC* que est uniformiter difformis terminata ad non gradum in

10   puncto *B* [Fig. 21(a)]; et sit *D* punctus medius linee subiective, cuius quidem puncti gradus vel intensio ymaginatur per lineam *DE*. Igitur qualitas que esset uniformis per totum subiectum secundum gradum *DE* ymaginabilis est per quadrangulum *AFGB*, ut patet per 10^m capitulum prime partis. Constat autem per 26^{am} primi Euclidis quod duo parvi trianguli *EFC* et *EGB* sunt

28 ens *B[VAFMPC]* esse *L[SG]* esse ens [*N*]
29-30 videlicet lux *tr. L* lux [*N*]
31 extenditur *L[S]*

III.vii: BL
3-4 ipsa...uniformis *om.* [*FMP*]
5 si...linearis: qualitate lineari *B*

7 medie superficiei *tr. L[NS]* superficiei [*V*]
/ semper: secundum hoc *L*
8 ostenditur primo *tr. L[G]* ostenditur [*FMPC*]
11-12 esset *B[VASG]* est *L[NFMPC]*
13-14 Constat autem *B[VSG]* constatque *L[N]* constat et [*FMPC*]
14 EFC: EFG *B[V]*

if it is imagined to be a successive entity. Whence it is said in Isaias:[3] "And the light of the moon shall be as the light of the sun, and the light of the sun shall be sevenfold as the light of seven days," for evidently the light of one day increased intensively by sevenfold is as the light which would be extended through a space of seven days.

III.vii   On the measure of difform qualities and velocities

Every quality, if it is uniformly difform, is of the same quantity as would be the quality of the same or equal subject that is uniform according to the degree of the middle point of the same subject.[1] I understand this to hold if the quality is linear. If it is a surface quality, [then its quantity is equal to that of a quality of the same subject which is uniform] according to the degree of the middle line; if corporeal, according to the degree of the middle surface, always understanding [these concepts] in a conformable way. This will be demonstrated first for a linear quality. Hence let there be a quality imaginable by $\triangle ABC$, the quality being uniformly difform and terminated at no degree in point B [see Fig. 21(a)]. And let D be the middle point of the subject line. The degree of this point, or its intensity, is imag-
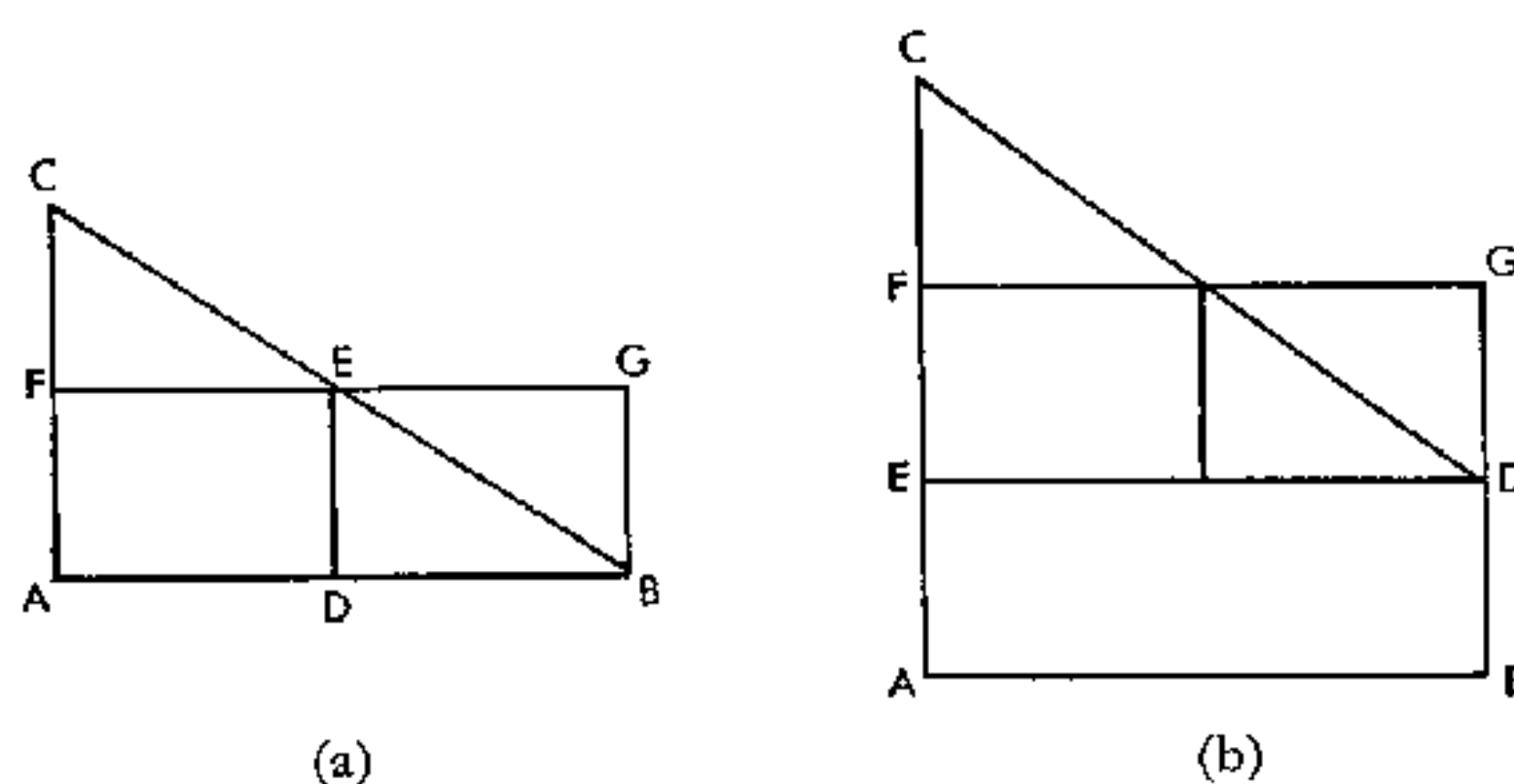

(a)   (b)

Fig. 21

Figures in *BLSJG*. Figures are rotated through 90° in MS *G*. In figure (b) in MS *L*, there is no center perpendicular. In MS *J*, line *ED* is missing and the center perpendicular is marked *KH*. Both figures are reversed in MS *J*.

ined by line DE. Therefore, the quality which would be uniform throughout the whole subject at degree DE is imaginable by rectangle $AFGB$, as is evident by the tenth chapter of the first part. Therefore, it is evident by the 26th [proposition] of [Book] I [of the *Elements*] of Euclid[2] that the two small triangles EFC and EGB

III.vii

[3] *Isaias* 30:26.

[1] See the Commentary, III.vii, lines 3–5.

[2] *Ibid.*, line 14.

15 equales. Ergo maior triangulus *BAC* qui designat qualitatem uniformiter
difformem et quadrangulus *AFGB* qui designaret qualitatem uniformem
secundum gradum puncti medii sunt equales. Ergo qualitates per huius-
modi triangulum et quadrangulum ymaginabiles sunt equales. Et hoc est
propositum.

20   Eodem modo potest argui de qualitate uniformiter difformi terminata
utrinque ad certum gradum, sicut esset qualitas ymaginabilis per quadrangu-
lum *ABCD* [Fig. 21(b)]. Protrahatur enim linea *DE* equedistans basi subiec-
te et fieret triangulus *CED*. Deinde protrahatur per gradum puncti medii
linea *FG* equalis et equedistans basi subiecte, et protrahatur etiam linea
25 *GD*. Tunc sicut prius probabitur quod triangulus *CED* et quadrangulus
EFGD sunt equales. Ergo addito utrobique quadrangulo communi *AEDB*
fient duo tota equalia, scilicet quadrangulus *ACDB* qui designat quali-
tatem uniformiter difformem et quadrangulus *AFGB* qui designaret quali-
tatem uniformem secundum gradum puncti medii ipsius subiecti *AB*. Igitur
30 per capitulum 10ᵐ prime partis qualitates per huiusmodi quadrangulos desig-
nabiles sunt equales.

Conformiter potest argui de qualitate superficiali ac etiam de corporali.
De velocitate vero omnino dicendum est sicut de qualitate lineari, dum
tamen loco puncti medii capiatur instans medium temporis velocitatem
35 huiusmodi mensurantis. Sic itaque patet cui qualitati aut velocitati uniformi
adequatur qualitas sive velocitas uniformiter difformis. Proportio autem
qualitatum et velocitatum uniformiter difformium est sicut proportio quali-
tatum et velocitatum simpliciter uniformium quibus adequantur. Et de
mensura et proportione illarum uniformium dictum est in capitulo prece-
40 denti.

Si autem qualitas seu velocitas fuerit difformiter difformis, tunc, si
componatur ex partibus uniformibus aut uniformiter difformibus, ipsa
poterit mensurari per suas partes, de quarum mensura dictum est ante. Si
vero qualitas fuerit alio modo difformis, sicut difformitate illa que per curvi-
45 tatem designatur, tunc oporteret recurrere ad mensurationem figurarum
curvarum inter se aut earum cum rectis figuris; et hoc est alterius specula-
tionis. Sufficiant ergo que dicta sunt.

21 utrinque *B[SG] om. [C]* utriusque *L[A]*
   utrobique *[VN]* uterque *[FMP]*
23–24 et...et² *om. L*
26 sunt *B[VANSG]* fient *L* erunt *[FMPC]*
26–27 equales...fient *B[VANSG] om. [FM PC]* equales quare *L*
27–28 ACDB...quadrangulus *om. L*
28 designaret *B[AVS]* designat *L[FNM ?P, ?C, ?G]*

33 De¹ *om. L[N]*
34 capiatur *B[VSG] om. [FMP]*, *tr. L[AN]*
   post temporis / instans: instantis *L* infert *[FMP]*
36 qualitatis aut velocitatis *L*
37 et: aut *L[N]* sive *[A]*
38 Et *om. L[AN]*
39 et: et de *L[VMP]* / uniformium *om. L[N]*
41 qualitas...velocitas: velocitas seu quali-

are equal. Therefore, the larger $ABAC$, which designates the uniformly difform quality, and the rectangle $AFGB$, which designates the quality uniform in the degree of the middle point, are equal. Therefore the qualities imaginable by a triangle and a rectangle of this kind are equal. And this is what has been proposed.

In the same way it can be argued for a quality uniformly difform terminated in both extremes at a certain degree, as would be the quality imaginable by quadrangle $ABCD$ [see Fig. 21(b)]. For let line DE be drawn parallel to the subject base and $\triangle CED$ would be formed. Then let line FG be drawn through the degree of the middle point which is equal and parallel to the subject base. Also, let line GD be drawn. Then, as before, it will be proved that $\triangle CED = \square EFGD$. Therefore, with the common rectangle $AEDB$ added to both of them, the two total areas are equal, namely quadrangle $ACDB$, which designates the uniformly difform quality, and the rectangle $AFGB$, which would designate the quality uniform at the degree of the middle point of the subject AB. Therefore, by chapter ten of the first part, the qualities designatable by quadrangles of this kind are equal.

It can be argued in the same way regarding a surface quality and also regarding a corporeal quality. Now one should speak of velocity in completely the same fashion as linear quality, so long as the middle instant of the time measuring a velocity of this kind is taken in place of the middle point [of the subject].[3] And so it is clear to which uniform quality or velocity a quality or velocity uniformly difform is equated. Moreover, the ratio of uniformly difform qualities and velocities is as the ratio of the simply uniform qualities or velocities to which they are equated. And we have spoken of the measure and ratio of these uniform [qualities and velocities] in the preceding chapter.

Further, if a quality or velocity is difformly difform, and if it is composed of uniform or uniformly difform parts, it can be measured by its parts, whose measure has been discussed before. Now, if the quality is difform in some other way, e.g. with the difformity designated by a curve, then it is necessary to have recourse to the mutual mensuration of the curved figures, or to [the mensuration of] these [curved figures] with rectilinear figures; and this is another kind of speculation.[4] Therefore what has been stated is sufficient.

[3] *Ibid.*, lines 33–35.   [4] *Ibid.*, line 46.

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         tas $L[N]$ difformitas sive qualitas *[A]*   47 Sufficiant…sunt *BL[VS] om.*
44 sicut *om. [C]* sicut de $L[N]$ *[ANFMPCG]*