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RICHARD KILVINGTON'S THEORY OF HYLOMORPHISM AND QUALITATIVE CHANGE*

Introduction

This paper concerns Richard Kilvington's inventive interpretation of Aristotle and Averroes's hylomorphism in relation to different types of transformations, including generation, corruption, mixture, and qualitative change. The theories examined here derive from Kilvington's question-commentary on the *Physics*, reconstructed through cross-references found in each individual question.[1] His questions cover most of the topics Aristotle touched upon in his *Physics*. The main issues presented in this article are addressed in questions 1–2, the *expositio* of the first chapter of the first Book of the *Physics*, and question 6. The complete list of these questions is as follows:

1. *Utrum omne quod generatur ex contrariis generetur*.
2. *Utrum in omni generatione tria principia requirantur. Expositio super primum capitulum primi libri Physicorum*.
3. *Utrum omne scitum sciatur per causam.*
4. *Utrum omnis natura sit principium motus et quietis.*
5. *Utrum aliquod corpus simplex possit moveri aeque velociter in vacuo et in pleno*.

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[1] See E. Jung, *Introduction*, in: Ricardus Kilvington *Quaestiones super libros Physicorum* (forthcoming).

6. *Utrum qualitas suscipiat magis et minus*.
7. *Utrum omne transmutatum in transmutatione initio sit in eo ad quod primitus transmutatur*.
8. *Utrum in omni motu potentia motoris excedit potentiam rei motae*.[2]

As Kilvington explains, the *Physics* deals with natural bodies, and "Aristotle intends to discourse on causes in general terms and in three particular aspects, viz.: 1) as to the principles of natural beings (*res*); 2) as to the cosequences of natural beings; 3) as to the properties ot these cosequences."[3]

Kilvington fully accepts Aristotle's definition of natural things when he states, "by natural things I mean here not all of those which exist naturally, but strictly these that contain an intrinsic principle of motion."[4] As he explains:

> I say... that every nature which is a form of generable and corruptible body is the active principle thanks to which a natural body is capable of being generated and corrupted, and is capable of moving locally or remaining at rest. In keeping with this understanding, it must be taken for granted that nature is the *per se* and non-accidental principle of motion and rest of any body in which it is found.[5]

From this description, Kilvington concludes that detailed analyses should be conducted on cases of various types of changes of individual bodies, whether they are observable or imaginary. For each analyzed case, the conditions that must be met for a given change to occur are discussed. Kilvington devotes most of his time to considering the problems of different types of change, and the properties of primary and secondary qualities, of medium and void, of place,

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[2] For the detailed information about manuscripts of Kilvington's commentary on the *Physics* see E. Jung, "Richard Kilvington," *The Stanford Encyclopedia of Philosophy* (Fall 2022 Edition), ed. E.N. Zalta, U. Nodelman, URL = <https://plato.stanford.edu/archives/fall2022/entries/kilvington/>.

[3] Ricardus Kilvington, *Expositio super primum capitulum primi libri Physicorum*, Paris BnF, Ms 6559, f. 153va: "...Aristoteles in hoc libro intendat declarare de causis in generali, et praecipue quoad tria, videlicet quoad principia rerum naturalium, quoad consequentia res naturales, et quoad proprietates consequentium earundem."

[4] *Ibidem*, f. 153vb: "Unde hic intelligo per res naturales non indifferenter quascumque res quae naturaliter existunt, sed illas praecipue quae in seipsis principium motus habent." See Aristoteles, *Physica*, lib. II, cap. 1(192b,22–23). English transl. R.P. Hardy, R.K. Gaye, in: *The Basic Works of Aristotle*, ed. R. McKeon, New York: Random House, 2001, p. 236, l. 22–23: "…nature is a source or cause of being moved and of being at rest in that to which it belongs primarily."

[5] Ricardus Kilvington, *Utrum omnis natura sit principium motus et quietis*, Sevilla, Biblioteca Capitular y Colombina, Ms. 7–7–13, f. 37vb: "…dico ... quod omnis natura, quae est forma corporis generabilis et corruptibilis, est principium activum quo natum est corpus naturale generabile et corruptibile quiescere et movere localiter. Et secundum istum intellectum debet hoc totum intelligi, videlicet natura est principium motus et quietis eius in quo est primo et per se et non secundum accidens."

time, and infinity. He also devotes considerable effort to comparing motions in terms of speed, time, and distance traversed, and to investigating the causes of motion. The remaining parts of his *Physics* commentary are dedicated to epistemological problems and logical considerations, such as the theory of knowledge acquisition, the question of future contingent events, and the theory of obligations.

As a teacher, Kilvington had the goal of providing students with a correct interpretation of the views of Aristotle and Averroes. Like them, he points to different solutions to particular problems in order to discover a coherent, true theory. Nevertheless, his views usually do not concure with the opinions of Aristotle or Averroes, but are original reinterpretations. It should be strongly emphasized, however, that Kilvington always claimed that his interpretation would be acceptable to both the Philosopher and the Commentator. John Duns Scotus and William of Ockham are his most respected predecessors. By developing or arguing with their views, Kilvington often shapes theories of his own.

The main element in Kilvington's method of practicing natural philosophy is nominalism.[6] His nominalistic position is precisely characterized in the following declaration:

> I claim that all things in the world, be they universals or souls, are single things, since they are universal only because they signify universally, and not because they are things different than singular ones.[7]

Like Ockham, Kilvington also makes frequent use of the principle of parsimony; he accepts without reservation that individual things in the world are limited to substances and qualities, which are *res absolutae*. He breaks with the Aristotelian *metabasis* and, consequently, considers mathematics to be a legitimate method for describing physical phenomena. He is committed to clarify the individual processes of change that bodies undergo. Consistently, Kilvington takes into account only natural principles (matter, form, and privation) as the causes of natural processes, and not material, formal, efficient, and final causes, which play only an explanatory role.[8] Consequently, in Kilvington's opinion, the main task of a natural philosopher is to search for the specific true causes responsible

[6] A detailed study of all Kilvington's works obliges me to revise my earlier position that he was a realist. See E. Jung-Palczewska, "Works by Richard Kilvington," *Archives d'histoire doctrinale et littéraire du Moyen Âge*, vol. 67 (2000), p. 221.

[7] Ricardus Kilvington, *Utrum omne scitum*, f. 178rb: "Dico enim quod omnes res mundi sive universales sive animae sunt res singulares, quia universales non sunt res universales nisi quia significant universaliter et non quia sint aliae res a singularibus."

[8] Ricardus Kilvington, *Utrum in omni generationetria principia requirantur*, Sevilla, Biblioteca Capitular y Colombina, Ms. 7–7–13, f. 33va: "Ad istam quaestionem quando quaeritur utrum in omni generatione tria principia requirantur respondeo, et suppono quod principia hic

for specific processes of change. This investigative attitude results in the clear-cut structure of his questions on the *Physics*, in which only the basic causes of individual processes of change and the effects of their action are examined thoroughly. Therefore, Kilvington often uses a method of *ceteris paribus*, which attempts to take into account only the main factors causing change.

Kilvington opens his commentary on the *Physic* with a quote from Aristotle's Book III of the *Metaphysics*. Aristotle says:

> Now for those who wish to get rid of perplexities it is a good plan to go into them thoroughly, for the subsequent certainty is a release from previous perplexities and release is impossible when we do not know the knot. The perplexity of the mind shows that there is a "knot" in the subject; for in its perplexity it is in much the same condition as men who are fettered, in both cases it is impossible to make any progress. Hence we should first have studied all the difficulties, both for the reasons given and also because those who start an inquiry without first considering the difficulties are like people who do not know where they are going …"[9]

Kilvington begins his discussion of natural philosophy by interpreting this passage and Averroes' commentary on it, explaining the basic problems of natural philosophy, i.e. the structure of nature and the processes of different types of generation.

1. The Structure of Nature

1.1. Hylomorphism

Kilvington is by no means original in accepting the hylomorphic structure of nature, holding that all bodies are composed of matter and form. He accepts Averroes' view that, "apart from prime matter and the last form, all other things are composite, and all other forms of all natural beings are composite."[10] Prime matter and the last form are the first uncompounded causes existing in being (*in re*). However, in order for material bodies to change, in most cases, three causes are needed, i.e., matter, form, and privation (*privatio*). Although privation is

accipiantur pro principiis primis rei generabilis et corruptibilis, secundum quod accipit Commentator I *Physicorum* commento 64, et commento 65 allegatis, non pro primis principiis alicuius scientiae secundum quod accipit Lyncolniensis I *Posteriorum* capitulo 2."

[9] Aristoteles, *Metaphysica*, III, 1 (995a 28–995a 35). English trans. H. Tredennick, in: *Aristotle*, *The Metaphysics*, *Books I–IX*, ed. W.D. Ross (Loeb Classical Library, 271), London–New York, 1933, p. 97.

[10] Averroes, *In Physicam*, I, 1, in: *Aristotelis opera cum Averrois commentariis*, vol. 4, Venetiis, apud Iunctas M.D.LXII, f. 6rb(E): "…quae sunt praeter primam materiam et ultimam formam cuiuslibet naturalium rerum sunt materiae compositae et formae compositae."

a principle of change, in itself it is not a being, though it is the *sine qua non* of every generation and alteration of earthly bodies. Since privation only provides matter with a capacity to undergo a specific change, that is, to acquire a new form, matter and form play the essential roles in the processes of change.[11]

1.1.1. Matter

According to Kilvington, matter is of three kinds: prime matter, composite matter (of which prime matter is a part), and the matter of celestial bodies. The first two accept a variety of forms; the third is informed solely by one indivisible form.[12]

Prime matter is a privation, i.e., a non-being, with respect to any form, either substantial or accidental, that might be introduced into it.[13] However, unlike privation, prime matter is only accidentally and not absolutely (*per se*) non-being. When a specific form is introduced into it, it is no longer a privation of that specific form.[14]

Like form, prime matter also is a substance. Since matter and form belong to two different species and as such differ as regards more or less, matter is less "substantial" than form.[15] Similarly, Ockham claims that

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[11] Ricardus Kilvington, *Utrum in omni generatione*, f. 37ra: "Unde dico quod quam cito aliqua forma fuerit generata in materia prima, statim materia prima desinit esse privatio respectu eiusdem formae. Et ideo est quod dicit Commentator I *Physicorum* commento 64 quod generatum incompletum componitur ex materia et forma et privatione praecedente. Quod sic intelligendum est: id est ad hoc quod aliquid generetur, requiritur forma generanda et materia prima quae ante generationem eiusdem formae fuerit respectu eiusdem formae privatio."

[12] Ricardus Kilvington, *Expositio*, f. 157ra: "…dico quod causa materialis accipitur tripliciter secundum triplicem acceptionem materiae, videlicet pro materia prima, et pro materia composita cuius pars est materia prima, et pro materia coeli quae est materia in actu, et ideo in actu quia actualiter perfecta per formam indivisibilem."

[13] Ricardus Kilvington, *Utrum in omni generatione*, f. 36vb: "…dico quod materia prima est privatio respectu cuiuslibet formae tam substantialis quam accidentalis inducendae in eam."

[14] Ricardus Kilvington, *Utrum in omni generatione*, f. 36vb–37ra: "…Commentator distinguens materiam primam a privatione dicit quod *materia prima est non ens per accidens, et quod privatio est non ens per se*. Sed pro ista auctoritate dico quod Commentator ibi sic intelligit, videlicet quod materia prima non est aliquod ens perfectum de se sed per formam, et quod materia prima quam cito aliqua forma de novo fuerit inducta sive generata in ea non est privatio respectu eiusdem formae."

[15] Ricardus Kilvington, *Utrum omne scitum*, f. 159vb: "…concedo quod materia prima est substantia et minus substantia quam forma…Unde pro auctoritatibus in oppositum allegatis dico quod per eas debet intelligi quod nulla substantia unius speciei est magis quam alia substantia eiusdem speciei. Et ideo est quod pono, quod nulla substantia potest esse magis substantia vel minus substantia quam ipsamet modo est, et tamen quod aliquae sunt duae substantiae diversarum specierum quarum una est magis substantia quam alia. Et hoc est verum de materia et de forma quarum forma est magis substantia."

> …potency is a substance which is matter, and matter is potency, because matter is a kind of potency for substantial form, in such a way that potency is not a medium between matter and form, but matter itself is a potency for acquiring form.[16]

As a substance, prime matter is perfect in itself, and as such is not perfected by any form.[17] Kilvington says:

> Therefore I say that although prime matter, by receiving various forms, receives various perfections which belong to those forms, or rather are those forms, it does not receive those perfections as something perfectible through them, but as their substratum (*subiectum commune*).[18]

This explanation is Kilvington's response to the opinion that holds that the non-existence of prime matter results from its imperfection.[19]

The potency of matter is twofold: remote (*remota*) and proximate (*propinqua*). Remote potency exists before any act and does not cause any act. Remote potency is the same as prime matter, because it is capable of acquiring as many forms as there are species of generable things, and it has the disposition to acquire a variety of forms.[20] Kilvington claims, "hence, assuming that prime matter itself is the potency to receive forms, it does not follow that the potency of matter is a different thing (*res*) than prime matter itself."[21] He seems to be in

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[16] Guillelmus de Ockham, *Summula philosophiae naturalis*, ed. S. Brown, in: Guillelmi de Ockham, *Opera Philosophica et Theologica*, Opera Philosophica, t. 6, St. Bonaventure: St. Bonaventure University, 1984, p. 183:48–51: "…potentia est substantia quae est materia, et materia est potentia, quia materia est quaedam potentia ad formam substantialem, ita quod potentia non est aliquod medium inter materiam et formam, sed materia est ipsa potentiae quae potest recipere formam."

[17] Ricardus Kilvington, *Expositio*, f. 160ra: "…dico quod materia prima est perfecta de se et non per formam. Cuius causa est, quia nulla forma superaddit aliquam perfectionem materiae primae quam ipsa non haberet, licet foret existens per se sine aliqua forma."

[18] *Ibidem*, f. 160rb: "Unde dico quod licet materia una cum receptione formarum diversarum recipiat diversas perfectiones quae sunt illarum formarum aut potius illae formae, non recipiat illas perfectiones tamquam aliquod perfectibile per easdem sed tamquam subiectum earundem commune."

[19] *Ibidem*: "Demum respondeo ad aliud argumentum, in quo ad probandum materiam primam non esse arguitur principaliter materiam primam non esse perfectam."

[20] *Ibidem*, f. 160ra: "Et dico pro auctoritatibus in oppositum quod potentia duplex est: remota et propinqua. 'Potentiam remotam' voco illam quae est ante actum, et ex illa non sequitur actus. 'Propinquam potentiam' voco illam quae est cum actu, et ex illa sequitur actus. Primo modo dico quod materia prima est in potentia, sed non secundo modo… dico quod Commentator per istas intelligit, quod materia prima est potentia sive potens ad recipiendum tot formas distinctas in specie quot sunt species rerum generabilium, et quod materia est habilis ad recipiendum multas formas."

[21] *Ibidem*, f. 160rb: "Unde posito quod ipsamet materia prima est potentia ad recipiendum formas, non <sequitur> quod potentia materiae sit res aliqua a materia prima."

agreement with Ockham, who asserts that "matter is a thing that actually exists in nature, which is in potency for all substantial forms, without having any of them necessarily."[22] Kilvington does not call prime matter a thing (*res*) but he says that its potency is not a thing different than matter itself; he calls prime matter a substance, which is a thing.

Thus, Kilvington agrees with Aquinas, Scotus and Ockham, who — as Marilyn McCord Adams observes — maintain that

1) "Prime matter is the ultimate subject of inherence; substantial form inheres in prime matter but prime matter cannot inhere in anything.
2) Prime matter is a substratum of substantial change in which it first has and then lacks (lacks and then has) some substantial form or other.
3) Prime matter is in potentiality with respect to any substantial form that it lacks and can acquire by a natural process."[23]

Nevertheless, like Ockham and Scotus, he rejects Aquinas's conclusion that

4) "Prime matter of itself is pure potentiality and has no actuality of its own but receives all of its actuality from the substantial form in it."[24]

The proximate potency "coexists with an act", as Kilvington asserts, and is the cause of other actualizations. This type of potency characterizes, for example, elements that are already combined in their substantial forms, but yet are a substrate for constituting mixt bodies. Such potency together with an active complex form creates only one individual body.[25]

Like Ockham, Kilvington endorses a substratum thesis. "According to the substratum thesis, when change happens, something endures the process."[26] He emphasizes that in every type of generation, the mixt that begins to change and the one that comes into being have the same substrate, i.e., prime matter.

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[22] Guillelmus de Ockham, *Summula*, p. 179, l. 5–8: "…materia est quaedam res actualiter existens in rerum natura, quae est in potentia ad omnes formas substantiales, nullam habens necessario."

[23] M. McCord Adams, *William Ockham*, vol. 1–2, Notre Dame: University of Notre Dame Press, 1987, p. 640.

[24] *Ibidem*.

[25] Ricardus Kilvington, *Expositio*, f. 160rb: "…*si materia fuerit una et generans unum et potentia una, tunc illud quod fit, erit unum* (Averr. *In Metaph*., XII, 11, f. 297va). Ista enim auctoritas debet intelligi de potentia propinqua et non de remota."

[26] N. Polloni, "Francisco de Toledo on Elemental Mixtures," *Hylomorphism into Pieces. Elements, Atoms, and Corpuscles in Natural Philosophy and Medicine 1400–1600*, (Palgrave Studies in Medieval and Early Modern Medicine), ed. N. Polloni, S. Roudaut, Cham: Springer, 2024, p. 251. For the theory of substratum thesis see R. Pasnau, *Metaphysical Themes 1274–1671*, Oxford: Clarendon Press, 2011, p. 17–34, 66–70.

Moreover, he states that Averroes assumes, when saying "that something comes from something (*ex aliquo*)," that this is because the nature of that from which something comes and the nature of that which comes are the same, and by 'nature' he means matter. "Just as we say that an idol is made of copper, that is, that the nature of the idol is the nature of copper."[27]

Having insisted that matter in itself is a perfect being and as such it might have an actuality of its own, Kilvington goes on to the problem of its extensions. The problem of the existence of prime matter — which he addresses — gives rise to a discussion about its extension and the manner of its quantification.[28] Kilvington's initial argument reads as follows: "if prime matter existed, thus either it would determine a certain quantity of itself or it would not. If not, then prime matter, separated from a form, would be either indivisible or infinite."[29] He first rejects the claim that prime matter would be indivisible or infinite, and then clarifies his view affirming that

> …prime matter does not determine any quantity for itself, that is, prime matter does not of itself tend more to be under one quantity than under another… Hence, recognizing that a continuum quantity, such as a line, a surface, or a body (that is in the genus of quantity, not substance), is nothing else than an accident in a substance, prime matter, if it were separated from the form, would have no quantity; though from this it does not follow that it would be indivisible. This is so, because if prime matter were separated from the form, it would still be the

[27] Ricardus Kilvington, *Utrum omne quod generatur*, f. 47va: "pono istum casum quod A ignis summus egerit in B terra summa usque ad hoc instans, ita quod in hoc instanti sit forma ignis acta per A coextensa per totam B terram iam existente<m> remissa<m>, et sit C ignis compositus ex materia B et forma ignis acta per A, et sit D mixtum ex C et B;" f. 50rb: "…dico quod sufficit ad hoc quod C generetur ex B tamquam ex causa materiali, quod C generatur ex materia prima B, et materia prima B sit materia prima C…Et dicit quod aliquid dicitur uno modo 'esse vel fieri ex aliquo', propter hoc quod natura generati et natura illius ex quo generatur est eadem, et hoc prout natura dicitur de materia, secundum quod apparet per exemplum Commentatoris ibidem. Exemplificat enim Commentator quoad praedictum: *sicut dicimus quod idolum est ex cupro, id est, quod natura idoli est natura cupri*."

[28] During the Middle Ages the problem was widely discussed. On the different opinions see e.g., A.B. Wolter, "The Ockhamist Critic," *The Concept of Matter in Greek and Medieval Philosophy*, ed. E. Mc Mullin, Notre Dame: University of Notre Dame Press, 1965, p. 124–146; R. Cross, *The Physics of Duns Scotus. The Scientific Context of Theological Vision*, Oxford: Clarendon Press, 1998, p. 13–33; M. McCord Adams, *William Ockham*, p. 671–696; R. Pasnau, *Metaphysical Themes*, p. 35–76; N. Polloni, "Robert Grossteste on Matter," *The Royal Society Journal of the History of Science*, vol. 75 (2021), p. 397–413.

[29] Ricardus Kilvington, *Utrum in omni generatione*, f. 32va: "…si materia prima foret, tunc aut materia prima determinaret sibi aliquam quantitatem, aut materia prima non determinaret sibi aliquam quantitatem, quorum utrumque est falsum quod probo."

> same as it is when it is informed, but it would then have no quantity, <since> it would lack line, surface, and body, which are only quantities.[30]

However, the substantiality, perfection, and disposition of the quantifiability of prime matter implies, as Kilvington says, that

> Hence it is quite imaginable that prime matter could exist by itself without any form and without any accidents, and yet that it would be divisible by the division of its parts, and that the parts of the prime matter would be distant from each other by some quantum and not by some quantity; and that some parts of the prime matter would be immediately in contact, but they would not be continuous or contiguous... The reason for this is that although the prime matter which is now of a ten-fold quantity might be separated from any form, it would nevertheless remain equal to a ten-fold quantity; and yet it would not have any quantity, nor any part of it would be terminated by any final limit which would make it a quantity.[31]

Kilvington affirms that prime matter once quantified would remain of a definite, e.g., ten-fold size, yet it would have no qualifying form, that is a bodily form. Such an extensional entity (prime matter) would be divisible into immediate parts, but neither into continuous nor contiguous parts, because it does not have the accident of quantity. This very possibility of being composed of parts causes the corruptibility of prime matter if its parts were separated.[32]

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[30] *Ibidem*, f. 36va-vb: "…dico quod materia prima de se non determinat sibi aliquam quantitatem, ita videlicet quod materia prima de se magis nitatur esse sub una quantitate quam sub alia… Unde ponendo quantitatem scilicet continuam non esse rem aliquam nisi accidens in substantiam, scilicet aut lineam, aut superficiem, aut corpus quod est in genere quantitatis non in genere substantiae, dico quod materia prima, si ipsa foret separata a qualibet forma, non haberet aliquam quantitatem; nec ex illo sequitur quod materia prima foret indivisibilis. Cuius causa est ista, quia materia prima, licet foret separata a forma, nihilominus tunc foret tanta sicut est ipsamet iam existens sub forma, non tamen tunc haberet aliquam quantitatem, <quia> tunc careret linea, superficie, et corpore quae solae sunt quantitates."

[31] *Ibidem*, f. 36vb: "Unde satis imaginabile est quod materia prima foret per se existens sine aliqua forma et sine aliquo accidente, et tamen quod ipsa foret divisibilis ad divisionem suarum partium, et quod partes materiae primae distarent a se invicem per aliquod quantum et non per aliquam quantitatem, et quod aliquae partes materiae primae essent immediatae, et non essent continuae nec continguae — et hoc loquendo de continuo et continguo secundum quod loquitur Commentator in principio VI *Physicorum*, cuius causa est quia licet materia prima quae est iam pedalis quantitatis <quando> foret separata a qualibet forma nihilominus ipsa maneret aequalis pedali quantitati, et tamen non haberet aliquam quantitatem nec aliqua eius <pars> terminaretur ad aliquid ultimum quod foret quantitas."

[32] *Ibidem*: "…concedo quod materia prima est corruptibilis, sed non per se puta per actionem alicuius sibi contrarii cum non habeat contrarium, sed per accidens puta per divisionem partium materiae a se invicem."

Kilvington seems to have been inspired by a question posed by Ockham in his *Summula philosophiae naturalis*: "Whether, if matter were separated from every form, it would then be of a certain quantity?" Ockham reasons: "Yet it must be said that if matter were separated from every substantial and accidental form, there would be a certain quantity which would belong to it either by its nature or by the action of an agent upon it."[33]

Kilvington's example which follows seems to confirm Ockham's view, and points to a fundamental difference between matter and form. While matter retains specific extension given by the prior form similar to form even without form, substantial form is always the same in producing a specific elemental body such as fire, air, water, or earth. Kilvington believes that if in the sphere of fire or earth matter were separated from an elementary form of fire or earth, it would keep the same size as the sphere of fire or earth. On the other hand, if form were separated from a greater or lesser matter, it would remain the same, because an elementary form always keeps the same qualities, in this case, of the hottest and most rarefied fire.[34]

It is unfortunate that Kilvington does not express his opinions as clearly as does Ockham, who, according to McCord Adams, maintains that

> Like other stuffs, prime matter is naturally extended apart from the inherence of any really distinct quantitative forms; it is continuous and infinitely divisible. Prime matter of itself is a thing (*res*) with its own actuality. It is no more common or universal than any substantial form is, but is just as concrete and determinate as the actual elements earth, air, fire, and water are… prime matter is divided when efficient causes introduce distinct substantial forms or multiply the same substantial form into different parts of it.[35]

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[33] Guillelmus de Ockham, *Summula*, p. 193: 65–70: "Sed quaeritur: si materia esset separata ab omni forma, cuius quantitas esset?…Tamen dicendum est quod si materia esset separata ab omni forma substantiali et accidentali, esset certae quantitatis quae sibi competeret per naturam suam vel per actionem agentis in eam."

[34] Ricardus Kilvington, *Utrum in omni generatione*, f. 36vb: "Unde posito quod si tota materia ignis in sua sphaera foret separata a qualibet forma, tunc ipsa foret tanta praecise sicut iam est ignis in sua sphaera; et quod si tota materia terrae in sua sphaera foret separata a qualibet forma, tunc ipsa foret tanta praecise sicut iam est terra in sua sphaera... Unde licet forma, si ipsa foret separata a qualibet materia foret magna vel parva, similiter materiae primae nunc habens aliquam quantitatem. Et in hoc tamen est differentia inter materiam primam et formam existentem in materia prima, eo quod forma existens in materia prima sive existat sub quantitate maiori sive minori, si ipsa foret separata a materia semper foret aequalis. Verbi gratia si forma ignis remissi et condensati foret extracta ab eodem igne et separata ab omni materia, tunc ipsa non foret maior quam ipsamet forma iam est et aequalis praecise sicut ipsamet foret forma ignis summi et summe rari." Cf. Guillelmus de Ockham, *Summula*, p. 193–194, l. 71–79.

[35] M. McCord Adams, *William Ockham*, p. 671.

Kilvington's theory of prime matter requires more careful study. It is hard to resist the impression, however, that he too could be ascribed the attitude that McCord Adams attributes to Ockham:

> …both in his own theory and in his interpretation of Aristotle sees himself as recalling prime matter from its exile as a metaphysical principle of diminished ontological; status to its "rightful" place as a naturally extended, fully actual stuff, which is an essential ingredient in all material substances.[36]

Accepting the above interpretations of Aristotle's and Averroes's concepts, Kilvington cannot yet resist the "force of logic" that compels us to acknowledge various theories as true if they are conceivable, i.e., coherent, such as the concepts of Parmenides and Melissos that matter itself may be quanta, but not due to any accident of quantity. In Kilvington's opinion, Averroes has no good arguments against this theory.[37]

1.1.2. Plurality of Forms

Kilvington accepts the theory of the plurality of forms. All bodily composites have many substantial forms hierarchically arranged. In this paper I shall solely consider the issue of the plurality of forms of inanimate bodies, which are inherent in all natural beings. The forms which shape living beings are introduced after the forms proper to inanimate bodies. As Kilvington says:

> universally in every mixed animate body there is one superimposed form which does not consist of elemental forms, and it is neither intensifiable nor remissible because of the intensifiability and remissibility of the elemental forms.[38]

The animating substantial forms are distinct from the bodily forms, and there is no proportionality between these forms, since the former are indivisible and the latter are divisible. Changes in elemental and mixed forms do not cause changes

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[36] *Ibidem*, p. 690.

[37] Ricardus Kilvington, *Utrum in omni generatione*, f. 36vb: "Sed contra istam solutionem posset argui, quia secundum istam solutionem sequatur quod possibile foret aliquod quantum esse non habens aliquam quantitatem, quod est contra Commentatorem I *Physicorum* commento <15>, ubi Commentator, arguens contra Parmenidem et Melissum ponentes tantum unum esse et illud esse substantiam, arguit quod non tantum unum est per hoc modum quod substantia est quanta. Ubi tamen non valeret argumentum Commentatoris nisi ita foret quod quodlibet quantum foret quantum per aliquam quantitatem, quod tamen negaverunt Parmenides et Melissus ponentes solam substantiam esse. Dico tamen quod satis est imaginabile aliquam substantiam puta materiam vel formam in materia esse quantam et non per aliquam quantitatem. Et contra istud non est sententia Commentatoris ubi prius."

[38] Ricardus Kilvington, *Expositio*, f. 161vb: "Universaliter in omni mixto animato est una forma superaddita non composita ex formis elementaribus, et talis forma non est intensibilis neque remissibilis ad <intensionem et> remissionem formarum elementarium."

in the substantial forms of living bodies; therefore their actions are entirely different. The only influence, Kivington sees, is in the duration of animate bodies: those in which predominates a mixture of fire and water live longer than those in which a mixture of air and earth predominates.[39]

1.1.2.1. *Elements*

Elements are the result of an actualization of the remote potency of prime matter by an elemental form which makes matter a body, and at the same time introduces such qualities as hotness and dryness for fire, hotness and moisture for air, moisture and coldness for water, and coldness and dryness for earth. The same qualities play both active and passive roles in qualitative change. Each of the four elements is formed by only one elemental form, resulting in it having only one primary quality. For example, the quality of fire is constituted by its hotness and dryness, but its primary quality is hotness.[40] Kilvington employs this account to explain the process of different mixtures, as presented below.

Elemental (substantial) forms can be intensified and diminished, because their corresponding qualities can be strengthened or suppressed. As easily may be observed, qualities are subject to more or less; for example, water can become hotter or colder.

As Kilvington states:

> I grant that substance is generated, or at least can be generated, from opposites, and can receive more and less. For I say… that elemental forms can intend and remit. I do not say, however, that elemental forms are essentially intensifiable and remissible, as are elemental qualities, but accidentally, that is, according to the intensity and remission of elemental qualities.[41]

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[39] Ricardus Kilvington, *Utrum omne quod generatur*, f. 49va: "Et dico quod Commentator ibi intelligit sic quod generatio perfectorum mixtorum cuiusmodi sunt animata est quando ignis et aqua, quae sunt elementa magis activa quam sunt aer et terra — secundum quod patet per ipsum ibidem — dominantur aeri et terrae secum commixtis. Et propter hoc est quod subdicit Commentator quod entia in quibus dominatur mixtio ignis et aquae mixtioni terrae et aeris sunt longioris vitae."

[40] *Ibidem*, f. 49rb: "…pono quod eadem qualitas est caliditas ignis et siccitas ignis, et similiter quod eadem qualitas est frigiditas terrae et siccitas terrae, et sic de aliis elementis, ita quod quodlibet elementum habet tantum unam primam qualitatem elementarem sicut habet tantum unam formam elementarem. Cum isto dicto convenit illud dictum Aristotelis II *De generatione* capitulo 1, videlicet quod quattuor entia unius unumquodque est, ubi Aristoteles per illud dictum intelligit quod quodlibet quattuor elementorum est simpliciter unius qualitatis, quod non foret verum si quodlibet quattuor elementorum haberet duas qualitates primas specifice distinctas. Unde istis positis respondeo ad primum argumentum factum in fine istius primi principalis contra istam positionem, et concedo quod eadem qualitas est activa, et passiva."

[41] *Ibidem*, f. 48rb: "…concedo quod substantia generatur, vel saltem potest generari ex contrariis, et suscipere magis et minus. Dico enim, sicut dicit Commentator III *Coeli et mundi* commento 67, quod formae elementares possunt intendi et remitti. Non tamen dico, quod formae

The primary qualities constituting a substantial form, like the coldness and dryness of earth, are of the same intensity, but earth tends to dry out more than it does to cool; fire tends to heat more than to dry out; and so on.[42] Primary qualities can be more or less intense, but all of them are at their maximum degree of intensity (*in summo*) in their proper sphere.

Although Kilvington asserts that his position is the correct interpretation of Averroes, yet we might see a significant discrepancy. Averroes considers it necessary that both elemental forms and qualities are remitted *secundum mediatatem*. As Petrescu observes:

> Averroes argues that the elemental forms need to be kept because they act as a necessary intermediary between prime matter and the final form of the mixt; prime matter cannot be informed directly by the form of the composite body, but only through the mediation of elemental forms. Although the final introduction of the new form is the work of an external agent, the elements too act as a material cause, preparing the matter of the mixt.[43]

Kilvington accepts this last claim, as will be shown below, but he disagrees with Averroes' claim, in Petrescu's words, that "elemental form are not as perfect as the substantial form of mixts and that their existence is a medium between a substantial form and an accident."[44] According to Kilvington an element and a mixt are equally perfect, because a perfection of the mixt is proportional to the perfection of the element contained in this mixt.[45]

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elementares sunt essentialiter intensibiles, et remissibiles, sicut sunt qualitates elementares, sed accidentaliter videlicet secundum intensionem et remissionem in qualitatibus elementaribus. Et hoc est, quod formae elementares non sunt contrariae essentialiter sicut sunt qualitates elementares, sed accidentaliter <sicut sunt> qualitates elementares."

[42] *Ibidem*, f. 48rb: "Nec sequitur ex illo quod siccitas in terra sit intensior siccitas quam frigiditas in terra, necque quod siccitas in terra sit intensior siccitas quam ipsamet est frigiditas, non enim propter istas causas dicitur siccitas terrae esse magis siccitas quam frigiditas, sed ideo dicitur siccitas terrae magis etc. quia siccitas terrae nata est magis desiccare quam frigefacere. Et eodem modo est ponendum de qualitatibus in aliis elementis."

[43] L. Petrescu, "John Duns Scotus and the Ontology of Mixture", *Res Philosophica*, vol. 92, n. 3 (2014), p. 320–21

[44] L. Petrescu, "John Duns Scotus," p. 321. Averroes, *Commentum magnum super libro De celo et mundo Aristotelis*, III, 67, ed. F.J. Carmody, R. Arntzen, vol. 1–2, (Recherches the Théologie et Philosophie médiévales. Bibliotheca, 4), Leuven: Peeters, 2003, p. 634, l. 105–111: "Si igitur aliquis dixerit quod sequitur ex hoc ut forme eorum substantiales recipiant magis et minus (et hec est dispositio accidentium non formarum substantialium, dictum est enim in multis locis quod forme substantiales non recipiunt magis et minus), dicemus quod forme istorum elementorum substantiales sunt diminute a formis substantialibus perfectis, et quasi suum esse est medium inter formas et accidentia..." See also A. Maier, *An der Grenze von Scholastic und Naturwissenschaft*, Roma: Edizioni di Storia e letteratura, 1952, p. 81–88.

[45] Ricardus Kilvington, *Expositio*, f. 161vb: "Unde respondeo ad primum argumentum in contrarium, et admisso casu et suppositionibus ibi suppositis concedo istam conclusionem sicut

The second type of form (*forma mixta*) — the form of a mixed body — is constituted by elemental forms. In any mixed body there are as many mixed forms as there are combinations of elements in it. Accordingly, two elemental forms give rise to a third, three to a fourth, and so on. However, in a mixed body, the number of mixed forms is limited by and proportional to the possible combinations of elements, and the process of composing new forms does not go on *in infinitum*.[46] These forms are also intensifiable and remissible because so are the qualities that constitute the elemental forms.

2. Changes

2.1. Generation and Mixture

In Kilvington's first two questions, the various types of change, such as generation, alteration, and mixture, are thoroughly discussed. All of these changes are called generation because, as Kilvington posits in his *determinatio quaestionis* to the first question *Utrum omne quod generatur ex contrariis generetur*, a generation is twofold: either a generation of a substance (*simpliciter*) or a generation of an accident (*secundum quid*). Furthermore, the preposition *ex* can denote any kind of cause, e.g., material, formal, efficient, or final; or it can signify the same as the preposition *post*, as in the statement "night arises from (*ex*) day", i.e., after (*post*) day. Opposites (*contraria*) can also be taken in two ways: as opposites belonging to the same genus and most distant, or as being and non-being.[47] He states finally:

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est proposita, videlicet quod aliquod elementum et aliquod mixtum sunt aeque perfecta. Cuius ratio est, quia perfectio mixti, cuius forma est composita ex formis elementaribus, est proportionalis perfectioni elementi."

[46] *Ibidem*, f. 161rb: "Ad principale, si aliqua forma sit composita, cum nulla forma possit poni componi nisi ex formis solummodo, sequitur quod aliqua forma foret composita ex formis. Et ita sequitur cum maxime sit ponendum formas componi ex duabus formis elementaribus potest componi tertia forma, et ex tribus quarta, et ex quattuor quinta in eodem mixto. Et ita sequitur quod tot forent formae in mixto ex quattuor elementis quot forent combinationes omnium formarum elementarium in eodem mixto componibili."

[47] Ricardus Kilvington, *Utrum omne quod generatur*, f. 48vb: "Ad quaestionem quando quaeritur: utrum omne quod generatur, etc. distinguo de 'generari' sicut distinguit Commentator I *Physicorum* commento 62 quantum aliquid generatur secundum quid, et isto modo generatur accidens; et aliquid generatur simpliciter, et isto modo generatur substantia. Similiter de 'ex' distinguo, quia 'ex' potest denominare omne genus causae scilicet causae materialis, et causae formalis, et efficiens, et finalis. Similiter iste terminus 'ex' potest significare idem quod significat ista praepositio 'post'. Primum membrum illius distinctionis est satis notum. Secundum membrum patet a Commentatore V *Metaphysicae* commento 29, ubi Commentator distinguit de isto termino 'ex aliquo' dicens quod *haec praepositio 'ex' aliquando sumitur transsumptive loco istius praepositionis 'post'*. Et exemplificat per hoc quod nos dicimus, quod 'nox fit ex die', id est post diem. Similiter distinguo de contrariis quoniam contraria possunt accipi dupliciter scilicet stricte et

> With this, I answer the question that if we take 'generation' indifferently both in the first and second sense, and 'from' in the second sense, and 'opposites' in the second sense, then the answer to the question will be universally true, namely, that if something is generated, afterwards it is, and <before> it was not.[48]

Kilvington is convinced that the above claim has been proven by both Aristotle and Averroes, namely, that "in every generation, that which comes into being comes into being from opposites. Which is true if the terms are understood as given."[49]

In qualitative changes all three components, i.e., matter, a form to be created, and its privation in matter, are necessary. This view does not contradict the opinion of Averroes, who claims that form as a principle is neither generable nor corruptible; only bodies composed of matter and form are such. According to Kilvington, when individual things are generated, each time new proximate matter and a new substantial form that constitute a given thing are "generated"; such generation is accidental, but still real.[50] For example, a mixed body, e.g., a dough made of flour and water, can turn into ash under the influence of fire.

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large. Primo modo accipit Commentator contraria X *Metaphysicae* commento 19, ubi sic definit contraria: *contraria sunt quae posita sunt sub eodem genere et maxime distant*. Secundo modo accipit Commentator contraria I *Physicorum* commento 56, ubi dicit Commentator quod prima contraria sunt esse et non esse, et commento 41, ubi dicit Commentator quod contrarium accipitur *large pro contrario, et privatione, et habitu sive sit in rei veritate sive secundum famam*. Quod sic intelligendum est: qualitercumque accipiantur privatio et habitus, sive in rei veritate sive secundum similitudinem."

[48] *Ibidem*: "Pro hoc dico ad quaestionem quod loquendo de generatione utroque modo indifferenter tam primo quam secundo, et de 'ex' secundo modo, et de contrariis secundo modo erit ille intellectus quaestionis universaliter verus, videlicet quod si aliquid generatur illud est postquam non fuit."

[49] *Ibidem*: "Et sic intelligunt Aristoteles et Commentator quaestionem ubi habet locum, et non de virtute sermonis sicut verba procedunt. Ibi enim intendunt tam Aristoteles quam Commentator verificare quaestionem, scilicet quod omne generatur, generetur ex contrariis in omni generatione tam accidentis quam substantiae. Quod non posset esse nisi quaestio intelligeretur modo dicto."

[50] Ricardus Kilvington, *Utrum in omni generatione*, f. 37ra: "...concedo, quod in generatione formae requiruntur tria principia ita quod illa propositio significet verum intellectum quaestionis prius datum, sic videlicet quod <ad hoc quod> aliqua forma generetur requiritur forma generanda et materia prima quae fuerit privatio respectu eiusdem formae generandae... dico quod non potest aliqua forma, videlicet substantialis generari nisi generatur aliquod compositum ex materia et ex illa forma. Et hoc manifestum est tam in simplicibus quam in mixtis...concedo quod forma generatur vel saltem formam generari est possibile. Et tunc dico ad Commentatorem,...ubi dicit quod forma non generatur sed compositum ex materia et forma, quod Commentator ibidem per illud intelligit quod forma non est generabilis nisi per accidens, sed compositum ex materia et forma est per se generabile et proprie... Sed generabile et corruptibile in rei veritate est individuum compositum ex materia et forma... Et ideo est quod nullum principiorum generatur proprie sed solum per accidens."

The question arises whether corruption is the same as generation in reverse, i.e., whether transformation can bring about a return to the original state. Aristotle says "the generation of one is always the corruption of another" (*semper generatio unius est corruptio alterius*).[51] Kilvington interprets this statement as follows:

> …that authoritative claim is to be understood about generation which is the transformation of the whole into the whole; nor is it necessary that every generation be of this kind, but <only> that by which the extreme is generated from the extreme, or the extreme from the middle, as one highest (*summum*) element from another highest element, or highest element from a mixt.[52]

Mixture is not a transformation of this kind and therefore has no opposite. It should be noted that Kilvington, along with Scotus and Ockham, disagrees with Aristotle's opinion, and argues that mixture is just a transformation like generation or alteration.[53]

According to Kilvington the process of generating a mixt takes place only when

> the mixing opposites are divided into small parts of equal or nearly equal potencies so that one part alters another opposite to it, and on the contrary is altered by the same until a form is generated in each part composed of the preceding form and of the newly introduced form… For this reason it should be noted that generation of the mixt is not possible among the elements in the highest degree (*summa*) no matter how they are applied to each other, but only among the mixts composed of the elements so that each mixt has a contribution from some element that is in the other mixt to act mutually in the other mixt.[54]

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[51] See Aristoteles, *De generatione et corruptione*, I, 3 (318a 23–25); *Les Auctoritates Aristotelis*, ed. J. Hamesse, (Philosophes médiévaux, 17), Louvain: Université catholique de Louvain Institut supérieur de philosophie, 1974, p.167(7): "Generatio unius est corruptio alterius; propter hoc generatio et corruptio sunt aeterna."

[52] Ricardus Kilvington, *Utrum omne quod generatur*, f. 50rb: "Et dico quod illa auctoritas est intelligenda de generatione quae est transmutatio totius in totum; nec oportet quod quaelibet generatio sit huiusmodi, sed illa per quam generatur extremum ab extremo vel extremum a medio, sicut unum elementum summum ab alio elemento summo vel elementum summum a mixto."

[53] For Aristotle's concept of mixture see e.g., A. Maier, *An der Grenze*, p. 3–22; L. Pretrescu, *John Duns Scotus*, p. 317; N. Polloni, "Francisco de Toledo", p. 248–253.

[54] Ricardus Kilvington, *Utrum in omni generatione*, ff. 34ra-rb: "...solum illa generatio mixti est mixtio quae est quando miscibilia contraria dividuntur in parvas partes aequalium potentiarum vel fere aequalium, ita quod una pars alterat aliam sibi contrariam et econtra alteretur ab eadem quousque in utraque parte generetur forma composita ex forma praecedente et ex forma de novo inducta… Propter quod notandum quod illa generatio mixti, ultimo dicta, non est possibilis inter elementa summa qualitercumque fuerunt ad invicem applicata, sed solum inter mixta sic composita ex elementis, ita quod utrumque mixtum habeat iuvamentum ex aliquo elemento

In Kilvington's opinion, this is the way that Aristotle teaches how mixts are generated, in his book *De generatione et corruptione*.[55] Kilvington's quote indicates, however, that he acknowledges the preservation of elements in a mixt and their active role in its formation.

As Petrescu claims, according to Aristotle:

> In the operation of mixture, elements are not *quite* preserved but also not *quite* destroyed… Aristotle explains this ambiguous persistence by appealing to his distinction between actual and potential being. According to the most widespread Latin reading of this text, elements are kept potentially or virtually, not *in actu*, in the mixt (327b 22–31). To use Aristotle's term, they keep their *dynamis* (327b 30, translated as *virtus* or *potentia*). This was meant to explain both their permanence in the mix and their regeneration when the mixt is dissolved.[56]

In his first question, Kilvington disputes three theories of his contemporaries:

1) only elemental forms are preserved in the mixt, not the elements;
2) neither elemental forms nor elements are preserved in the mixt, but only elemental qualities;
3) not elements, nor elemental forms, nor elemental qualities are preserved in the mixt.[57]

Through an extensive and detailed discussion of these positions, Kilvington demonstrates that during the process of mixture elements remain, and consequently also elemental forms, which possess qualities that are subject to transformation. Especially much attention is devoted to the position that eight qualities, belonging to different species, participate in the mixing process, such as: the hotness of fire opposite the hotness of air, the dryness of fire opposite the dryness of earth, the moisture of air opposite the moisture of water, and the coldness of water opposite the coldness of earth. Although Kilvington himself believes that, e. g., the hotness of fire is opposed to the hotness of air and that they belong to different species, he nevertheless formulates his theory on the assumption that each element taking part in the mixture possesses only one primary quality, which consists of two; in the case of fire, hotness and dryness.

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quod est in altero mixto ad mutuo agendum in alterum mixtum, et hoc secundum illum modum secundum quem probata fuit possibilitas reactionis in secundo principali."

[55] *Ibidem*, f. 34rb: "Et ille modus generationis mixti est ille modus quem docet Aristoteles I *De generatione* capitulo de mixtione."

[56] L. Pretrescu, *John Duns Scotus*, p. 317.

[57] Ricardus Kilvington, *Utrum omne quod generatur*, f. 45vb: "1) Quidam namque ponunt quod elementa non sunt in mixto sed formae elementares; 2) et quidam ponunt quod nec elementa sunt in mixto nec formae elementares sed qualitates elementares; 3) et quidam ponunt quod elementa non sunt in mixto, nec formae elementares, nec qualitates elementares."

As shown above, he argues that "everything that is generated is generated from opposites," that qualities undergo more or less, and that elemental forms also share this feature. Thus, if something comes into being, opposites must interact with each other in accordance with the proportion of *maioris inequalitatis*, i.e., the acting factor must have greater power than the resistance being overcome.

Kilvington offers a number of objections to the theory that there are a set of eight primary qualities distinct in species. According to his understanding of mixture as the process of overcoming the power of one quality by another, when, e.g., a mixt of fire and water acts upon a mixt of air and earth, producing a mixt of air and earth, the stronger heat of fire overcomes the resistance of the weaker heat of air, and the stronger cold of water overcomes the weaker cold of earth.[58] If there were eight active and resistive qualities, then eight also would remain in the new mixt, and then the opposites would be combined in one mixt.[59]

Kilvington is convinced that his conception is in agreement with the theory of Aristotle, who argues that the four elements exist because there are four prime qualities. The recognition of the four qualities enables us to explain all transformations, i.e. mixtures and qualitative changes.[60]

2.2. Qualitative Changes

Question 6 (*Utrum qualitas suscipiat magis et minus*) is entirely devoted to the problem of qualitative change. Kilvington criticizes the five most popular views of his time: progression, succession, admixture, and two versions of the addition theory.[61]

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[58] Ricardus Kilvington, *Utrum omne quod generatur*, f. 43va: "Sed tamen contra illam responsionem arguo et probo quod sit falsa, quia ex ista responsione sequitur quod posset esse quod in eodem passo simul intenderetur caliditas et frigiditas, humiditas et siccitas. Quia pono quod C sit unum mixtum ex solis igne et aqua, et D aliud mixtum ex solis aere et terra; et alteret C D quousque generaverit ex D mixtum sibi simile."

[59] *Ibidem*: "Hoc posito, manifeste sequitur contra illam responsionem quod C simul aget in D caliditatem ignis et siccitatem ignis, frigiditatem aquae et humiditatem. Et istud conceditur a ponentibus positionem recitatam. Probo tamen quod illud sit falsum, quia dato illo sequitur quod in eodem passo simul intenduntur contrariae qualitates."

[60] *Ibidem*, f. 43vb: "Iterum, illa positio quae ponit quod octo sint qualitates etc. est manifeste contra Aristotelem II *De generatione* capitulo secundum quosdam primo, ubi Aristoteles probat numerum quattuor elementorum ex numero quattuor qualitatum primarum, cui etiam concordat Aristoteles in principio IV *Metaphysicorum* ponens ibi idem. Item, ponens tantum quattuor esse primas qualitates elementares potest complere causas omnium apparentium sicut ponens octo esse primas qualitates elementares, igitur non est ponendum octo."

[61] For a detailed discussion of these theories, see S. Roudaut, *La mesure de l'être. Le problème de la quantification des formes au Moyen Âge (ca. 1250–1370)*, Leiden–Boston: Brill, 2022, p. 96–124. For detailed analyses of Kilvington's citrique and Latin quotes from his question see E. Jung-Palczewska, *Między filozofią przyrody a nowożytnym przyrodoznawstwem. Ryszarda*

In his opinion, alteration always takes place gradually (*pars ante partem*). When one quality is changed into another quality, the first to be changed is the part nearest the quality causing the change; after the transformation this part becomes the same as the quality of the agent and supports the agent in changing the next part of the quality undergoing transformation; then these two parts assist the third, and so on. This transformation continues until all previous quality has been changed into the new quality. Quality as *res absoluta* remains the subject of change itself.[62]

The generation of a new element, for example fire from water, and its form with qualities, i.e., its hotness and dryness, is a process in which the qualities of fire (that is, according to Kilvington, its hotness and dryness) acting on water change its qualities (that is, its coldness and moisture) in order to produce a new fire. At the last moment of such a change, water acquires the qualities of fire and its elemental form, and becomes a new element. The final moment of alteration is the first instant of generation, and is the extrinsic limit of alteration. Therefore, the difference between alteration and generation is easily identifiable: as long as a new quality of e.g., fire (hotness and dryness), and at the same time a new form which entails this quality gradually diminishes the quality of water (coldness and moisture), a process of continuous change takes place; when a new form is produced, there is no longer a process, but an instantaneous change of water into fire.[63]

To better understand and most appropriately describe qualitative processes, Kilvington employs the term latitude (*latitudo*) of quality.[64] As he explains,

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Kilvingtona kwestie o ruchu, Łódź: Lodz University Press, 2000, p. 187–236. See also E. Sylla, *The Oxford Calculators and the Mathematics of Motion*, New York: Garland, 1991, p. 435–446; E. Jung, "Richard Kilvington's Theory of Qualitative Change" (forthcoming).

[62] In Kilvington's questions there are many cases examining such part before part processes of change; therefore I provide only one example. Ricardus Kilvington, *Utrum in omni generatione*, f. 36ra: "Et concedo similiter quod A immediate post D instans velocius alterabit primam medietatem C quam secundam medietatem B, et hoc quia A immediate post D instans habebit magis iuvamentum ad alterandum primam medietatem C quam habebit A immediate post D instans ad alterandum secundam medietatem B."

[63] *Ibidem*, f. 36vb: "...si aliquid sit generatum oportet quod subiectum quod fuit ens in actu ante initium generationis sit totaliter corruptum, vel quod idem subiectum sit in potentia et pars alterius subiecti de novo existente in actu generatione completa, ut verbi gratia posito quod transmutetur aqua per ignem quousque generetur forma mixta sive composita ex forma aquae quae praefuit et ex forma ignis generata de novo generati, quoniam in tali casu erit ita quod aqua quae fuit subiectum in actu ante initium generationis mixti compositi ex aqua et igne manebit in potentia cum mixtum compositum ex aqua et igne fuerit generatum, et erit pars eiusdem mixti tunc existens in actu. Ex quo faciliter patere potest differentia sufficiens inter generationem et alterationem, et hoc loquendo de generatione prout generatio est finis alterationis."

[64] For the excellent studies of the theory of latitudo see E. Sylla, *The Oxford Calculators*; S. Roudaut, *La mesure de l'être*.

latitude does not have any manifestation in reality. He says: "the latitude of heat is not really distinct from heat itself, just as time is not distinct from the heavens."[65] The term 'latitude' only serves as a handy tool for the correct description of the processes of various changes, such as heating, acquiring knowledge, or increasing a moral habit. Since the "measure" of change must be adequate to the type of change, and a quality itself is continuous and divisible into infinitely proportional parts, *latitudo* needs also share this feature. A latitude of any quality is a successive continuum, and as such, like time, it does not actually have any intrinsic limits, and as such it is infinite. However, the latitude of any quality is finite in extent.[66] Latitude is a continuously divisible line segment that geometrically represents the intensity of a given quality of a particular length.[67] Therefore, such segments can be added and subtracted, pictorially representing subsequent stages of qualitative change.

The parallel between a real quality and a mathematical tool, such as *latitude* may be seen clearly in the following propositions derived from Kilvington's questions:

1) All finite latitude has a certain range within which it can act or be acted upon.
2) The largest range has a latitude of maximum quality (*in summo*).
3) The maximum degree of, e.g., coldness, is an external extreme of the latitude of hotness.

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[65] Ricardus Kilvington, *Utrum qualitas suscipiat magis et minus*, Paris BnF Ms 6559, f. 126vb: "Et sic concedo quod tempus habet medietates, et tunc nunc esset sensus illius propositionis: 'coelum ut est hora non ita diu durat sicut coelum ut est annus, vel sicut coelum ut est <tempus> duplum ad horam'. Et consimiliter est de latitudine caliditatis, nam eadem res realiter est latitudo caliditatis et illa caliditas et latitudo caliditatis habent partes sicut tempus, et eadem caliditas ut est in transmutari dicitur latitudo, et quando non transmutatur dicitur caliditas et non latitudo."

[66] Ricardus Kilvington, *Utrum in omni generatione*, f. 30va: "…nihil habeat latitudinem nisi quod est intensibile et remissibile." Ricardus Kilvington, *Utrum qualitas*, f. 141va: "Alio modo accipitur 'infinitum' pro aliqua re non habente terminos in actu; sic loquendo dico quod quaelibet res successiva, ut talis, est infinita et non terminata sicut arguebatur de die. Et sic loquendo concedo, quod si aliqua caliditas sit <in>finita quod eius latitudo, ut est latitudo, non habet terminos iam in actu... Concedo quod latitudo caliditatis ignis est finita."

[67] See Ricardus Kilvington, *Utrum continuum sit divisibile in infinitum*, ed. R. Podkoński, *Mediaevalia Philosophica Polonorum*, vol. 37, no. 2, (2007), p. 123–175. See also E. Jung, R. Podkoński, "Richard Kilvington on Continuity," *Atomism in Late Medieval Philosophy and Theology*, ed. C. Grellard, A. Robert, Leiden–Boston: Brill, 2009, p. 65–84; E. Jung, "Controversy on Infinity between Richard FitzRalph and Richard Kilvington", *A Companion to Richard FitzRalph. Fourteenth-Century Scholar, Bishop, and Polemicist*, ed. M.W. Dunne, S. Nolan, Leiden–Boston: Brill, 2022, p. 121-153; E. Jung, R. Podkoński, "Mathematical Imagination in 14th-Century Natural Philosophy. The Case of an Endless, Infinite Helix Line," *Historia Mathematica* (forthcoming).

4) A quality must be capable of taking on a continuous range of values between a *non-gradus* (zero) value and the value which serves as its boundary (*maximum in summo*), and no other value.
5) The *in summo* maximum latitude ranges are the same. Consequently, the latitude of hotness and dryness in fire, and coldness and dryness in earth, are the same in extent. The other two elements are of less than the maximum degree of their qualities, and thus the latitudes of their qualities may be described as less intense by a "shorter line."
6) Degrees of qualities are discrete (*indivisibiles*) and not continuous. Thus, for example, when describing various processes of change, the average degree of the maximum (*in summo*) hotness can be taken into account. Such a degree is the boundary value of the intensity of a given quality, meaning it determines the length of the latitude of a given quality, i.e., its intensity. However, from this it does not follow that "a latitude consists of indivisible degrees."[68] Kilvington is not a indivisibilist.
7) In every alteration of one element into another, the total latitude of the primary quality must be replaced with the new incoming total latitude.
8) Using Euclid's theory of proportions, it can be easily proven that if the proportions among parts of latitude, e.g., hotness to coldness, are not equal, the alterations do not proceed with the same speed.
9) The primary qualities of fire (i.e., maximum hotness and dryness) and earth (i.e., maximum coldness and dryness) imply the maximum of the secondary qualities, respectively weightiness and lightness, which are

[68] In her most recent published chapter Monika Michałowska suggests that Kilvington was an indivisibilist, since as she claims: "Evidently, Kilvington's reasoning relies on the concept of latitude (*latitudo*), which comprises an infinite number of degrees (*gradus*) stretched between its maximum and minimum points. Crucial to all the Calculators, the notion of latitude was normally used to describe physical change, for instance, the degree at which water froze or boiled. Briefly, latitude was thought of as a continuum encompassing all possible degrees of intensity." On the one hand, Michałowska maintains that a latitude comprises an infinite number of degrees, on the other she claims that "latitude was thought of as a continuum encompassing all possible degrees of intensity." Kilvington asserts that a degree is indivisible, thus to say that "a continuum comprises an infinite number of degrees" is to say that a continuum is a set of infinite indivisible degrees; this statement does not meet the conditions for the continuum adopted by Kilvington. It is also risky to claim that latitude "was normally used to described physical change, for instance, the degree at which water froze or boiled." There is no single passage in Kilvington's works where he ponders such problem; he arbitrarily says, e.g.: "let's assume that the water is in 5 degrees and fire in 7…". Michałowska's way of framing the issue suggests that Kilvington goes far beyond the horizon of Aristotelian physics and is a modern physicist. However, that is decidedly not the case. See M. Michałowska, "At the Intersections of Physics and Ethics. Richard Kilvington on Ethical Change," *Calculating Ethics in the Fourteenth Century*, ed. A. Lucács, M. Michałowska, Leiden–Boston: Brill, 2024, p. 80.

> absolute opposites. The weightiness and lightness of the remaining two elements, water and air, are relatively opposed due to the intensity of their qualities.

Kilvington applies all these basic assumptions to explain various kinds of uniform and difform alterations. He considers, e.g., the case of the action of the qualities of one mixt on another when the qualities are difformly distributed, and the mixts touch each other with their hotter ends, or the hottest end of one mixt acts upon the coldest end of the other, or the less cold one on the warmer one, etc. Considering all the different types of individual cases, he comes to the conclusion that the result of the action and reaction between qualities depends on the manner of contact between the two bodies. Thus, in each individual case the result of a change depends on the conditions that are assumed at the beginning of the process of change.[69]

Conclusions

Although Kilvington commented on Aristotle's *Physics* as part of his teaching duties and attempted to do so accurately, his independent attitude and nominalistic views produced interpretations that were significantly different from his sources. In keeping with his nominalism, Kilvington recognizes that only individual beings exist (he also includes physical phenomena in this category of 'being'); therefore he focuses on the explication of individual cases of physical phenomena, not on finding general principles for the existence of entities. Knowledge about phenomena is acquired first of all through observation, and subsequently through analysis of the natural causes underlying a given phenomenon. Mathematics is a useful tool for practicing natural philosophy; logic determines the coherence of a theory; cases *secundum imaginationem* sometimes indicate other possible solutions, although they are most often used to analyze phenomena that cannot be observed.

Therefore, Kilvington, like Ockham, is a natural philosopher, not a metaphysician. Yet Kilvington, even while reinterpreting Aristotle's views in an original way and offering significantly new explanations, never overstepped the boundaries set by Aristotle; his theory remained shaped by the Philosopher's philosophy of nature.

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[69] See, Ricardus Kilvington, *Quaestiones super libros Physicorum. A Critical Edition with and Introduction* by E. Jung (forthcoming); E. Jung, "Richard Kilvington's Theory" (forthcoming).

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RICHARD KILVINGTON'S THEORY OF HYLOMORPHISM AND QUALITATIVE CHANGE

Summary

The purpose of this article is to present an original interpretation, first proposed by Richard Kilvington (ca. 1302–1361), of the theories of Aristotle and Averroes on hylomorphism and natural processes such as mixing and qualitative changes. These problems were widely discussed by many thinkers from the 12th to the 17th century. Some of these interpretations paved the way for modern concepts in natural philosophy. One of the thinkers who contributed to the development of these concepts was William of Ockham. As I show in this article, Ockham also inspired Kilvington, whose concepts differ significantly from Aristotle's.

Keywords: Richard Kilvington, philosophy of nature, hylomorphism, qualitative changes

Słowa klucze: Ryszard Kilvington, filozofia przyrody, hylemorfizm, zmiany jakościowe