

THOMAS AQUINAS AND THE REALITY OF TIME¹

Small differences in the beginning can result in large differences later. It is unexpected when agreement in the beginning yields significant differences. But such was the case with Averroes, Robert Kilwardby, Albert the Great, and Thomas Aquinas on time. For thirteenth century Latin masters the *locus classicus* of time is not Augustine's *Confessions* or Boethius' *Consolatio Philosophiae* but Aristotle's *Physics* IV.10-14². Thomas Aquinas' principle explanation of the nature and reality of time is given in his *Commentary on Aristotle's Physics*, which is heavily influenced by the commentaries of Averroes and Albert. Four questions dominate Aristotle's analysis of time: whether time exists, what time is, whether time would have extra-mental existence if no intelligent mind existed to measure events temporally, and whether there is one time of the universe or many (the problem of the «unity» of time). Despite their agreement on time's existence and definition, Averroes and Albert differed significantly in the conclusions they drew from that shared starting point about time's unity and about the dependence of time on a soul's temporally numbering events of the world. To understand Thomas' position, we must see it in relation to the positions of Averroes and Albert, whom he had carefully read. We shall also introduce into our analysis an opusculum *De tempore* by Robert Kilwardby, because it is very helpful for our

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² In this paper the following texts and translations are used, all other translations being my own: ARISTOTLE, *Physics* IV.10-14 (217 b 30 - 224 a 16), trans. Hippocrates G. Apostle (Grinnell, IA: Peripatetic Press, 1980); AVERROES, *In 4 Physicorum*, comm. 87-134, in *Aristotelis Opera cum Averrois commentariis*, vol. 4 (Venice, 1562-1574; repr. Frankfurt am Main, 1962); ROBERT KILWARDBY, *Tractatus de tempore*, in *On Time and Imagination*, ed. P. Osmund Lewry, O. P. (Oxford: Oxford University Press, 1987); translated as ROBERT KILWARDBY, *On Time and Imagination*, Part 2: Introduction and Translation by Alexander Broadie (Oxford: Oxford University Press, 1993); ALBERTUS MAGNUS, *Physica*, lib. 4, tr. 3, cc. 1-17, ed. P. Hossfeld (Cologne, 1987), vol. 4/1 of *Opera Omnia*, pp. 259-293; and THOMAS AQUINAS, *In 4 Physicorum*, lectiones 15-23 (Rome: Marietti, 1965). For a clear and insightful overview of the physics of time in the middle ages, see Anneleise MAIER, *Metaphysische Hintergründe der spätscholastischen Naturphilosophie* (Rome: Studi di Storia e Letteratura, 1955), pp. 47-137.

seeing the implications of Averroes' position. I have found no internal evidence in the texts indicating that Thomas read Kilwardby's *De tempore*³. Yet a comparison of Thomas' and Kilwardby's positions on the unity of time is useful in applying Thomas' insights to a modern cosmology which denies the existence of the sphere of the fixed stars, which played so important a part in medieval Aristotelians' explanations of time's unity. Thomas in the *Physics Commentary* defends a position on the extra-mental reality of time which protects the realist basis of Aristotelian physics in a way that Averroes' position undermines. Thomas' position is historically important for Aristotelian natural philosophy and philosophically important today, given current emphasis on chronometrics, time measurement.

HISTORICAL BACKGROUND TO THOMAS' *PHYSICS COMMENTARY* ON TIME

Prior to any disagreements, these four thinkers —Averroes, Kilwardby, Albert, and Thomas— agree on Aristotle's explanation of time's mode of being and definition. They agree that time's mode of being is the flowing, successive being which motion has (*esse successivum* and *actus imperfectus*), not the stable, enduring being of material substances (*esse permanens* and *actus perfectus*)⁴. All of time that exists in physical reality is the flowing present moment or now, which is always «other and other»⁵. The sophistical dialectical arguments with which Aristotle introduces his analysis of time in *Physics* IV.10 all err because they fail to recognize time's successive mode of being, which follows upon motion's successive mode of being because time is an attribute of motion. We remember that the Parmenidean sophistical arguments which opened the *Physics* erred similarly by misunderstanding motion's flowing, imperfect actuality. The four physicists also agree that Aristotle rightly defines time as «the number of motion according to before and after»⁶. As the number of motion, time is by nature not an abstract counting number but the number precisely of events of the material universe⁷. There is, then, verbal agreement among the four on time's mode of being and definition; but there is significant disagreement on the meaning of the words they have agreed to, as we can see by turning to the two questions of time and the soul and the unity of time.

³ Whether Kilwardby composed his *De tempore* as an arts or theology master is unknown: see Lewry (n. 2 above), pp. xvii-xx.

⁴ On *actus imperfectus* and *actus perfectus*, see, e.g., THOMAS, *In III Phys.*, lect. 2, nn. 2-3 (nn. 285-290); lect. 3, n. 6 (n. 296); and lect. 10, n. 4 (n. 373).

⁵ For example, ARISTOTLE, *Physics* IV.11 (219 b 9-10); AVERROES, comm. 103 (f. 182G); KILWARDBY, q. 1, nn. 7-9; ALBERT, 4.3.7 (4/1:272.4-83); and THOMAS, *In IV Phys.*, lect. 18, nn. 1-11 (nn. 582-592).

⁶ ARISTOTLE, *Physics* IV.11 (219 b 2-3); AVERROES, comm. 101 (f. 181C-H); KILWARDBY, q. 2, nn. 10-12; ALBERT, 4.3.5-6 (4/1:267-271); and THOMAS, *In IV Phys.*, lect. 17, nn. 1-11 (nn. 571-581).

⁷ ARISTOTLE, *Physics* IV.11 (219 b 7-10); AVERROES, comm. 102 (f. 181K-182E); KILWARDBY, q. 6, nn. 26-27; ALBERT, 4.3.6 (4/1:269.69-270.37); and Thomas, *In IV Phys.*, lect. 17, n. 11 (n. 581).

Aristotle presents the problem of time and the soul in the following text:

«One might also raise the problem of whether time would exist or not if no soul existed; for, if no one can exist to do the numbering, no thing can be numbered and so clearly no number can exist, for a number is that which is numbered or that which can be numbered. So if nothing can do the numbering except a soul or the intellect of a soul, no time can exist without the existence of a soul, unless it be that which when existing, time exists, that is, if a motion can exist without a soul. As for the prior and posterior, they exist in a motion; and they are time qua being numerable»⁸.

Averroes thinks that Aristotle is giving a demonstrative argument in *Physics* IV.14 when he says, «[...] if nothing can do the numbering except a soul or the intellect of a soul, no time can exist without the existence of a soul [...]». Time is made actual, according to Averroes, by the intellective soul's act of numbering events of the world. It does so by marking off earlier and later nows as the temporal termini of a motion. The now or instant of time is not time but is a principle of time. The now has no temporal extent, but time clearly is extended, e.g., one hour or one day. Because the now, which is all of time that exists in reality, is flowing, a temporal extent arises only when the intellective soul mentally fixes two distinct nows. This mentally constructed quantity is time. For example, the intellective soul marks off the start and finish of one diurnal motion as one day: time is thus measured, and a measure now exists for measuring other motions also, for example one half-day of walking. For Averroes, time exists materially and potentially in events of the world; it is given formal being by the soul's act of numbering.⁹

Averroes answers the second question, whether there is one time of the universe or as many times as there are motions, by saying there is only one: time is numerically one. The motion named in time's definition is the motion in the universe best suited to serve as the standard by which all other motions can be measured, *viz.*, the regular and observable rotational motion of the ultimate celestial sphere of the fixed stars. By its measure all events of the world are at least potentially measured. The emphasis in Averroes is on time's being one because there exists this one motion by reference to which the soul can measure all other subordinate motions. For Averroes, the proper way to understand Aristotle's definition of time is «the number caused by the intellective soul's act of numbering the motion of the sphere of the fixed stars, in so far as that motion possesses ordered (prior and posterior) parts».

Robert Kilwardby owes much to Averroes' analysis, but he goes beyond Averroes by arguing that time taken in one sense exists in nature independent of the mind, not just materially and potentially but also actually and formally. Kilwardby concluded that even without the mind's act of numbering there

⁸ ARISTOTLE, *Physics* IV.14 (223 a 23-29).

⁹ AVERROES, comm. 109 (f. 187C) and 131 (f. 202C-F).

nonetheless exists in each event of the universe some real temporal quantity over and above the event's motion. There are two senses of the word «time», however. In one sense time exists as a real attribute of each event of the world. Kilwardby calls time as it exists in reality *tempus illimitatum et indeterminatum*; it is the quantity of time belonging as a proper attribute and measure individually to each event of the world without the soul's act of numbering. Each event has its own *tempus illimitatum*¹⁰. There is a second meaning of time, because the formal specification «number» in Aristotle's definition means more than just quantity. For Kilwardby, «number» means not only measure but also arithmetical number, and arithmetical number can only be caused by an intellective soul¹¹. Every motion takes some time; but the full meaning of the physicist's definition of time, according to Kilwardby, includes determinate measures of time, *tempus limitatum et determinatum*, such as one week or two minutes or three millennia; *tempus limitatum et determinatum*, which is the complete meaning of the word «time», can only be caused by the intellective soul's act of arithmetically numbering motions in the world¹². Averroes was correct with respect to *tempus limitatum*, but he did not properly consider the pre-numerical quantity of time, *tempus illimitatum*, according to Kilwardby's reasoning.

The problem of the unicity of time is more acute for Kilwardby than for Averroes, who denied that time exists *in actu* in nature. Kilwardby's *tempus illimitatum* is multiplied with the multiplication of motions. Since each and every motion possesses temporality as a proper attribute, each and every motion can properly serve as the subject numbered by the soul's act of numbering. In theory, since there are as many times (*tempus illimitatum*) as there are motions, there could be as many times (*tempus limitatum*) as there are motions and observers numbering events determinately. However, Kilwardby's geocentric cosmology meant that all of these various human measures of time are translatable into one all-embracing and best known measure of times, the soul's measure of the time of the motion of the sphere of the fixed stars¹³. The many times become one by being reducible to one ultimate time. One person could, for example, take the

¹⁰ KILWARDBY, q. 14, n. 77, & q. 11, nn. 44-51. Kilwardby's position on *tempus illimitatum* seems analogous to Averroes' position that bodies have a quasi-substantial «form of corporeity» ontologically prior to their accidental form of determinate dimensions: see Henry J. WOLFSON, *Crescas' Critique of Aristotle* (Cambridge, Mass: Harvard University Press, 1929), note 18, pp. 579-590.

¹¹ KILWARDBY, q. 6, nn. 25-28.

¹² One advantage of this interpretation of time and the soul for Kilwardby is that it in some way saves Augustine's *Confessions* XI analysis of time (cf. KILWARDBY, q. 1, n. 4; q. 2, n. 10; and q. 13, n. 72). Albert and Thomas, as we shall see, would say that Kilwardby is correct in asserting against Averroes that time really exists outside the mind (his *tempus illimitatum*), but he errs first of all by saying time outside the mind is without *number*. Rather, the number of time in reality has *esse successivum*; but number conceived by the mind exists after the manner of a stable being, an *ens permanens*. Arithmetical number can exist in the mind, according to Albert, only because real number, *i.e.*, real numerical distinction, already exists outside the mind. Albert, at least, has no interest in preserving Augustine's teaching authority on this question of natural philosophy. See ALBERT 4.3.3 (4/1:264.62-81) & 4.3.4 (4/1:265.35-36).

¹³ KILWARDBY, q. 11, n. 49.

time of a Hail Mary as his standard for measuring all other events, and another person could take the swing of a pendulum as his standard for measuring all other events. But both of these can be expressed in terms of an ultimate measure best known to all, the heavenly motions of the stars. Therefore, Kilwardby's many possible temporal standards are dominated by and reducible to one temporal standard. There is in this sense only one time. Concerned to save the unity only of *tempus limitatum et determinatum*, Kilwardby does so in Averroistic fashion.

Albert the Great¹⁴ argues against Averroes and says that time is not made by the soul: time exists materially and formally, as an *ens naturae* which is the number of motion, in the flowing successive being of the present now. The mind fashions temporal extents like one week or one second, but it can only do so because temporal number, time, already exists *in re*. Further, there is but one real time of the universe, Albert argues, although our ways of perceiving that time can be various and many.

Albert holds that the error of Averroes, which we have seen Kilwardby followed, arose from misunderstanding the nature of number. Albert says that Averroes certainly was in error in ascribing the origin of temporal number to the soul, and that Aristotle seems to have made the same error. But against this error Albert points out, «[...] the soul never numbers anything unless there is in it a principle of number taken from things themselves»¹⁵. Our concept of number is derived from our experience of real number in nature. Number exists already when there is real otherness, real distinction, in nature¹⁶. Where there is distinction in nature, there is number in nature. Motion's being is successive and flowing and motion's parts do not co-exist as does a multiplicity of enduring beings. To perceive a temporal extent we must mark off and hold in the memory earlier and later nows. We conceive time as an enduring being. Averroes erred because he confused the way temporal number exists in the mind with the way temporal number exists in

¹⁴ See John Michael QUINN, «The Concept of Time in Albert the Great»: *Southwestern Journal of Philosophy* 10 (1979) 21-47, repr. in *Albert the Great: Commemorative Essays* (Norman, Okla: Univ. of Oklahoma Press, 1980), pp. 21-47. Piero ARIOTTI, «Celestial Reductionism of Time: On the Scholastic Conception of Time to the End of the 16th Century»: *Studi Internazionali di Filosofia* 4 (1972) 91-120; A. MANSION, «La théorie aristotélicienne du temps chez les péripatéticiens médiévaux»: *Revue Néo-scholastique de Philosophie* 36 (1934) 275-307; P. HOSSFELD, «Das dritte Buch der Physik des Albertus Magnus»: *Philosophia Naturalis* 24 (1987) 15-42; Donato SPERDUTO, «L'imitazione dell'eterno in Alberto Magno»: *Sapienza* 52 (1999) 221-229; and Ernest J. MCCULLOUGH, «St. Albert on Motion as *forma fluens* and *fluxus formae*», in James A. WEISHEIPL (Ed.), *Albertus Magnus and the Sciences* (Toronto: Pontifical Institute of Mediaeval Studies, 1980), pp. 129-154.

¹⁵ «Ecce, haec videtur esse sententia Aristotelis [viz., "(...) tempus in potentia est sine anima, actualem autem accipit perfectionem ab anima numerante"], et est expositio Averrois de hoc, qualiter tempus se habeat ad animam, et est imperfecta, ut mihi videtur. Cuius ratio est, quoniam anima numquam numerat aliquid, nisi sit in ipsa principium numeri, quod accipitur a rebus ipsis» (ALBERT, 4.3.16 [4/1:289.61-69]).

¹⁶ ARISTOTLE, *Categories* c. 6 (4 b 20-31); *Metaphysics* XIV.1 (1087 b 34 - 1088 a 14) and X.6 (1057 a 7 - 8); cf. Hippocrates APOSTLE, *Aristotle's Philosophy of Mathematics* (Chicago: The University of Chicago Press, 1952), p. 5. See also ALBERT, *I Metaph.* tr. 3, c. 2 (ed. Colon. [1960] 16/1: 32.32), and *V Metaph.* tr. 1, cc. 8-10 (16/1: 227.41-229.26, 231.61-233.52); and A. George MOLLAND, «Mathematics in the Thought of Albertus Magnus», in James A. WEISHEIPL (Ed.), *Albertus Magnus and the Sciences*, cit. pp. 476-477.

reality. But we can number time in the mind only because there is real temporal number, real temporal distinction, in the flowing present now which is all of time that is real in the world. For, each present moment, just because it is flowing, distinguishes past from future, earlier from later. Because the present moment not only continues time but also distinguishes past from future, there is real temporal distinction and order, and so real temporal number, belonging to events themselves. The order of prior and posterior in the flowing now is time in nature.¹⁷

And so Albert concludes:

«[...] in order "to number", three things are needed: namely, numbered matter, formal number, and a soul numbering not formally but efficiently. Therefore, if there were no soul, there still is number according to formal being and numbered matter [...] and so, when no soul exists, number exists not only in potency but also according to an accidental form of discretion belonging to the things numbered; and in this way also time exists entirely outside the soul. And since for the existence of a thing in itself all that is needed is form and matter, soul is not needed for the existence of time in itself. But soul by the act of numbering does establish and cause our own comprehension of time [...].¹⁸

Temporal extents like one year do exist in the mind, but these extents are our way of holding together in our perceptions a reality which in nature is not an extent but only a flow. Our temporal measuring, our *chronometrics*, would be pure fiction, unrelated to physical reality, unless prior to *chronometrics* there is real *chronos*, real time, existing in nature with its own proper mode of physical being.

Albert concludes with Averroes that there is but one time of the whole universe, the number of the motion of the sphere of the fixed stars, and an important reason for that motion's being first is that it is completely regular and faster than other local motions; as such it is best suited to be the standard by which other motions are judged. The primary reason Albert gives, however, is that the motion of the ultimate sphere is causally first among all motions and so is implicitly present, *per effectum*, in all other motions. Time is universal because of the universality of this motion, as ultimate physical cause of all other motions.

¹⁷ ALBERT, 4.3.16 (4/1: 290.17-23) and c. 12 (4/1: 283.2-88).

¹⁸ «[...] ergo ad numerare tria exiguntur, scilicet materia numerata et numerus formalis et anima efficienter et non formaliter numerans; ergo si non sit anima, adhuc numerus est secundum esse formale et secundum materiam numeratam; ergo "quo numeratur" est duplex, scilicet "quo numeratur efficienter" et "quo numeratur formaliter". Non ergo secundum potentiam solum est numerus non existente anima, sed etiam secundum habitualementem formam discretionis rerum numeratarum, et hoc modo penitus est etiam tempus extra animam, et cum ad esse rei in se non exigatur nisi forma et materia, non exigitur anima ad esse temporis in seipso. Sed anima actione numerantis ponit et causat temporis deprehensionem, et quoad hunc actum non est tempus extra animam» (ALBERT, 4.3.16 (4/1:290.1-16)). Concerning Albert's use of *habitualementem*, which is derived from the Latin translation of Aristotle, which refers to time as a *motus habitus* (223 a 18-19), note that Thomas glosses *habitualementem* as *accidens motus* (*In IV Phys.*, lect. 23, n. 2 [n. 626]).

THOMAS' PHYSICS COMMENTARY ON TIME

Thomas¹⁹ agrees in his *Physics Commentary* with Albert's position, against Averroes, on the extra-mental reality of time. But on one point Thomas differs from Albert. Albert allowed that Aristotle *seemed* to have made the Averroistic error of saying the soul supplies the formal principle of time; Thomas intends his careful commentary to demonstrate that Aristotle avoided this erroneous position in *Physics* IV.10-14. Thus Thomas clearly identifies Aristotle's argument «if only soul numbers, then, if soul does not exist, neither does time», as a dialectical «objection» against the view Aristotle will adopt, not a demonstrative argument and not Aristotle's own view. The problem of time and the soul is the same as the problem of motion and the soul, for each without the soul is a successive being, an *utcumque ens*. Thomas says:

«If therefore motion had a fixed (*fixum*, i.e. enduring) being in nature (*in rebus*), as does a stone or horse, it would be possible to say without restriction that, just as there is a number of stones even though no soul exists, so also there would be the number of motion, which is time, even if no soul existed. But motion does not have fixed being in nature, nor is anything of motion found in act in nature except a certain indivisible of motion, which is a division of motion; but the totality of motion is established by the consideration by the soul comparing a prior disposition of the mobile body to a posterior one. Therefore in the same way time also does not have being outside the soul except by virtue of its proper indivisible [*sc.*, the now]. However, the totality of time is established by the ordering of the soul's numbering the prior and posterior of motion, as has already been said. And therefore the Philosopher expressly says that, if the soul does not exist, time is an *utcumque ens*, that is, [it exists] imperfectly, just as it would be said that motion exists imperfectly if it happens to be without soul»²⁰.

Real distinction of earlier and later, and so real temporal number, exists in physical reality in the indivisible, flowing now. Natural time exists in the flowing

¹⁹ See M. JOCELYN «Time: The Measure of Movement»: *The Thomist* 24 (1961) 431-440, repr. in James A. WEISHEIPL (Ed.), *The Dignity of Science* (Washington, D. C.: The Thomist Press, 1961), pp. 295-302; Peter REDPATH, *The Ontological Status of Time in the «Commentary on the Sentences», the «Commentary on the Physics», and the «Summa Theologiae» of Thomas Aquinas*. Ph.D. Thesis (Buffalo, NY: State University of New York at Buffalo, 1974); Alberto G. FUENTE, *Caracter cosmológico de la noción de tiempo en Santo Tomás* (Santander: Las Caldas de Besaya, 1955); A.-J. FESTUGIÈRE, «Le temps et l'âme selon Aristote»: *Revue des Sciences Philosophiques et Théologiques* 23 (1934) 5-218; and Leo J. ELDERS, «Modern Science and Time: An Evaluation»: *Sapientia* 54 (1999) 209-217.

²⁰ «Si ergo motus haberet esse fixum in rebus, sicut lapis vel equus, posset absolute dici quod sicut etiam anima non existente est numerus lapidum, ita etiam anima non existente esset numerus motus, qui est tempus. Sed motus non habet esse fixum in rebus, nec aliquid actu invenitur in rebus de motu, nisi quoddam indivisible motus, quod est motus divisio: sed totalitas motus accipitur per considerationem animae, comparantis priorem dispositionem mobilis ad posteriorem. Sic igitur et tempus non habet esse extra animam, nisi secundum suum indivisibile; ipsa autem totalitas temporis accipitur per ordinationem animae numerantis prius et posterius in motu, ut supra [ed. note: lect. 17, n. 2sq] dictum est. Et ideo signanter dicit Philosophus quod tempus, non existente anima, est utcumque ens, id est, imperfecte; sicut et si dicatur quod motum contingit esse sine anima imperfecte» (THOMAS, *In IV Phys.*, lect. 23, n. 5 [n.629]).

now's distinction of before from after. No more of time need or can exist naturally.

The problem of time and the soul arises as a *dubitatio*, a question or conundrum, after Aristotle has completed his properly scientific determination of the being and nature of time²¹. That is, the solutions to these questions are already implicit in the conclusions reached in *Physics* IV.10-13 concerning time and in the previous books of the *Physics*. Where there is distinction there is number; since there are really distinct substances in nature, there is a real numerical multiplicity in nature. But there is a distinction of motion's ordered parts naturally in the becoming of any body in motion. And so Thomas concludes:

«For just as motion is taken, so also it is necessary to take time: because before and after are in motion, and these, namely the before and after of motion, inasmuch as they are numerable, are time itself»²².

To confirm that there is no numbering by the soul where there is not already number in reality, Thomas continues:

«Moreover, for proof of this solution it must be borne in mind that, when numbered things have been posited to exist, it is necessary that number be posited to exist. Thus, the number of numbered things depends on one numbering just as numbered things themselves do. However, the being of numbered things does not depend on an intellect, unless there be some intellect which is the cause of things, as the Divine Intellect is. But the being of numbered things does not depend on the intellect of a soul. And so neither does the number of things depend on the intellect of a soul—only the process of numbering (*numeratio*) itself, which is an actuality of the soul, depends on the intellect of a soul. Therefore, just as sensible things are able to be when sensation does not exist, and intelligible things are able to exist when understanding does not exist, so numerable things and number are able to exist when numbering does not exist»²³.

Things have natures and characteristics which make them sensible, intelligible, and numerable by the soul. Things are not without sensible qualities and without

²¹ «Postquam Philosophus determinavit de tempore, hic removet quasdam dubitationes circa tempus [...] primo circa existentiam temporis, secundo circa temporis unitatem [...]» (THOMAS, *In IV Phys.*, lect. 23, n. 1 [n. 625]).

²² «Sicut enim ponitur motus, ita necesse est poni tempus: quia prius et posterior in motu sunt; et haec, scilicet prius et posterior motus, in quantum sunt numerabilia, sunt ipsum tempus» (THOMAS, *In IV Phys.*, lect. 23, n. 5 [n. 629]).

²³ «Ad evidentiam autem huius solutionis considerandum est, quod positus rebus numeratis, necesse est poni numerum. Unde sicut res numeratae dependent a numerante, ita et numerus earum. Esse autem rerum numeratarum non dependet ab intellectu, nisi sit aliquis intellectus qui sit causa rerum, sicut est intellectus divinus: non autem dependet ab intellectu animae. Unde nec numerus rerum ab intellectu animae dependet: sed solum ipsa numeratio, quae est actus animae, ab intellectu animae dependet. Sicuti ergo possunt esse sensibilia sensu non existente, et intelligibilia intellectu non existente, ita possunt esse numerabilia et numerus, non existente numerante» (*Ibid.*, n. 5 [n. 629]). Thomas continues in this text by saying that if a perceiver or knower or numberer were a contradiction in terms or in some other way impossible, then no thing would be sensible or understandable or numerable. But that is not the case Aristotle set; Aristotle only said «if there were no number-ers», not «if numbering and number-ers were impossible».

intelligible qualities if there is no soul to perceive those qualities, and similarly they are not without numerable qualities—distinction and number—if there is no soul. They exist with these characteristics, and it is because they have these characteristics that souls can be aware of those characteristics in them. The soul does not make those characteristics, it perceives them, after its own proper manner. Of course, things and their characteristics do depend on God for their being; although that point does not address the point at hand, Thomas makes it here, and alludes to it more or less explicitly elsewhere in the *Physics Commentary*²⁴.

Before turning to the question of the unicity of time, let us digress to examine briefly Thomas' *Sentences* commentary, where he at first might seem to present a different view from the one he later adopts in the *Physics* commentary. Thomas' view in the *Sentences* seems to be the Averroistic view that time exists *materialiter* in motion but *formaliter* in the intellect, in the soul's act of temporally numbering events of the world. For example, Thomas says in the *Sentences*:

«[...] and similarly concerning time, which has its foundation in motion, namely in the before and after of motion itself, but with respect to that which is formal in time, namely the process of numbering (*numeratio*), time is completed (*completur*) by the operation of the intellect's numbering»²⁵.

But let us look at the context of this quotation; we must not be too quick in saying that Thomas' position here is Averroistic and contrary to the position he will later adopt:

«[...] a three-fold diversity is found among those things which are signified by names. For, there are some which exist outside the soul according to their whole, completed being (*secundum esse totum completum sunt extra animam*); and beings of this kind are "completed beings" (*entia completa*), such as a man or a stone. Moreover, there are some which have no being outside the soul, such as a dream and the fancy of a chimera. Moreover, there are some which have their foundation in reality outside the soul, but the completion of their intelligibility (*ratio*) with respect to that which is formal is by an operation of the soul, as is clear in the case of the universal [...] and similarly concerning time, which has its foundation in motion, namely in the before and after of motion itself, but with respect to that which is formal in time, namely the process of numbering (*numeratio*), time is completed (*completur*) by the intellect's operation of numbering»²⁶.

²⁴ An important connection of physics to God's existence is the principle «[...] omne quod appetit aliquid, vel cognoscit ipsum et se ordinat in illud vel tendit in ipsum ex ordinatione et directione alicuius cognoscens [...]» (THOMAS, *In 1 Phy.*, lect. 15, n. 10 [n. 138]).

²⁵ «[...] et similiter est de tempore, quod habet fundamentum in motu, scilicet prius et posterius ipsius motus; sed quantum ad id quod est formale in tempore, scilicet numeratio, completur per operationem intellectus numerantis» (THOMAS, *In 1 Sent.*, d. 19, q. 5, a. 1 sol. [Mandonnet 1:486]).

²⁶ «[...] eorum quae significantur nominibus, invenitur triplex diversitas. Quaedam enim sunt quae secundum esse totum completum sunt extra animam; et hujusmodi sunt entia completa, sicut homo et lapis. Quaedam autem sunt quae nihil habent extra animam, sicut somnia et imaginatio chimerae. Quaedam autem sunt quae habent fundamentum in re extra animam, sed complementum rationis eorum quantum ad id

This comparison of time with the universal is odd, if we think that it is meant to bring out the fact that the intellect supplies time's formal principle; for, the intellect supplies nothing formal in the case of the universal. If it did, what is conceived in the intellect would be formally different from what it is meant to correspond to in reality. Rather, the same formality is given a different way of being, universal being, by the intellect. What the soul does in its act of temporal numbering, Thomas says, is «complete» time; a stone and a man are his examples of «completed beings» earlier in the quotation. In the language of the *Physics Commentary*, time is an *utcumque ens*, a «successive being» having imperfect, incomplete actuality, since its parts do not co-exist but its being is always flowing. The mind by its act of numbering conceives time as an enduring «completed being» having simultaneously existing parts. The mind holds together two distinct now-s and numbers the extent between them. By the process of numbering (*numeratio*) time is given temporal extent in the mind. There is, then, nothing in this text to deny the later position of the *Physics Commentary*. Moreover, it seems that interpreting the text as Averroistic would lead to the completely anti-Thomistic consequence that nothing of motion exists outside the mind except the material body, and that the mind adds whatever is formal in motion. For motion is not a «completed being, like a man or stone». Motion, like time, is a successive being. So, if this text is saying that time's formal cause is supplied by the soul, then it must also be saying that motion's formal cause is supplied by the soul, which is impossible²⁷. Rather, Thomas, who was writing the *Sentences* only a few years after having studied with Albert, seems to accept as an unstated but obvious premise what his master had taught: «[...] the soul never numbers anything unless there is in it a principle of number taken from things themselves».

For Thomas, there is one time and not many times belonging naturally to the universe. We know *that* there is only one time because we have indubitable experiences of simultaneity. Thomas says:

«If, however, time would be consequent upon a motion of the soul, it would follow that nothing is related to time except by a mediating soul. And thus time would not be a being of nature but an *intentio* of the soul, after the manner of an *intentio* of genus and of species. Moreover, if time were consequent upon each and every motion, it would

quod est formale, est per operationem animae, ut patet in universali [...] et similiter est de tempore, quod habet fundamentum in motu, scilicet prius et posterius ipsius motus; sed quantum ad id quod est formale in tempore, scilicet numeratio, completur per operationem intellectus numerantis» (*Ibid.*).

²⁷ The same interpretation is reasonable for the following text, namely that the soul completes — conceives as a temporal extent for the purposes of human measurement — what exists incompletely, as a successive being, in nature: «Cum igitur unicuique rei respondeat propria mensura, oportet quod secundum conditionem actus mensurati accipiatur essentialis differentia ipsius mensurae. Invenitur autem in actu qui motus est, successio prioris et posterioris. Et haec duo, scilicet prius et posterius, secundum quod numerantur per animam, habent rationem mensurae per modum numeri, quae est tempus [...] Ex quo patet quod illud quod est de tempore quasi materiale, fundatur in motu, scilicet prius et posterius; quod autem est formale, completur in operatione animae numerantis: propter quod dicit Philosophus» in *IV Physic.*, [text. 131], quod si non esset anima, non esset tempus» (*In 1 Sent.*, d. 19, q. 2, a. 1 sol. [Mandonnet 1: 467]).

follow that there would be as many times as motions, which is impossible, because two times are not simultaneous [...]»²⁸.

If, as Averroes said, time is *formaliter* in the soul, then it really does not exist outside the soul at all. And if, as Kilwardby said, each and every motion had its own proper time belonging to it (Kilwardby's *tempus illimitatum*), then no two events would happen in the same time —the meaning of «simultaneous»— because each event happens in its own individual time. Thus we know, Thomas argues, *that (quia)* there is only one natural time of the universe.

Thomas then immediately follows the above quoted text with the reason *why (propter quid)* natural time is one. Time is one, numerically one in the universe, because the universe is one. There is ultimately a single temporal becoming common to the whole universe. Time is the number of the fundamental becoming of the whole. For, individual motions not only have their own proper becoming but also partake of the becoming of the system they are in. In our terminology, the earth, for example, partakes of its own motion and the motion of our solar system and the motion of our galaxy and, indeed, the motion —the most fundamental becoming— of the universe as a whole. It is because the inferior motions are part of a single universe, have their start and finish as part of one flowing whole and partake of the becoming of the whole, that all motions are in the one time of the universe. Thomas says:

«[...] there is one first motion, which is the cause of every other motion. And so, any things whatsoever which have changeable being have it from this first motion, which is the motion of the *primum mobile*. Moreover, whoever perceives any motion, whether existing in sensible things or in the soul, perceives changeable being and as a result perceives the first motion which time follows upon. And so, whoever perceives any motion whatsoever perceives time, although time does not follow upon any except the one first motion, by which all other motions are caused and measured. And thus there remains only one time»²⁹.

²⁸ «Si autem tempus consequatur motum animae, sequetur quod res non comparentur ad tempus nisi mediante anima; et sic tempus erit non res naturae, sed intentio animae, ad modum intentionis generis et speciei. Si autem consequatur universaliter omnem motum, sequetur quod quot sunt motus, tot sint tempora: quod est impossibile, quia duo tempora non sunt simul, ut supra [ed. note: lect. 16, n. 2, & lect. 15, n. 5] habitum est» (THOMAS, *In IV Phys.*, lect. 17, n. 4 [n. 574]).

²⁹ «Ad huius igitur evidentiam sciendum est, quod est unus primus motus, qui est causa omnis alterius motus. Unde quaecumque sunt in esse transmutabili, habent hoc ex illo primo motu, qui est motus primi mobilis. Quicumque autem percipit quemcumque motum, sive in rebus sensibilibus existentem, sive in anima, percipit esse transmutabile, et per consequens percipit primum motum quem sequitur tempus. Unde quicumque percipit quemcumque motum, percipit tempus; licet tempus non consequatur nisi unum primum motum, a quo omnes alii causantur et mensurantur; et sic remanet tantum unum tempus» (*Ibid.*). See also lect. 23, n. 12 (n. 636), *in fine*.

Cf. Albert: «[...] tempus ut in causa et ut in subiecto est in primo mobili; et bene concedo, quod non est in motu primi mobilis, secundum quod est expansus in toto caelo, sed prout in ipso secundum naturam aliquid est, a quo incipit motus, et aliquid, per quod regyrat motus. Haec autem sunt dextrum et sinistrum, non distincta ab anima, sed in ipsa caeli existentia [...]» (ALBERT, 4.3.16 [4/1: 290.36-45]).

Thomas does acknowledge something of the Kilwardbian insight that perceivers of events can choose any number of different standards to measure time, for he notes that

«[...] that which is measured does not seem to be different from the measure [...]»³⁰.

However, there is an important difference between Kilwardby's and Thomas' positions. Let us assume there is no sphere of the fixed stars, as science now knows is the case. Then by Kilwardby's principles we must conclude that there are as many times as there are observers choosing their irreducibly different standards. On Thomas' principles, on the other hand, time would still be one, because the universe, with or without a sphere of the fixed stars, is one. The one ultimate becoming shared in by all the universe is the natural subject unifying time, even if the source and course of that underlying becoming of the whole is not directly observable or measurable by us³¹. Natural time remains one, and the awareness of time's passing and the universe's history remains common to all men; but mathematical measurement of time turns out to be much more complicated than simply comparing motions to the diurnal motion of the stars.

CONCLUSION

Averroes, Robert Kilwardby, Albert the Great, and Thomas Aquinas agree on the principles of the analysis of time, but they draw various conclusions from them in their answers to the questions of time's extra-mental existence and the unity of time (one time of the universe vs. many). On Aristotle's question in *Physics* IV.14, on whether time would exist if there existed no soul capable of numbering events of the world, Averroes holds that numbering is an act of the soul, and so it is the intellective soul which provides the formal principle «number» constituting time as a being. Time potentially and *materialiter* exists outside the mind in events of the world, but it exists actually and *formaliter* in the mind's act of numbering. There is but one time of the universe, according to Averroes, because there is one motion, the motion of the sphere of the fixed stars, which is naturally suited by its primacy both in its own being and in its familiarity to us to serve as the standard by which all other motions can be temporally measured. Robert Kilwardby follows Averroes' position on time and the soul;

³⁰ «Illud enim quod mensuratur, non videtur esse aliud quam mensura [...]» (THOMAS, *In IV Phys.*, lect. 23, n. 12 [n. 636]).

³¹ Cf. John M. Quinn, who has written extensively on the natural philosophy of time: «Plainly, the ubiquity and uniformity of time are mediated by the primary motion of the universal physical cause. Insofar as its number resident in the primary motion is secondarily exhibited in every other motion, time stretches to the farthest reaches of the cosmos [...] Here warranted knowledge stops; man cannot put his finger on which motion is the primary subject of time» (J. M. QUINN, «Time», in *New Catholic Encyclopedia* [New York: McGraw-Hill, 1967], 14:159).

however, he adds a notion absent from Averroes, that of *tempus illimitatum et indeterminatum*, which is «temporal quantity» real in the world and proper to each motion existing prior to the soul's act of determinately numbering that temporal extent (*tempus limitatum et determinatum*). Thus Kilwardby can conclude that in the sense of *tempus illimitatum* there are as many times as motions, although in the end he agrees with Averroes that there is only one time—in the sense of *tempus limitatum*—which results from the soul's act of temporally numbering events using the motion of the fixed stars as the one proper standard.

Both Albert and Thomas argue that the Averroistic position on time and the soul errs because it falsely assumes the way we perceive time is the way time really exists. Because we number time as an enduring being, and because only in the mind can time exist as an enduring being, the Averroists falsely conclude that time as number does not exist in reality. But «the soul never numbers anything», Albert points out, «unless there is in it a principle of number taken from things themselves»³². Number exists wherever distinction exists; the now distinguishes past and future. Temporal number exists *formaliter et materialiter*, as a successive being naturally in the events of the world, although we must reason to this conclusion because our perception of time is after the manner of an enduring being, a temporal extent. Thus Albert and Thomas emphasize that time's unity arises not primarily from the unity of the measure by which we perceive time but from the unity of the becoming of the entire universe: time is one because there is a fundamental becoming of the universe shared in by all of its events. Thomas recognized, however, that while there is absolutely only one time of the universe there may be a multiplicity of temporal measures we humans fashion. But whereas for Kilwardby science's subsequent rejection of a sphere of the fixed stars means that there can only be a multiplicity of times in the universe, Thomas' position still explains that there is one temporal becoming upon which all of the various human measurements of events are ultimately based.

The issue between Averroes and Kilwardby, on the one hand, and Albert and Thomas on the other is not an esoteric debate of little importance. At stake is whether physics can be a realist physics and whether metaphysics can attain knowledge of God. For, when the physicist measures time, he must be measuring something real: time measure, *chronometrics*, is dependent on there being real time, real *chronos*, which is being measured. If time is denied real, flowing, successive being in the material world and is made primarily a mental construct, then it will logically follow that motion must be denied real being in the world and must be treated primarily as a mental construct. For motion and time share the same mode of successive being. Motion has the same weak hold on actual being that time does. Motion must be a mental construct to the same extent that time is a mental construct. But if we lose the reality of motion, then we lose the reality of nature, for it is through motion that we know nature. And since it is

³² See above, n. 15.

through nature that we know God, even by revelation, then losing nature means losing all knowledge of God. Indeed, losing nature means losing all human knowledge, for we know through immediate sense awareness of natural things in their temporal motions³³. Thus Thomas had good reason for referring to the Divine Intellect when he took up the question of time and the soul:

«[...] if there are numbered things, there must be number. Hence, both numbered things and their number depend on one who numbers. Now the existence of numbered things does not depend on an intellect unless there is some intellect which is the cause of things, as is the Divine Intellect»³⁴.

Time and motion lead to natural knowledge of God. By losing true understanding of time as a successive being real in the world, we would lose understanding of motion, which is also a successive being, as real in the world. Our victory over Parmenidean skepticism in *Physics* I would in the end be given away in *Physics* IV. Losing nature we would lose God and lose ourselves. Thus it is essential that we study carefully the legacy on the nature of time bequeathed by Thomas Aquinas and Albert his teacher³⁵.

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³³ «[...] omnis autem nostra cognitio est per sensus a rebus sensibilibus et naturalibus accepta [...]» (THOMAS, *In II Phys.*, lect. 4, n. 6 [n.171]).

³⁴ See above, n. 23.

³⁵ Underlying this conclusion is the general principle that Aristotelian natural philosophy, rightly understood as Albert and Thomas did and modified to accommodate new facts, is essentially true and philosophically necessary today. Succinct statement of this principle can be found in James A. WEISHEIPL, O. P., «The Validity and Value of Natural Philosophy», in *Atti del Congresso Internazionale Tommaso d'Aquino nel suo settimo centenario*, vol. 9: *Il cosmo e la scienza* (Naples, 1979), pp. 263-266; and Benedict ASHLEY, O. P., «The River Forest School and the Philosophy of Nature Today», in R. James LONG (Ed.), *Philosophy and the God of Abraham: Essays in Memory of James A. Weisheipl, O. P.* (Toronto: Pontifical Institute of Mediaeval Studies, 1991), pp. 1-16. We have benefitted also from the works on natural philosophy by William Humbert Kane, O.P., William A. Wallace, O.P., Vincent Edward Smith, and Richard J. Connell.