

The Concept of Time in Giles of Rome*

The Meaning of the Now

The analysis of time remains incomplete without an analysis of the now, and it is to this elusive feature of time we here direct our attention. First, arguments comparing the now to mobile being and a point yield a definition of the now. Second, the now is viewed as the measure of time. Third, the now is indirectly proved to be indivisible. Fourth, we weigh certain common expressions involving the now. Fifth, we follow Giles's subtle account of the baffling question of the now's role in the (for the medievals) factual instantaneous propagation of light and the hypothetical instantaneous fall of a body in a vacuum. A sixth section briefly suggests why the now that Giles and other medievals handled with an air of sureness and clarity still seems, even after labor and sweat of brain, cloudy and blurred to the contemporary mind.

1. *The definition of the now.* Earlier dialectical inquiry produced antinomies concerning the nature of the now. If we think of the now as exclusively constant and invariant, the obvious temporal diversification of events is erased; against all experience, everything is decreed to occur at the same time or in the same instant. If, on the other hand, we take the now as through-and-through unchangeable, it has to be corruptible — an alternative that, besides entailing a corruption without corruption, makes the now partitive and does away with any possibility of speaking of an event happening now in a precise sense. A solution faithful to the data has to retain both polar facts but bring them to jibe rather than clash with one another. The now, Giles holds, is both one and many. The now stays the same *secundum rem* but *secundum esse diffinitivum sive secundum rationem* the now is manifold or unceasingly differentiated along the time-line ⁹⁸). Insofar as the now is a natural entity or *aliquid ens*, insofar as the now is taken *secundum esse reale*, it is the same throughout the whole of time. But insofar as the now shows itself as prior and posterior, insofar as the now is taken according to its definitional being or *ratio*, it is unceasingly other

* See *Augustiniana* 28 (1978), 310-352. Erratum: p. 322, n. 22 last line: in place of n. 147 read n. 149.

⁹⁸) In *phys.*, IV, l. 21, fol. 101d-102a (under *Et sicut motus, Ipsum autem nunc tempus, and Ipsum autem nunc est*).

along the time-line. Each of these claims, however, calls for proof that will enable us to construct a sound definition of the now. (i) Comparison with a mobile thing shows that the now is the same *secundum rem*. (ii) Differently viewed, this analogy informs us that the now is differentiated *secundum rationem*. (iii) The now, it becomes clear, is the number of time.

(i) A double comparison establishes the unvarying identity of the now: (a) the mobile is to motion as a point to a line, and (b) the now is to time as a mobile to motion ⁹⁹) (a) We are invited to imagine a geometrical point moving so as to generate a line, with the point touching on every individual position. If the positions were not really different, there would be no motion and no line generated. The making of the line remains one motion because the same point is borne along the various positions. If the point were not really the same, there would be no motion, no line generated, and no prior and posterior positions assigned along the path of motion. A similar stability obtains in the course of a motion. We can observe and make sense out of the rolling of a stone down a hill only because the stone remains a stone throughout its rolling. In rolling, the stone plainly does change; but in abiding as a stone or invariant mobile subject, the stone does not change. If the stone ceased to be a stone in midcourse, we could not speak of the rolling of the stone. Without the unchanging, change does not occur. A stone becomes other only because subjectively, in its mobile-thingness, it does not become other. A stone rolls only because its very stoneness does not roll.

(b) This brings us to the second of the two comparisons: the now is to time as a mobile thing is to motion. Just as one mobile thing perdures throughout any one given motion, so one and the same now exists *realiter* throughout time. The now, it is implied, is the unit, bearer, and subject of time. Since there is only one time, since there is only one time-line, there can be only one now in time. As with a mobile thing, so with the now: if the subject is radically altered, if the subject is transmuted into something else, the oneness of time disappears and the continuity of the time-line may be dissipated into a series of discrete jumps or, with equal incongruity, into a congeries of radically distinct times nested one within the other. *Secundum rem* then there is only one now in the cosmos.

But, a *dubitaret* wonders, is not the parallel between point-to-line and mobile-to-motion a fuzzy one? For whereas there can be only one

⁹⁹) *Ibid.*, fol. 102a-b (*Sequitur enim sicut*). See also *In lib. de caus.*, prop. 32C, fol. 109: «Et sicut realiter est idem tempus et motus, sic realiter sunt idem nunc temporis et substantia rei mobilis».

mobile thing in one motion, a number of points are distributed along any line. The two relationships, Giles responds, are similar but not the same ¹⁰⁰). The similarity consists in this: just as we cognize and mark the parts of a line through a point, so we know and distinguish the phases of motion through the same mobile thing. Dissimilarity enters and the comparison breaks down when we recognize that a point is ordinarily a *punctum stans*. But here we are asked to imagine a point moving and, through its motion, generating a line. It is the flowing point that causes the line. So too, it is the flowing mobile that causes the motion. So, further, it is the flowing now that causes time ¹⁰¹). Clearly the flowing now does not cause time in the way parents generate offspring or in the way a vital principle informs a body or in the way seeing causes, or is the reason for, eyes. The causality seems to be material: as the mobile thing as moved is the substrate of motion, so the now as flowing is the substrate of time. Taken precisely as the thing-moved, the flowing mobile thing constitutes the motion and is the motion. Taken precisely as the *flowing* now, the flowing now constitutes time and is time. In any case, because there can be only one time in the universe, there can be only one now *secundum rem* or *realiter fluens* throughout time.

(ii) But a mobile thing successively occupies (or strictly goes through) several places in its passage ¹⁰²). *Secundum rationem*, formally

¹⁰⁰) *Ibid.*, fol. 102b-c.

¹⁰¹) *Ibid.*: « ... sicut mobile fluens causat motum et sicut intelligitur punctum fluens causat lineam, sicut intelligitur nunc esse fluens causabit tempus, Propter quod sicut ex fluxu unius mobilis causatur unus motus et ex fluxu unius puncti una linea, sic ex fluxu unius nunc causatur unum tempus ». Cf. *In lib. de caus.*, prop. 32B, fol. 109: « ... nunc fluens causat tempus: ita quia tempus est fluxus nunc. Nunc vero est id quod fluit ». (To accord with this last proposition, the adage *Tempus fugit* might be strictly revised to read *Nunc fugit*. It is not time but the now that flows or passes).

Appointing this causation to the now seems to derive from Averroes, who writes: « ... instans ... est agens tempus ... » (*In phys.*, IV, com. 103, fol. 182G). « ... instans est causa in mensuratione temporis ... » (*ibid.*, com. 104, fol. 183C). « ... instans agit tempus ... » (*ibid.*, fol. 183G). Aquinas's language varies a bit from Averroes's: « ... nunc ... suo fluxu tempus facit ... » (*In phys.*, IV, l. 18, 4). In one place Giles's formulation agrees with that of Aquinas: « ... nunc fluens facit tempus » (*In phys.*, IV, l. 25, fol. 108a, toward the bottom of the column [under *Mensurabitur autem tempus*]).

¹⁰²) *Ibid.*, fol. 102c-d (under *Ratione autem aliud*). Giles's way of differentiating the now as the same and diverse varies somewhat from that of Averroes, who says: « ... instans est unum secundum subjectum et duo secundum rationem: ergo instans est unum in subjecto et duo ratione ... » (*In phys.*, IV, com. 104, fol. 183F). « ... instans est idem secundum subjectum et plura secundum definitionem ... » (*ibid.*, fol. 183M). Aquinas's handling of the distinction seems to follow Averroes: « ... nunc mensurat tempus, non secundum quod est idem subjecto, sed secundum quod ratione est alterum et alterum ... » (*In phys.*, IV, l. 18, n. 2). Aquinas repeats the distinction in nn. 3 and 4.

(from the angle of place), a mobile thing shows itself successively other in its movement. The Sophists's contention that movement from the theatre to the marketplace changes Coriscus into an utterly different person harbors a core of truth. To be sure, in identifying the *per accidens* with the *per se*, the Sophistic claim commits the fallacy of accident. From the angle of substance, Coriscus remains unaffected by his walk from the theatre to the marketplace. Yet from the angle of local motion, Coriscus does become other in going from one place to another. So by proportional resemblance, the now that remains always the same *secundum rem* manifests itself as always other throughout time. Not in terms of the oneness of time but in terms of the numerability of time, each now is a formally different now. More exactly, since the now as subject causes and centrally determines time, it is the formally other now that makes the time-line diverse at every juncture. It is the always varying now that makes the poles of time prior and posterior, which are the boundaries by which we number time. As we have seen, the *nunc fluens* materially causes time, so that in one sense time is nothing but the flow of nows. Time is formally number, and the now may be said to flow, only because the now is never the same and always other *secundum rationem*.

(iii) If the now is other *secundum rationem*, if it is always different *secundum esse diffinitivum*, the now of time may be briefly defined as the formally other subject of time ¹⁰³). In addition, since the incessant pluralization of nows makes for the endless variance of the time-line, the now may be said to number time: it may be defined as the number of time ¹⁰⁴). We become aware of time, we proved earlier, when we count two nows as the prior and posterior limits of motion. Approached from the standpoint of motion, time is the number of motion. But looked at within the framework of time itself, the now numbers time; that is to say, it is the diversity of the nows that makes the number that we call time. To put it in a slightly different fashion, the prior and posterior limits of a motion are, when counted, the number that is time. But the prior and posterior limits are prior and posterior nows: the nows constitute the number that is time. Because the one now is formally diversified as prior and posterior, we may speak of the now as the number of time.

2. *The now as measure of time.* The proportional likeness, the relationship of the now to time as the mobile to motion, also determines

¹⁰³) *Ibid.*, fol. 102c: « Sic secundum esse diffinitivum et secundum rationem [nunc] est alterum ».

¹⁰⁴) *Ibid.*, fol. 102d (under *Et notum autem*).

that the now be the measure of time. A measure is that by which the quantity of a thing is known ¹⁰⁵). By extension it is that by which something is made known. A mobile thing is the measure of its motion; i.e., in virtue of its abidingness we know its place-to-place passage. It is in virtue of the now, which may be called a quasi-substance in the line of time, that we know time or the time-line. As a perduring indivisible unit that manifests time, the now is the measure of time ¹⁰⁶). One serious difficulty does arise: an indivisible now paired with a divisible time would seem to nullify any essential commensuration. The analogous use of measure, Giles replies, sanctions a looser sort of paralleling of measure and measured ¹⁰⁷). The *ratio* of measure is found *per prius* or most properly in the arithmetical one that is the principle of number. Extended from discrete quantity to quality and substance, the notion of measure is somewhat modified. A certain likeness, not an absolute identity, joins the meaning of measure in quantity to its use in other categories. White is the measure of color but is plainly not commensurate in every way with all other colors. Because intrinsically more knowable, the primary substance is the measure of all substances, yet it is not identical in every respect with other substances. Similarly, because the now is intrinsically more knowable and because we know time in virtue of the now, it is really the measure of time in spite of the fact that the indivisibility-divisibility opposition rules out a perfect commensuration between the now and time.

3. *The now as indivisible.* Though not *ex professo* established till somewhat later on in physical inquiry, we may note here that the now has to be indivisible. It can be shown by induction that the now is indivisible: briefly, a finite line implies an indivisible term, and the term of the time-line is of course the now. However, it seems preferable to take the path of an indirect demonstration that exposes the absurdity involved in the denial of what is inductively evidenced. We will confine ourselves to one argument with two parts ¹⁰⁸). If the now is not indivisible, it is not the same. First, as a common term, the now is related to both past and future (taken in the broad sense). But if it were a divisible common term, one of its parts would include some of the past, and another terminal part something of the future. Since the now terminates the past and principles the future, something of the past would be contained in the future. A now

¹⁰⁵) *Quaestiones metaphysicales*, X, q. 1., fol. 36a-b.

¹⁰⁶) *In phys.*, IV, l. 21, fol. 102d (under *Et notum autem*).

¹⁰⁷) *Ibid.*, fol. 102d-103a.

¹⁰⁸) *Ibid.*, VI, l. 6, fol. 143a-b (under *Si autem divisibile* and *Simul autem et*).

in which past and future intermingle cannot be said to be one and the same now. Second, as a common term, the now is a *divisio*, a divisor: it is that in virtue of which a divisible is divided. It is impossible for a divisible now functioning as a divisor to be totally divisible. Part of such a now would be in potency to division; the other part would be that according to which the part potential to division is actually divided. A now that is simultaneously what is divided and that by which it is divided cannot exist; the self-identity of the now dissolves in the diversity of factors it is deputed to terminate and join.

The now undoubtedly belongs to time, but the indivisible identity of the now bars our calling the now a part of time in the strict sense. The nows on the time-line serve to link without break or seam the material parts of time. If the now were only a special sort of material part, two nows in contact would coincide in position, i.e., merge into one now¹⁰⁹). Thus common contact would reduce the cluster of nows, even an infinity of nows, to one now. Time not formalized by nows is impossible, and time materially composed of nows is impossible also. A time-segment is always a divisible interval bounded by indivisible nows. Time cannot exist without nows, but it cannot exist with nows as material parts; it can exist only in virtue of indivisible nows, instants that do not compose it.

4. *Expressions concerning the now.* The preceding analysis of the now equips us to supply warranty for certain expressions about the now, which have a currency among the educated, if not among men in the street. First, time, we hear it said, cannot exist without the now. Second, the now is said to continue time. Third, the now does not seem to be a part of time. Fourth, the now is held to terminate and number time; and accounting for this yields a third definition of the now.

(i) The now is inseparably joined to time, and vice versa. Without time there is no now, and without the now there is no time¹¹⁰). Just as the mobile and its movement are indissociably linked in the concrete, so the now and the number of motion are indissociably yoked together in the concrete. The now may be called the number of mobile being; it numbers and measures the mobile itself¹¹¹). This designation, however, must be

¹⁰⁹) *Ibid.*, I, 1, fol. 136c (under *At vero neque*).

¹¹⁰) *Ibid.*, IV, 1, 22, fol. 103a-b (under *Manifestum autem est*).

¹¹¹) *Ibid.*, Giles introduces what we shall shortly call a third definition of the now: the now is *numerus mobilis*. This expression is similar to Averroes's: « ... instans est numerus translati ... » (*In phys.*, IV, com. 105, fol. 184H; the Latin translation of the Arabic Aristotelian text has « numerus translati »). It is exactly the same as Aquinas's: « Sicut igitur nunc temporis intelligitur ut numerus mobilis, ita nunc aeternitatis ... ut unitas rei semper

taken in the broad sense. More properly, the now is *unitas numeri*; it bespeaks « more the unity of number than the number of unity »¹¹²). Every number, we may say, lies virtually in unity: the one measures each and every number¹¹³). So the designation of the now as number is virtually contained in the designation of the now as unity of number. The now is without question the number of the mobile thing; but, properly, it is *aliquid numeri* rather than number.

(ii) A second recourse to a comparison of the now with the mobile and a point explains why the now is said to continue time¹¹⁴). As we noted a few pages back, no change can occur without a changeless substratum. If the subject as such is changed during the motion, the motion breaks down into two or several (or even an infinity of) motions. It is the mobile that is responsible for preserving the unity of motion. Similarly, the now that remains the same *secundum rem* bestows unity on time. The continuity in time has its source in the subjectively one now.

The correspondence of the now to a point also shows the rootage of temporal continuity in the now¹¹⁵). A point continues the parts of a line; it terminates one point while being principle of its immediately adjacent neighbour. So the now serves as the continuant that terminates one part and principles a following part of time. Two dissimilarities, however, shorten the scope of the comparison¹¹⁶). For one thing, a point is *stans*, a

eodem modo se habentis». (*In phys.*, IV., l. 18, n. 4). Interestingly, when commenting on the *Manifestum est autem* portion, Aquinas does not describe the now as «*numerus mobilis*» but simply duplicates the words of the Aristotelian text, «*numerus eius quod fertur*».

Though the number of the mobile, the now is here spoken of as *unitas numeri*, Giles holds, because it is indivisible «...nunc habet rationem unitatis cum sit quoddam indivisibile. Et quodammodo videtur habere rationem numeri cum etiam numeret et mensuret ipsum mobile». This distinction may exhibit some dependence on Aquinas: «... ipsum autem nunc comparatur ad id quod fertur, non quidem sicut numerus (quia nunc indivisibile est) sed sicut unitas numeri» (*In phys.*, IV, l. 18, n. 8).

¹¹²) *Ibid.*, fol. 103b: «... nunc magis dicitur unitas numeri quam numerus unitatis».

¹¹³) *Ibid.* Giles credits this to Boethius: «... Boetius ait quod unitas est quodammodo numerus omnis, quia omnis numerus virtualiter continetur in unitate et per unitatem numeratur». Evidently he is not directly quoting but paraphrasing a passage from Boethius's *De institutione arithmetica*, II, 8: «... nam si [unitas] cunctorum mater est numerorum, quicquid in his, quae ab ea nascuntur, numeris invenitur, necesse est ut ipsa naturali quadam potestate contineat». We are using the edition reprinted by Minerva G.M.B.H., Frankfurt a. Main, 1966: Anicii Manlii Torquati Severini Boetii, *De institutione arithmetica* (et) *De institutione musica*, ed. Gotfried Friedlein (Leipzig, 1867), p. 93.

¹¹⁴) *Ibid.*, fol. 103b (under *Et continuum autem*).

¹¹⁵) *Ibid.*, fol. 103b-c (under *Sequitur enim hoc*).

¹¹⁶) *Ibid.*, fol. 103c-d (under *Sed cum sic*).

fixed entity unaffected by and uninvolved in process. But the now does not dwell in a static world apart. It never stops, it is incessantly borne along with its mobile subject, so that coupled with an uninterrupted motion is a continual time unbroken by a stasis. For another thing, the one point may be taken as the term of one part of a line. But the supposition of a single now does away with time. Time as we know it cannot exist without two formally different nows serving as boundaries of a time-segment. True, Giles adds, we are dealing with time when we view an instant as principle of the future and term of the past. This is, however, only a secondary or derivative consideration of time. The one now does finish the past and start the future, but a conceptually two-phased now remains only one now. If we make the one now that continues prior and posterior parts the primary paradigm of time, we virtually suppress the actual plurality requisite in time — the two nows that bound an intermediary continuum.

(iii) Since we have already briefly proved that the now is not a part of time, a few lines are enough to substantiate this expression ¹¹⁷) A magnitude is always divisible into smaller magnitudes. Hence time as a continuum is always divisible into smaller continua or time-segments. No divisible can be made up of indivisibles. A line composed of points would have no continuity or parts at all; it simply could not exist. So a motion made up of moments and a time constituted by nows would be forever a nonmotion and a nontime.

(iv) Finally, the now is said to be a term and number in reference to time ¹¹⁸). As a term, the now belongs to time; it is of time; it is tied to or present in time as in a subject. But as number and measure, the now enjoys a wider ambit of formally causative influence. A number is applicable to an assortment of physical objects, and time mensurationally encompasses

¹¹⁷) *Ibid.*, fol. 103d (under *Et adhuc manifestum*).

¹¹⁸) *Ibid.*, fol. 103d (under *Secundum quidem igitur*). Here Giles makes two references to Averroes. «... ipsum nunc est terminus vel est finis, ut habet littera Commentatoris, ipsius temporis. Non est tempus sed tamen accidit tempori, id est, est aliquid in ipso tempore, sicut accidens est aliquid in subiecto». The passage in Averroes reads: «... instans non est pars temporis, est accidens ei, id est, instans secundum quod est finis in motu, non est tempus, sed ipsum esse finem est accidens ei» (*In phys.*, IV, com. 107, fol. 186B). A second reference relies on Averroes for the difference between number and term: «... secundum Commentatorem haec est differentia inter numerum et terminum». Averroes writes: «... quoniam fines sunt in eo cuius sunt fines, et instans non invenitur in aliquo proprio, et non in alio, sicut est dispositio in numero, unde dictum est in definitione eius, quod est numerus translatus» (*ibid.*).

a variety of movements; so the now mensurationally embraces many mobile beings. Interwoven with the now as the continuant of time, this consideration of the now as number and measure leads to a deeper probing of the meaning of the now. Whereas the indivisible points continue and divide a permanent entity like a line, the moments do not principally furnish continuity for motion. It is, as we have repeatedly seen, the mobile thing itself that gives continuity to motion. Nevertheless, though time imitates motion, it is its own fluent punctiform unit, the now, that serves as the principal font of its continuity. Like the mobile in reference to motion, the now is the continuant of time. The complex proportion remarked on earlier still holds: the now is to time as the mobile to motion. But a simple switching of terms (similar to the interchange of denominator and numerator in an equivalence of fractions) gives a relationship that puts in sharp relief the kinship of the now with the mobile: the now is to the mobile as time is to motion ¹¹⁹). This leads to a precision concerning the now *secundum substantiam* or *secundum quod est*. Time, we saw earlier, is materially identified with motion itself, and similarly the now may be said to be a « nothing other than the very substance of the mobile thing » ¹²⁰). Formally it is of course otherwise. Formally time is not motion but the number of motion; motion viewed as marked by a numerable prior and posterior culminates in the *ratio* of time. Formally the now is not the *ipsum mobile* but the mobile as marked by a prior and posterior. All this leads to a possible third formulation of the now. We may define the now as the number of the mobile thing ¹²¹): it is the mobile as differentiated *secundum rationem*; the mobile as differentiated according to prior and posterior; the mobile as numbered according to prior and posterior. But one additional precision seems indispensable. Earlier Giles emphatically set down his preference for *unitas numeri* over *numerus mobilis* as a formula for the now, since unity bespeaks the identity of the now while virtually

¹¹⁹) *Ibid.*, fol. 104a (under *Quod quidem igitur*): « Habebit se ergo nunc ad tempus sicut mobile ad motus. Et per locum a permutata proportionem se habet nunc ad mobile sicut tempus se habet ad motum ». So far as I know, this altered proportional relationship is not found in Averroes. But it is employed by Aquinas: « Sic igitur se habet nunc ad tempus, sicut mobile ad motum: ergo secundum commutatam proportionem sicut tempus ad motum, ita et nunc ad mobile » (*In phys.*, IV, l. 18, 4). The similarity of wording makes it probable that Giles borrowed this « changed proposition » from Aquinas.

¹²⁰) *Ibid.*: « Nunc ergo materialiter nihil est aliud quam ipsa substantia rei mobilis ».

¹²¹) Giles twice speaks of the now as *numerus mobilis* in *ibid.*, fol. 103a-b (under *Manifestum autem est*). See n. 110 above.

containing the notion of number ¹²²). The upshot, we may suggest, is a third definition of the now not fully explicitated by Giles: the now is the *unitas numeri mobilis*, it is unity-of-the-number of the mobile thing. This formulation captures both the material and formal notes of the now, yet puts the primary stress on the now in its *esse reale* or self-identity. For, as regards this latter point, Giles is careful to insist that the now *secundum rem* is one with the substance of the mobile. This formal side of the now, its *ratio* or number of the mobile, is a superadded feature that arises from our intentional acts numbering the prior and posterior phases of the mobile. This permuted proportional resemblance also undergirds the response to the question: does the now measure mobile things ¹²³? Time, it was argued earlier, does not measure the primary motion in which it resides as a *passio* in its subject. But it does measure all other mobile things, in which it has no subjective existence. Correspondingly, the now does not measure the *primum mobile* in which it is subjectively situated, but it measures all the other mobiles precisely as mobiles.

In the perspective of the first proportional relationship — the now is to time as the mobile is to motion — we defined the now, first, as the formally other subject of time and, secondly, as the number of time (the second definition carries with it the implication that the now is the measure of time). In the light of the second proportional relationship, a permutation of the first — the now is to the mobile as time is to motion — we defined the now, thirdly, as the number of the mobile or, more exactly, as the unity-of-the-number of the mobile, a definition bearing within it the corollary that the now is the measure of all mobile things other than the primary mobile.

5. *Special problems.* Only one now oversees or measures the instantaneous positioning of all mobile things other than the primary mobile. This measurational unicity of the now provides the key for understanding (i) the factual instantaneous propagation of light and (ii) the hypothetical instantaneous fall of a body in a perfect vacuum.

(i) In spite of appearances, the occurrence or the emission of light is not a motion. Because the air has no contrary disposition to light, no time is required for the introduction of the new form, i.e., the air can be completely illuminated in an instant ¹²⁴). Yet it remains true that light

¹²²) *Ibid.*, fol. 103b. See n. 111 above.

¹²³) *Ibid.*, fol. 104a (under *Quod quidem igitur*).

¹²⁴) *Ibid.*, l. 27, fol. 111c (under *At vero prius*). Earlier Giles mentions the nontemporal or instantaneous transmission of light: « ... lux multiplicat se in non tempore

seems to be a movement, so that to account for a stream of light we apparently must posit the existence of several *mutata esse* or moments to differentiate the various positions taken by the light along its path through the air ¹²⁵). The several moments (without an intervening track of motion) that mark the diverse places occupied by the transmission of light are measured by one and the same instant. As time is related to motion, so, Giles argues, is the instant related to a moment or set of moments. Nature cannot abide a plurality of times: seated in the one primary motion, a single time measures all cosmic movements. Correspondingly, the oneness of the instant in the primary mobile dictates that, despite the plurality of moments, there be only one instant measuring a particular transmission of light or set of moments. This is admittedly a position that not all will deem satisfying, but its alternatives are paradoxical. If we posit several instants for the transmission of light, we are, in effect, introducing several *mutata esse* in the heaven or primary mobile and thus abolishing the unicity *secundum rem* of the now. Again, opting for a noninstantaneous transmission would entail the illumination of air in an interval of time (since two instants, if really two, must have an intervening segment) — a consequence that runs counter to the view of Aristotle and to the already proven oneness of the primary motion and of time. The point of conflict with the oneness of time would seem to be this: the time-interval posited for the transmission of light would be paired in the primary motion not with a like time-interval but with an instant. In other words, an incongruous matching of the cosmic instant with a time-interval is tantamount to claiming two ontically diverse times, which is of course physically impossible.

(ii) Giles proposes a partially similar solution to the measurement of the fall of a body in a perfect vacuum. In contrast to the previous question, which turns on what is, for Giles, established fact, the second problem concerns a hypothetical case. Let us conduct a thought-experiment, Giles seems to be saying, and suppose that there actually occurs what is ordinarily not directly observable. In a resistance-free medium the fall of a body has to be instantaneous. Yet the incontestable fact that the falling body occupies diverse points or parts of space requires several *mutata esse* ¹²⁶). This raises a nettlesome question: is such a fall

in toto medio quia non invenit in eo contrariam dispositionem ... » (*ibid.*, l. 13, fol. 91c-d [under *Si enim quatuor*]).

¹²⁵) *Ibid.*, fol. 111c-d.

¹²⁶) *Ibid.*, fol. 111d.

measured by one instant or several instants¹²⁷)? A complete parallel with the illumination case is impermissible, for a vacuum lacks a proper ordination to the primary mobile. Thus the several moments marking the fall have to be measured, it would seem, by several instants. No continuum binds these instants together, for the continuity of time derives from that of motion, and no motion as such is possible in a vacuum¹²⁸). Indeed since the instants in a vacuum do not make up a time-line, we may think of them as reducible to one instant: in effect, the fall occurs, in some sense, in one instant alone. The instants are pluralized and diversified *secundum rationem*, but *secundum rem* the instant remains one and the same¹²⁹). Another, a most formidable question suggests itself: is there any succession among the instants viewed *secundum rationem*? Experiencing a certain intellectual anguish, Giles observes that this difficulty is a veritable labyrinth¹³⁰). In whatever direction the mind gropes, the way seems blocked, each apparent exit becomes a stone wall, and the mind, lost in maze of wrong turnings without detectable egress, continues to stumble about in search of the daylight outside. The suppression of succession is absolutely untenable; to exclude diversity of position is to do away with the possibility of a fall. A heavy falling body would have to simultaneously occupy all the diverse parts of a vacuum. If we opt for succession, as apparently we must, we are driven into the position, contradictory on its face, that there can be succession in one and the same instant (for here succession over several instants amounts to succession in one instant). As partless, an instant properly measures a thing or change that is partless, whereas succession in a vacuum, however carefully qualified, remains a succession — a partitive series in some real sense. Instantaneity and succession are diametrically opposed: if there is succession, it cannot occur in one and the same instant; if the several instants come down to or are effectively equal to only one instant, there can be no succession. However piercingly put, the contradictoriness is only apparent, Giles contends, and those who surrender to the dilemma as inevitable are being hoodwinked by illusory image-thinking¹³¹). Once we rise above the clouds of image-ideas, we can analytically liberate

¹²⁷) *Ibid.*, fol. 111d-112a.

¹²⁸) *Ibid.*, fol. 112a-b.

¹²⁹) *Ibid.*, fol. 112b.

¹³⁰) *Ibid.*

¹³¹) *Ibid.*, fol. 112b-c.

ourselves from the sophisms that deny the congruity of successiveness and instantaneity. The first sub-difficulty — if there is succession, there cannot be only one instant — topples in the light of the distinction between a comprehensive and a proper measure ¹³²). Viewed as a proper measure, the one now cannot contain a diversity of positions marked by instants, but viewed as a comprehensive or assisting measure, it can embrace a succession of positions and instants. The now of eternity properly measures only the being or duration of God, but as a comprehensive measure it takes in and assists — i.e., supports the functioning of — all times. The eternal now's comprehensive measuring of the diversity and succession of times does not imperil in any way its absolutely simple and indivisible character. Analogously, one temporal instant can comprehensively, but not properly, measure a succession of instants. The plural instants measuring the plural moments *in vacuo* are comprehensively measured by the one celestial instant. The second sub-difficulty — if there is only one instant, there can be no succession — is also overcome by image-free reflection. No quantitative addition is required to guarantee a succession ¹³³). Black can suddenly, instantaneously succeed white. A segment of time, let us say, is succeeded by an instant, but the span comprising the instant added to time is no longer than the time-segment alone. Hence the comprehensive folding up of several instants in one instant does not nullify succession. Thus succession without temporal extension accompanies a plurality of instants punctuating a vacuum — instants really encompassed by the one instant. Thus the fall of a heavy body in a vacuum is truly successive and truly instantaneous.

At the end of this consideration Giles appends a note of caution that may allay the fears of discerning readers who may be alternately amazed and appalled at dialectical intricacies that put an attractive face on what some may only label physical fantasizing. Strictly speaking, he prudently adds, neither motion nor time can exist during the fall of a heavy body *in vacuo* ¹³⁴). Hence from the viewpoint of strict observation we have been hypothesizing physical impossibilities. *Mutata esse* that are not properly correlated with and measured by their celestial equivalent are impossible.

¹³²) *Ibid.*, fol. 112c.

¹³³) *Ibid.*

¹³⁴) *Ibid.* To undo a copyist's error, it may be noted, we should read (six lines from the end of Giles's consideration here) «descensus alicuius gravis» rather than «alicuius levis».

It is impossible also for a vacuum to be marked by several instants devoid of an intervening segment of time. A perfectly vacuous space in which a body falls is physically unthinkable. Thus we have been pondering a purely hypothetical case, one not physically observable or reproducible in experience or experiment. But we can abstractly ruminate about such a hypothesis, and if we posit such an impossible state of affairs ¹³⁵), if this impossible situation can be thought of as possible, it could be justified only along the lines already astutely laid down: some *mutata esse* would not be properly measured in the instant of celestial motion but broadly comprehended by the one now of time; the instants marking the position along the path of the falling body would be physical but discontinuous, untied to an intervening tract of time; succession would occur among the several instants yet the several instants would be comprehensively measured by, and effectively amount to, only one instant ¹³⁶).

¹³⁵) *Ibid.*: «Tamen si tale impossibile poneretur, sequeretur quod essent aliqua mutata esse non reducta in motu caeli...».

¹³⁶) Throughout this discussion Giles sticks unswervingly to the instantaneous character of any fall in a vacuum. This position rests upon or reflects the more common interpretation of the sixth paradox that, Aristotle argues, militates against the possibility of the separate void posited by Atomists. According to Aristotle, the evacuation of all intervening matter and therefore of all resistance would enable a falling body to traverse a distance in no time at all, i.e., instantaneously. Giles writes: «Ergo quia nihil est ibi impediens, nullum requiretur ibi tempus. Motus ergo in vacuo neque erit velox neque tardus. Immo nullus erit ibi motus cum de ratione motus sit quod fiat in tempore» (*In phys.*, IV, l. 12, fol. 91a [under *Id igitur in*]). Again: «... si esset aliquid spatium vacuum et in eo tolleretur omne medium resistens, mobile pertransiret illud spatium in non tempore. Dicerem enim quod sicut lux multiplicat se in non tempore in toto medio quia non invenit in eo contrariam dispositionem; sic si esset spatium vacuum corpus gravis vel leve transiret illud in non tempore. Quia non inveniret ibi corpus medium impediens eius motum» (*ibid.*, fol. 91b-c). Avempace or Ibn-Badja, a twelfth-century Spanish Moslem, rejects this sixth inconvenience, claiming that even with the removal of the medium a body would travel a distance in some time. Averroes devotes a lengthy rejoinder to turning back this attack (*In phys.*, IV, com. 71, fol. 160H-162C); and in essentials Giles makes these counter-arguments his own (*In phys.*, IV, l. 13, fol. 91b-92b). (We say «in essentials» advisedly, for, as we shall see presently, Giles introduces a remarkable refinement). In opposition to Averroes, however, St. Thomas maintains that Aristotle's argument is strictly a classic *argumentum ad hominem*: «... ratio Aristotelis inducta est ratio ad contradicendum positioni, et non ratio demonstrativa simpliciter» (*In phys.*, IV, l. 12, n. 10). In Aquinas's view, Aristotle is granting for the moment, but not conceding, that the resistance of the medium is the sole reason for the different velocities of falling bodies: remove the medium, and the movement occurs in no time at all. What Aristotle holds apart from this particular dialectical tactic, Aquinas contends, is really this: because the nature of the body plays a decisive role in the speed of its fall, a body will cover a certain distance in a certain time even in the absence of a medium. With the exception of the material on Giles, a very illuminating survey of this problem is to be found in James A. Weisheipl, O.P., «Motion in a Void: Aquinas and Averroes», in *St. Thomas Aquinas: Commemorative Studies 1274-1974* (Toronto: Pontifical

6. *Obscurity of the now.* Conceptual familiarity with certain objects can induce a false security of understanding by pushing to the fringes of attention incomprehensible, untidy, and inscrutable features of an object.

Institute of Medieval Studies, 1974), I. pp. 467-488. In showing that Galileo was aware of Aquinas's opinion (the great scientist refers to St. Thomas, along with others, as supporting the position that motion in a void would take place in time), Fr. Weisheipl points up the importance of this question in the development of early modern science. Though Fr. Weisheipl's study is admirably searching and balanced, the question of the temporality of a resistance-free fall remains unsettled and perplexing. Even if we grant the basic cogency of Aquinas's refutation of Averroes, St. Thomas's position does not seem entirely immune to objection. Implicit in Aquinas's view is the continuity of the motion through empty space; but space devoid of actual matter is space without the physical magnitude that is the source of continuity for motion and time. Zero resistance means zero magnitude, and zero magnitude means zero continuity. This is what is sharply focused and clearly set forth in Giles's approach: movement even through a void must contain succession, but succession without continuity, the succession of discrete *mutata esse*. Out of fealty to the *prima facie* meaning of the Aristotelian text as elaborated by Averroes, Giles clings, even in the face of fresh paradox, to the notion that a vacuum entails instantaneous movement. Supposing Aquinas's strictures on Averroes to be valid, we can discard the emphasis on instantaneity and retain Giles's picture of a body whose trip through a vacuum is marked by discontinuous moments corresponding to the pluralized positions in an empty space. Though we should never leave off reminding ourselves that here we are engaged in empirical speculation about the empirically nonobservable and physically unthinkable, Giles's scheme of bodily transition or succession without magnitude seems to represent conditions in an absolutely or radically evacuated space more accurately than Aquinas's retention of magnitude and continuity. As regards the impact on Galileo of the Thomistic case for motion in a vacuum, Fr. Weisheipl's concluding remarks are commendably circumspect: «... we do not mean that Thomistic natural philosophy prepared the way for classical physics. This would be to claim too much ... a specifically Averroist physics did exist in medieval philosophy [which] was vigorously opposed by St. Thomas and others. Only when Averroist physics was rejected could modern classical physics begin » (*loc. cit.*, p. 488). Yet two further specifications suggest that the Thomistic influence on Galileo was still less marked than Fr. Weisheipl indicates. First, Galileo's reliance on Aquinas among others was an appeal to authority — a dialectical move of the weakest probative value. Secondly, Galileo was aiming at establishing movement in an experimental vacuum, i.e., one from which all observable or accountable matter has been removed, which is a far cry from the separate void of the Atomists. He was concerned with what our contemporaries, with more sophisticated instrumentation, have achieved in the so-called vacuum tube, which is, from the angle of the Atomists's void, a *façon de parler*. Electrons move through a vacuum with differential direction and strength that would be of course, impossible in a strictly separate void (cf. Vincent Edward Smith, *The General Science of Nature* [Milwaukee: Bruce, 1958], p. 302). So far as I know, Averroes did not rule out as impossible an experimental vacuum of the sort that Galileo was advocating. Perhaps some of Averroes's later medieval disciples did leap from his interpretation of Aristotle's sixth difficulty as involving instantaneous movement (a conclusion in general or fundamental natural philosophy) to the hardline position that no experimental evacuation of ponderable matter was conceivable (a conclusion in specialized natural science). In that event the allegedly retarding influence of Averroistic physics on the rise of modern science would rest on a misreading of Averroes and a misunderstanding of

A theologian systemizing the givens of faith about Jesus may be so caught up in his explanations as to tend to blot out the deeply mysterious, super-rational aspects of the God-man. So, too, a philosopher of time can expatiate on the now, analyzing, defining, demonstrating attributes without adverting to what is, for the contemporary mind, a specific core of obscurity and even mystery in the now. Though we cannot effectively penetrate the specific mystery of the now, we can briefly indicate why after apparently acceptable analysis and crystal-clear definition the now still seems dim, shadowy, vaporous — so easy to talk about, so hard to catch hold of! The ancients and medievals did not experience this mixed sense of clarity and bafflement, because in their simpler geostatic universe they were able to point to the movement of the outermost sphere in the heavens as the cosmic clock. The now was thus concretely specifiable as the « quantity » of the first mover within nature or the number of the primary mobile. Advances in instrumentation have irrevocably razed that tidy world picture. There are no fixed stars, and our solar system is only one tiny portion of an enormous galaxy that is itself only one among roughly a billion galaxies in the universe. We are no longer able to make an intelligent guess concerning the particular natural clock, let alone give its exact specifications. The staggering size and complexity of the cosmos rule out any real possibility of our pinpointing the precise physical subject of the now. While we can, in general, lay hold of the now, the particulars of its physical situation apparently lie forever beyond our reach. Thus the definitional clarity in our cognition of the now is inescapably accompanied by thick darkness that shrouds its particular contours and location. A sound natural philosophy of the general meaning of the now must humbly accept as unavoidable a seemingly unfathomable natural mystery concerning its particular what and where.

The Existence of Time

With the main analyses of time and the now securely behind us, we still have to clear up certain quasi-dialectical problems concerning the

the role of general natural philosophy. It would seem more judicious to lay such misconceptions at the door not of Averroistic physics in general but of certain individuals of the Averroistic persuasion. In short, since there still remain to be unraveled a great many strands that went into the making of the minds of Galileo and other pioneers along with precursors of modern science, the whole business of apportioning philosophical praise or blame for the birth and development of early modern science appears to be a risky and perilous enterprise demanding the utmost restraint and caution.

existence and the oneness of time. This section will handle the question of time's existence, and the concluding section will deal with temporal unicity.

For convenience we will treat, first of all, under the head of existence the question of the universality or ubiquity of time, the cosmic scope of its existence. Then we will go on to the more troublesome question of time's relationship to the soul.

1. *Universality of time.* Time's linkage with motion furnishes sufficient warranty for its presence throughout all of nature. Time is the *passio* of local motion, and all mobiles are in some way in place ¹³⁷). It measures not only actual motions but potential motions or states of rest as well. As ubiquitous, time shows three features ¹³⁸). First, it is a measure, which is the primary factor in a genus that is the *raison d'être* of all else in the genus. Second, it is quantitative measure; through replication, it is equal to what is measured (whereas God as the measure of all substances is not replicatively equivalent to His creatures). Third, as we have noted previously, time is the *passio* of the first motion and extrinsically measures all other motions. Yet difficulties arise out of the apparent conflicting roles of time in relation to motion. On the one hand, we insist that time is materially identical with motion; on the other hand, we maintain that time is founded on, i.e., different from, motion. A material identity of time with motion also clashes with time as a *passio* of motion, i.e., an attribute distinct from its subject. A comparison with the universal-particular relationship lets in the necessary light ¹³⁹). A universal is materially or existentially identical with the particular, but formally and intentionally the universal differs from the particular. Similarly, time is materially or existentially one with motion, but its

¹³⁷) *In phys.*, IV, l. 28, fol. 112d (under *Aut quia motus*). Being in place, Giles notes, is taken in the broad sense since, as has been shown earlier (*ibid.*, IV, l. 8, fol. 82c [under *Caelum autem sicut*]), the heaven or outermost sphere is properly and per se not in place, since, as ultimate, it obviously cannot have beyond it another body containing it. In *I Sent.*, d. 19, q. 2, fol. 112K, which is concerned with whether all trues are measured by the one truth in God, Giles describes in the one-many relation of time to temporals an analogy to the one truth measuring the many trues. « Comparatur ergo veritas prima simpliciter loquendo ad omnia entia sicut mensura ad mensurata. Igitur sicut tempus quod est mensura omnium temporalium comparatur ad omnia temporalia. Et omnia quae sunt huiusmodi temporalia dicuntur, non quia tempus est in eis, sed quia ipsa sunt in tempore. Ideo non oportet tempus plurificari secundum numerum temporalium, sed est unum tempus omnium temporalium. Ita veritas divina comparatur ad omnia entia creata. Omnia talia dicuntur vera, non quia veritas est in eis, sed quia ipsa sunt in veritate. Propter quod non oportet unitatem multiplicari secundum multiplicationem verorum ».

¹³⁸) *Ibid.*, fol. 112d-113a.

¹³⁹) *Ibid.*, fol. 113a.

distinct formal *ratio* is founded on motion. The universal-particular parallel, however, seems deficient in two respects: a universal is not the *passio* of a particular; and unlike *passio* and subject, universal and particular are not located in different categories. Shifting to a physical comparison, Giles's answer points to action as a *passio* of motion that is categorically different from *passio*. So too is it physically thinkable that in spite of being predicamentally different from motion, time be a *passio* of motion ¹⁴⁰).

2. *Objectivity of time.* The problem of the ontic status of time is a rugged one with which minds have wrestled for centuries and concerning which, even within the scholastic tradition, no consensus seems achievable. Very few are disposed to assign to time a completely mindfree niche in nature. Time does not seem to be out there in the same way a tree and the green of its leaves and their peculiar shape lie before us, requiring no intervention of mind to round off their make-up. On the other hand, most would shrink from going as far as Kant does in consigning time exclusively to the furniture of the mind, in this instance, an inner form of sensibility. Most thinkers, or at least most realists, have found in the concept of time an intermixture of physical and mental features. It is with this company that Giles leagues himself: time is a basically physical reality that is completely mental. Time is both independent of and dependent upon the soul. The difficulty lies in properly balancing the mind-independent and mind-dependent components. Giles argues first of all that because time is number, it cannot exist without the soul. The tie-in of time with motion, he maintains secondly, assures time a firm foothold in nature. Materially one with motion, time in its complete conceptualization exists formally in the soul.

(i) As number, time without a soul seems impossible ¹⁴¹). In the line of possibility number and a subject capable of numbering are reciprocally related. If a subject capable of numbering is possible, things able to be numbered are possible; and the converse is true. This co-implication obtains in the line of impossibility also. If a subject capable of numbering is impossible, things capable of being numbered are impossible also. If no soul capable of numbering can exist, no number can exist. Thus in the

¹⁴⁰) In *ibid.*, fol. 113a-b, Giles shows that the correlation between the now and time is not exceptionless. While time is the *passio* of motion, the now is not the *passio* of the mobile, for the now is materially identified with the substance of the mobile, and a *passio* is no more than an accident.

¹⁴¹) *Ibid.*, fol. 113b (under *Utrum autem cum*).

absence of a numbering human intellect, time cannot exist. Underlying the argument, Giles notes, is a co-implication of cause and effect. Wherever we observe effects or natural phenomena, we search for their proper causes. But if certain proper causes cannot exist, their corresponding effects are likewise impossible. Specifically, if the proper cause of enumeration that is a soul cannot exist, number is impossible; and time, whether taken as numbering number or numbered number, simply cannot exist. Though Giles does not accord the point explicit attention, it seems worth noting that the argument turns not on the factual existence but on the possibility of the soul ¹⁴²). The argument does not run: if the soul does not exist, number and therefore time do not exist. A reciprocal relationship does not obtain between the existence or nonexistence of the soul and the existence or nonexistence of time. As will be evidenced shortly, time does exist in some bare physical sense apart from the soul. We cannot simply say: if the soul does not exist, time does not exist. The reasoning is pitched on the plane of possibility and impossibility, and on this plane we can apodictically maintain: if there can be no soul, there can be no number or time.

(ii) Time finds its physical residence in motion. It is *utcumque ens*, a discernible physical entity in virtue of its union with motion. As identified with motion, time is independent of the soul ¹⁴³). It seems undeniable that motion with its prior and posterior phases exists apart from the soul. But time is nothing but the prior and posterior in motion taken as numerable. Hence if motion can exist without the soul, time also can exist in independence of the soul. Certain entities such as sensible things (like a horse and the brown of its coat) are unaffected by the soul. Other things totally rely upon the soul for any objective existence; the fire-

¹⁴²) Giles undoubtedly relies heavily on Averroes throughout his analysis of the connection between time and the soul. His reading of this argument clearly follows Averroes, who takes Aristotle to argue: if there can be no soul, there can be no action that is numbering; if no numbering, there can be no number; and if no number, there can be no time (*In phys.*, IV, com. 111, fol. 202D-E). Taking a flatly counter view, however, Aquinas holds that Aristotle is posing a question rather than giving an answer. The problem raised is: if number depends on the numeration of the soul, time must be completely dependent on the soul. Aquinas's solution, implicit in Aristotle, distinguishes between possible and actual numbering. If numbering is impossible, so reciprocally is number; and, by corollary, so is time. But the actual number of things, say the four of a dog's eggs, does not depend on your or my numbering them as four. Sensibles can exist without a sense power and intelligibles without a created intellect; so too can numerables exist apart from the soul. Hence it is only the very act of numbering that depends on the soul. (*In phys.* IV, 1.23, nn. 4-5).

¹⁴³) *Ibid.*, fol. 113b (under *Sed autem hoc*).

breathing monster called the chimera falls into this class. Entities in a third group draw part of their objective existence from the soul ¹⁴⁴). Viewed materially, a universal such as dog or dogness is identified with the very nature of these beloved domestic animals. In some unassailable sense, the feature we call dog does exist as the primary principle in certain physical particulars. But viewed formally, the universal is the nature thought apart from the particulars physically exhibiting it. The formal universal is the nature denuded of individualizing conditions; it is the nature detached from reference to any particular dog. The universal is thus constituted in its formality by the intellect. Without a human mind dogs would go on existing; but without the intentional acts of the human mind, the universal dog, as stripped of its individuating integuments, would not exist. A similar distinction between physical materialization and intellectual formalization accounts for time's independence from and dependence upon the soul ¹⁴⁵). Taken materially, time does exist without the soul; it is, we have just seen, nothing other than the prior and posterior in motion viewed as numerable. But taken formally, time is absolutely dependent on the soul. Without the numbering of the soul its formal *ratio* that is number could not be completed. The numbering activity of the soul is strictly necessary to lift the prior and posterior of motion to the estate of actuality and insure the attainment of the formal *ratio* of time ¹⁴⁶).

¹⁴⁴) *Ibid.*, fol. 113b-c. The chimera illustration is found in Averroes, *In phys.*, IV, com. 111, fol. 202E. The comparison of the formal-material factors in time with those in the universal and particular seems clearly original with Giles. According to Anneliese Maier, *Metaphysische Hintergründe der spätscholastischen Naturphilosophie* (Roma: Edizione di Storia e Letteratura, 1955), pp. 70-73, Henry of Ghent, who also adopts Averroes's position, borrows the universal-particular parallel from Giles. « Wir haben damit also dieselbe Entscheidung, und dieselbe Parallele zu den Universalien, wie bei Aegidius Romanus und sicher nicht ohne Abhängigkeit von ihm » (p. 73).

¹⁴⁵) *Ibid.*, fol. 113c: « ... ipsa enim prius et posterius in motu sunt tempus materialiter. Completur tamen ratio formalis ipsius temporis ex eo quod talia sunt numerabilia ab anima ». The affinity with Averroes is again evident. Averroes writes: « ... tempus nihil aliud est quam prius et posterius in motu, sed secundum quod sunt numerata » (*In phys.*, IV, com. 131, fol. 202G). As mentioned in n. 22 above, Averroes has express recourse to the formal-material distinction in one place only (*ibid.*, com. 109, fol. 187C): « ... substantia temporis, quae est in eo quasi forma est numerus, et quod est in eo quasi materia est motus continuus ... ».

¹⁴⁶) *Ibid.*: « Oportet ergo ipsa prius et motu numerari ab anima. Et anima facit ad quoddam complementum temporis. Inquantum numerando et signando ipsa prius et posterius in motu facit ad quamdam actualitatem eorum ». Cf. Averroes, *In phys.*, IV, com. 131, fol. 202F: « ... secundum quod prius et posterius sunt in eo [motu] numerata in potentia, est tempus in potentia. Et secundum quod sunt numerata in actu, est tempus in actu ».

Motion is continuous, and therefore its prior and posterior features are lodged in it only potentially. The prior and posterior become actualized, they become discrete limits only through the designation of the soul. Points, for example, are only potentially present in a line. They become actualized only when, running our finger along the line, we designate this point, then that point. The soul runs its eye, so to speak, along the line of motion, marking this motion-point, then that, saying « now », then again « now », i.e., counting the prior and posterior of motion as the two nows that delimit the motion-continuum, which at this juncture we recognize as the time-line. Thus a nice consistency joins the solution of the objectivity of time with the determination of its definitional content ¹⁴⁷). Definitionally, we saw earlier, time is formally number but materially continuous or one with motion. In terms of its objectivity or ontic status, time is again seen as formally number and materially continuous. As formally number, it is formally dependent on the soul; as materially continuous, it is a physical entity, *utcumque ens*, materially one with motion and thus independent of the soul ¹⁴⁸).

¹⁴⁷) In dealing with the definition of time, Giles touches on the formalizing and actualizing role of the soul that makes for the completion of the *ratio* of time. « ... hic magis erit manifestum circa finem hujus capituli ubi ostendetur quod ad esse motus nihil facit anima sed ad esse temporis aliquo modo facit anima, quia prius et posterius in motu quae complent rationem temporis sunt in actu per significationem animae »; *ibid.*, l. 20, fol. 101c (under *Quoniam autem numerus*).

¹⁴⁸) Other works, concurring almost word for word with this commentary on the *Physics*, reinforce this position. « ... sequitur quod ad esse temporis faciat anima ... Nam cum tempus habeat rationem numeri numerati; cum non sit aliquid actu numeratum nisi sit anima actu numerans; licet esse potentiale possit habere tempus absque anima, actualitatem tamen ab anima suscipit » (*I Sent.*, d. 19, q. 2, art. 1, fol. 106D). Again: « Ipsa enim prius et posterius, ut sunt numerata ab anima, complent rationem temporis... Quare, si consideretur tempus, quantum ad id quod est formaliter numerus, est numeratum ab anima, quia est numerus numeratus. Nam, ut diximus, ipsa prius et posterius in motu, uti sunt numerata ab anima, complent rationem temporis » (*Quodlibeta*, V, q. 20, p. 325).

In this and nn. 50, 85, 86, 87, 88, 96, 100 and 135 above, we have drawn attention to passages closely corresponding to the views in *In phys.* from *I Sent.* (1275), *Quodl.*, V (1290), *In lib. de caus.* (1290), and *II Sent.* (1309). With the exception of *In lib. de caus.*, the approximate dates in the parentheses rest on the authoritative judgment of Gerardo Bruni in his *Una inedita Questio de natura universalis de Egidio Romano* (Naples: Morano, 1935), pp. 26-39. The date for *In lib. de caus.* is certified in Nicola Mattioli, *Studio critico sopra Egidio Romano* (Rome: Cuggiani, 1896), p. 142. If we situate the writing of the commentary on the *Physics* around 1272, a notable consistency binds together Giles's reflections on time over some thirty years. Moreover, just to touch on a point we have hypothecated elsewhere, this substantial unvarying stance on time may be one large sign that the concepts in the exposition of Aristotle, especially those in the physical commentaries, shape the foundation and framework — mold and indeed become the ingrained ideational idiom — of practically all of Giles's later works.

If all human beings vanished from the natural scene, time would still exist ¹⁴⁹). It is an ineradicably natural motion in its numerable prior and posterior features. But the disappearance of the human mind would render impossible the objective envisagement of time as the actual number of the prior and posterior in motion. From this angle, the physical entity called time that is one with motion is foundationally physical. Taken formally, it is completely a being of reason, an entity whose objective existence, or existence as an object for thought, rests upon the activity of the mind ¹⁵⁰).

The Unity or Unicity of Time

Here and there in the preceding pages we have already touched on the numerical unity of time. Now we propose, first, to offer a brief *ex professo* treatment of the matter. Secondly comes a contrast of numerical with specific unity. Finally, we shall say another word or two on the reason for the specific unsatisfactoriness of a realistic analysis of temporal unicity.

¹⁴⁹) *In phys.*, IV, l. 28, fol. 113c (under *Sed autem hoc*): « Bene ergo dictum est quod si non esset anima quod esset tempus utcumque, quia esset materialiter. Non esset tamen secundum suum formale complementum. Essent enim ipsa prior et posterius in motu ut sunt materialiter tempus, etiam si non esset anima ». Cf. Averroes: « Tempus igitur in actu non erit, nisi anima sit. In potentia vero erit licet anima non sit » (*In phys.*, IV, com. 131, fol. 202F).

¹⁵⁰) Though earlier reflections aligned Aquinas with Averroes's handling of the time-soul relationship, in his commentary he shifts to a new position: not motion but the now is the *utcumque ens* that affords time a mind-independent foothold in the physical world, for as a successive continuum, motion, like time, depends on the soul for its totality. « ... motus non habet esse fixum in rebus, nec aliquid actu invenitur in rebus de motu, nisi quoddam indivisibile motus, quod est divisio motus: sed totalitas motus accipitur per considerationem animae comparantis priorem dispositionem mobilis ad posteriorem ... tempus, non existente anima, est utcumque ens, id est, imperfecte; sicut et dicatur quod motum contingit esse imperfecte » (*In phys.*, IV, l. 23, n. 5). Giles's response to a *dubitaret* in the dialectic of the existence of time (see n. 9 above) seems somewhat like Aquinas's later view: time is physically founded not on motion but on the now, with perhaps an in-between-the-lines suggestion that the now is the *utcumque ens* of time. « Tempus fundatur in ipso nunc quod est principium unius partis et finis alterius. Licet ergo de tempore non sit nisi nunc et nunc non sit pars temporis, cum eo ipso quod est nunc tempus est, quia in ipso nunc fundatur ordo partium temporis, ex quo ordine partium tempus dicitur habere esse » (*In phys.*, IV, l. 18, fol. 98a (under *Adhuc autem omnis*). This formulation is repeated in *ibid.*, fol. 98d (under *In eadem quidem*): « ... intantum tempus est inquantum est ordo partium temporis. Et quia ille ordo fundatur in nunc, ideo ex hoc quod nunc est in quo fundatur ordo partium temporis dicitur tempus esse ... ». So far as I know, Giles does not return to this stress on the now as the physical foundation of time anywhere else in his discussion of time.

1. *Numerical unity.* Earlier in our dialectical portion we met with and dismissed the claim that there can be a plurality of simultaneous times. Here, we repeat, such a multiplicity of times is impossible ¹⁵¹). Unequal times can plainly coexist; a minute coexists with the hour that includes it. But two minutes, two segments of time that are equal, cannot coexist. If the two minutes are equal, if they are absolutely the same in every respect, then they are not really two but one span of time. Two times that are temporally indistinct from one another are really identical. Two different times that are in no temporal way different are really one and the same.

The unity of time is located in the motion of the first or outermost sphere ¹⁵²). In accord with the science of his day, Giles thought that the diurnal motion of the first heaven caused the circular motion of the whole firmament and affected the mutability of all natural things. Endowed with the most regular and all-influential revolution, the first heavenly sphere was properly named the *primum mobile*, the sovereign among mobile things. As primary, it is naturally qualified to serve as the primary seat of time.

Some confirmatory indicators of this concrete designation seems worth mentioning ¹⁵³). The opinion, rejected earlier, that identifies time with the heavenly sphere confusedly hints at the numerically one subject of time. Moreover, certain popular expressions about the cyclical behavior in living things and in human affairs support, or are supported by, this philosophic analysis. These instances of cyclical behavior reflect in a crude way the cyclical or circular motion of time itself.

Only in a modified sense can we speak of time as the measure of the primary motion ¹⁵⁴). From the angle of totality, time does not measure the primary motion, for it does not embrace the whole of the primary motion : «There was no time prior to that motion ¹⁵⁵). Each part of the primary motion, however, is contained and therefore measured by time. Time's role as measure is severely limited and appears somewhat defective only because of its peculiar relationship with the primary motion. As its

¹⁵¹) *In phys.*, IV, l. 18, fol. 99b (under *Amplius autem si*). See n. 14 above. *Ibid.*, l. 28, fol. 113d (under *Sed est nunc*).

¹⁵²) *Ibid.*, l. 28, fol. 113c-d (under *Dubitabit autem aliquid*). Also, *ibid.*, fol. 113d (under *Aut non omne*), and *ibid.*, fol. 114c-d (under *Propter hoc autem*).

¹⁵³) *Ibid.*, fol. 114c-d (under *Propter hoc autem*).

¹⁵⁴) *Ibid.*, fol. 114d.

¹⁵⁵) *Ibid.*: « Non enim fuit ante tempus quam esset ille motus ».

passio, as subjectified in the primary motion, time is a measure that turns out to be more dependent on what is measured than the measured on it ¹⁵⁶).

In any case, whatever the mensurational function of time vis-a-vis the primary motion, our definition is now expanded to full determination: time is the number of the primary motion. Giles goes so far that, strictly speaking, only primary motion is properly placed in the definition ¹⁵⁷). Time measures any particular motion only because every particular motion depends on the primary motion. The definition, we have seen, is given an even more particular determination by the erroneous astronomical knowledge of the day: time is the number of the primary revolution of the heavens.

Two additional comments may be in order. First, whatever its defects, medieval science cannot be taxed with being rigidly deductive and aprioristic. Recent cultivation of the history of medieval science has helped scotch a good many lingering elements of the old baseless prejudices about the alleged unempirical cast of the medieval mind ¹⁵⁸).

¹⁵⁶) This view echoes Averroes, *In phys.*, IV, com. 132, fol. 203L: «Tempus igitur sequitur hunc[primum] motum, et iste motus accipitur in definitione ejus. Et ipsum mensurat illum, non secundum quod numerus mensurat numeratum, sed secundum quod mensurat aliquid quod est forma in re. Alios vero motus mensurat secundum quod numerus mensurat numeratum scilicet secundum quod numeratum non accipitur in definitione numeri». On Averroes's reckoning, time does measure the primary motion in a special manner, whereas for Giles time does not measure the primary motion. Yet the discord may be somewhat more verbal than real. Giles admits the role Averroes deposes to time as regards the primary motion but declines to call this role mensurational. In other words he accepts the Commentator's analysis without accepting his looser signification of measure. If we add the feature of containment to Averroes's notion of measure (or what amounts to the same thing, if we subtract it from Giles's notion of measure), Giles's view essentially coincides with that of Averroes: because of its ultimacy, the primary motion is a privileged case to which time is singularly related.

Traces of the influence of this passage can be discerned elsewhere in Giles. Probably one odd use that Giles makes of the distinction between absolute or mathematical number and physical or numbered number owes its origin to Averroes. As mentioned earlier (see n. 52 above and the accompanying material in the body of the article), the time that numbers the primary motion is numbered number because time is materially identified with this motion (or, logically speaking, because the primary motion is included in the definition of time). But the time that numbers sub-primary motions is absolute or mathematical number, because time is not subjectified in them (or, from the angle of logic, these motions have no place in the definition). (See *In phys.* IV, l. 20, fol. 101d). Furthermore, this passage from Averroes very probably lies behind Giles's exclusion of all but primary motion from the definition of time (cf. the following note, n. 157).

¹⁵⁷) *In phys.*, IV, l. 28, fol. 113c-d (under *Dubitabit autem aliquis*).

¹⁵⁸) Growing side by side with the surprising intensification of scholarly interest in every aspect of medieval life and thought has been serious and sustained research into

As in other branches of natural science, its astronomical findings were solidly grounded on careful observations. Unfortunately, its empirical base was much, much too narrow. The telescope was still over three centuries away, and without its invaluable assistance the medievals could only count on the naked eye to compute and analyze the complex circlings of the heavenly bodies. The medievals had the will but not the way. The lack of the proper technology denied them the instruments for penetrating beyond the partly deceptive veil of astronomical phenomena. Second, no doubt the rise of modern science decisively overturning the view that the first sphere has the simplest and swiftest motion nullifies the last particular determination noted in the previous paragraph. Surely it is physically impossible for time to be the number of the primary spherical revolution in any ordinary sense. But the advance of modern science does not alter the prior determination: time remains the number of the primary motion, this motion being of course unspecified. Certainly also the overthrow of the old astronomy does not bear on the general definition of time as the number of motion according to the prior and posterior.

2. *Distinction from specific unity.* Existentially, time is numerically one, but quidditatively, it is specifically one ¹⁵⁹). Things are said to be specifically one which are identical in *ratio* or quiddity. Things are said to be numerically one which enjoy the same *esse* or being. Accidents find their oneness in the unity of their subject. A white wall, e.g., differs specifically from a black wall, but two whites, one in a wall, the other in a wooden stick, are specifically the same but numerically distinct. Taken quidditatively, time is number, and it is in its formal *ratio* that its specific unity consists. Taken existentially, time is one with motion, and it is in its material subject that its numerical unity lies. This is the sense in which we are to understand Aristotle's example of the sameness and difference of sevenness in seven dogs and seven horses. Seven dogs are concretely, physically different from seven horses, but the seven of the dogs is identical with the seven of the horses ¹⁶⁰). So seven posterior days differ as units of time from seven prior days, but the seven of the two remains the

medieval science. We need only instance here A.C. Crombie, *Medieval and Early Modern Science* (Anchor paperback; New York: Doubleday, 1959) and a bit later, William A. Wallace, *Causality and Scientific Explanation*, I (*Medieval and Early Classical Science*) (Ann Arbor: University of Michigan Press, 1972).

¹⁵⁹) *In phys.*, IV, l. 28, fol. 113d-114a (under *Aut non omne*).

¹⁶⁰) *Ibid.*, fol. 114a; and *ibid.*, fol. 114a-b (under *Si enim et*).

same. The specific unity of time is then rooted in its *unitas numeri* (not to be confused with its numerical or individual oneness) which we may here translate as its sameness insofar as it is number. But the numerical unity of time derives from the oneness or unicity of the primary motion in which it resides. Species is related to individuals, Giles adds, as form to matter. Time is specifically number and materially or individually motion. Hence time's specific unity springs from number, and its numerical unity arises from its subjectification in the primary motion.

The strength and consistency of this analysis, however, seem mortally threatened by a telling objection. Rather than being absolute number or the number whereby we number, time is numbered number or number applied to the physical world. In the language of the Aristotelian example, if time is like seven, it remains the same. But as numbered number it is like seven dogs or seven horses: this would mean, it seems, that time physically varies from subject to subject. In short, if time is numbered number, it cannot be numerically one. True, Giles replies, each numbered number is numerically or individually diversified in its various physical subjects, but it remains specifically the same number ¹⁶¹). Surely, he goes on, the seven in dogs differs from that in horses, but the difference is numerical or individual. The sevenness in this or that physical group remains specifically the same numbered number. Time remains specifically one and the same even when the various motions it numbers and measures are specifically different.

The analogy of time with number returns in the illustration of ten sheep and ten dogs ¹⁶²). The two groups of animals are identical as ten but not as sheep and dogs. Two logical principles are operative here. First, we do not differentiate species in the light of a remote genus; and, second, we do not differentiate individuals in the light of a proximate genus. Scalene and equilateral are not distinguished as figures — this they have in common, but are sorted out as different species of triangle. So man and lion are identical as ensouled thing but differentiated as species of animal. So in the case of the two sets of ten, the ten serves as a remote genus in reference to specific differences. Formally, in the light of ten, sheep and dogs are the same. Materially, in terms of ten embodied in animals, they are different. Physical number, Giles adds, carries with it a hint of the *species specialissima*, which is the last, or «atomic», i.e., not-further-

¹⁶¹) *Ibid.*, fol. 114a-b (under *Si enim et*).

¹⁶²) *Ibid.*, fol. 114d-115a (under *Dicitur autem recte*).

dividable, species in a descending physical chain¹⁶³). The entities to which number is applied are not able to be further differentiated.

The analogy fixes attention once more on the diverse formal and material faces of temporal unity, with perhaps a shade more stress laid on the material unity¹⁶⁴). As number, time shows no difference save in virtue of the matter or subject in which it resides; but unlike ten, which as physical number is multiple and varied in the groups to which it is applied, time is not pluralized in the multiple and various motions that it measures. A plurality of times is inadmissible, here for the new reason that several primary motions are impossible. Time is seated in the one and only primary motion. As the *passio* of this first movement, it strictly numbers it, and in virtue of numbering measures every other motion in the cosmos. Subjectively restricted to one special movement, time extends its mensurational hegemony throughout the cosmos. In virtue of the formal causality of mensuration, time is unique yet omnipresent throughout the length and breadth of nature.

3. *Specific unsatisfactoriness.* A certain vagueness still clings to the notion of the primary motion in the universe. For fear that we may throw out the baby with the bathwater; for fear that some may succumb to the temptation to brush aside pre-Galilean endeavors in physical analysis as pitiable mythologizing of the Dark Ages prior to the glorious Dawn of Science and Enlightenment; for fear that some may think that not to know all about time is to not know anything at all; it might be well to set down summarily our warranted knowledge of the unity of time. First, there can be only one time in nature. Two equal coexisting times, we have seen, reduce to one and the same time. Second, without pursuing the point with any rigor, let it suffice here to mention in passing that relativity theory does not annul any possibility of a unity of time. The translation, so to speak, of the particular data of one coordinate system into those of another coordinate system presupposes a common physical background or unity of time to which the local times of the diverse coordinate systems are commonly referred. Thirdly, though this is not the place to prosecute the inquiry, it can be demonstrated that in terms of the chain of physical efficient causes there has to be a primary motion within nature. In contrast to the Newtonian view of an absolute time disengaged from all observable process; in contrast to the view still potent in the popular and

¹⁶³) *Ibid.*, fol. 115a.

¹⁶⁴) *Ibid.*

educated scientific imagination that time is an abstract dimension or sovereign coordinate presiding over all change; time is, for Giles, imbedded in, concretized in the primary motion that causes all other motions. Hence the one time is virtually present as measure in all the motions caused by the primary motion. Time is the number of the primary motion in nature. But with this our assured knowledge is brought to an abrupt halt. Beyond this we cannot go. We reach a point of no advance. We cannot even take one provisional step forward. We lack even the slightest glimmer of what and where the primary motion might be in precise detail. To our *ignoramus* we are most probably safe in adding an *ignorabimus*: we do not know and most probably we will never know. Thus our account of time ends not with a period but with one large questionmark; this portion of our inquiry terminates in a baffling indetermination. Though our prior determinations are secure, a significant, unclosable gap in our knowledge of time remains. Some simple-minded academic souls, dupes of the softheaded empiricism and sociologicistic irrationalism of the day, mindlessly parrot the view that the glory of science consists in its being open-textured and open-ended. Openness undoubtedly sparks the start of an investigation, but as an inquiry draws to a finish, any serious thinker in any branch of learning who hungers after the hard answers we call truth does not exult in openness but reluctantly accepts it as a sign of defeat, a loss rather than a gain, a debit not easily erased. The terminus of Giles's account of time then leaves the contemporary inquirer with a sense of frustration. The desire to pinpoint the specific locus of the primary motion, to identify the cosmic clock, is, and will most probably always remain, unsatisfied.

Some Difficulties

However much we may want to dissociate ourselves from A. N. Whitehead's substance-denying organismic picture of the universe, anyone who has grappled over a period of years with the vexing problems of nature, especially that of time, will probably assent wholeheartedly to his poignant reflection: « It is impossible to meditate on time and the creative passage of nature without an overwhelming emotion at the limitations of human intelligence »¹⁶⁵). The cosmos is so vast and so

¹⁶⁵) A. N. Whitehead, *The Concept of Nature* (Cambridge: The University Press, 1920), p. 73. Cf. A. Cornelius Benjamin, « Ideas of Time in the History of Philosophy », in J. T. Fraser, (ed.), *Voices of Time*. (New York: Braziller, 1966), p. 8. Whitehead's

intricate, and our philosophic and scientific probings so paltry and coarse. The obvious facts of time especially seem to slip through the nets of our analyses, resisting systemization and nice coherence. Time also can easily entangle minds in a sticky web of inconsistencies. When trying to define time, Berkeley picturesquely wrote, « I am lost and embrangled in inextricable difficulties »¹⁶⁶). Even when we can clearly focus the general lines of the meaning of time, as in Aristotle's definition and its corollaries, we may still find ourselves dogged by paradoxes, troubled by imprecisions, and beset by frustrations springing from the seemingly endless job of fitting together all the muddy, loose ends of details into a clean consistent whole. It is not surprising then that some thorny difficulties apparently sprout from Giles's ordinarily deft and careful elucidation of the Aristotelian concept. His generally acute treatment seems somewhat marred by three major flaws and a number of lesser mistakes. The major difficulties involve paradoxes concerning the objectivity of time, instantaneous transmission, and temporal unicity. We shall merely list what seem to be less significant mistakes.

1. *Objectivity*. It seems legitimate to say that time, in its formal *ratio*, is number but materially subjectified in the continuum of motion. But in the significantly different question of the existence of time, the formal-material distinction seems inapplicable and breeds paradoxes. Time is independent of the soul or (in contemporary language) extramental, Giles tells us, because time is materially one with the physical reality that is motion, whereas its formal *ratio* is completed by mental acts¹⁶⁷). Time is soul-dependent: its *ratio* is achieved by

impoverished acquaintance with the history of philosophy, due probably to his late entrance into philosophy proper, probably explains in part his unfortunate persistent lumping of the understanding of substance and time characteristic of Newtonian physics with that of realistic natural philosophy. Thus he is led banish the instant from nature as a mere abstraction, a refined construct or being of reason (pp. 56-57). More curiously, his actualism or eventism tricks him into an absurdity of the crudest sort — the claim that the future may have actual physical existence here and now. We must look for the « creative force of existence », we are told, perhaps « in the unrealized future » and perhaps « in the future which might be as well as the actual future which will be » (p. 73). Even a quick reading of the whole chapter entitled « Time » (pp. 49-73) is doubly instructive: it shows how easy it is for even a first-rate mind to slip into elementary mistakes about time; and it confirms one in the perennial point and power of Aristotelian realism in analyzing issues in a fundamental natural concept like time.

¹⁶⁶) *The Principles of Human Knowledge*, para. 98, in *The Works of George Berkeley*, ed. George Sampson (London: Bell and Sons, 1908), I, p. 222. Cf. M.F. Cleugh, *Time and Its Importance in Modern Thought* (London: Methuen, 1937), p. 2.

¹⁶⁷) *In phys.*, IV, l. 28, fol. 113b-c (under *Sed autem hoc*). See nn. 143-147 above.

intentional acts. Time is also soul-independent: its formal *ratio* is founded on motion. Time is materially identified with motion; its *utcumque ens*, its bare physical reality, is motion in its prior and posterior parts. The formally constructed concept of time is materially based on the indubitable physical reality that is motion. Motion is undoubtedly a physical reality (and because of its linkage with motion, so is time also), but it is no less incontestable that motion, like time, is not grasped as a whole or all at once. Since it is successive, since it is a flowing continuum, motion is apprehended successively; one part is known after another. In short, taken as a whole, a motion also is known only by intentional acts, only by the completive activity of the soul. The posterior pole of the motion can be joined to the prior, already vanished pole only because the former pole is mentally retained. Thus motion in its totality is just as much a being of reason as time in its totality. We cannot locate the material foundation for the formality of time in a motion whose totality is equivalently formal. It seems self-defeating to look for a physically real ground for one being of reason in another similarly structured being of reason. A motion that is completely a being of reason in its totality cannot supply the physically real foundation for a time that is completely a being of reason in its totality.

2. *Instantaneity*. The mensurational unicity of the now underlies the instantaneous propagation of light and the instantaneous fall of a body *in vacuo*. Unhappily, the paradox of collapsing several instants into one instant cripples both arguments. Yet the two issues deserve distinct comments since for Giles the first occupies a region of fact and the second summons us to think the unthinkable, i.e., to ponder a pure hypothesis.

(i) The fact that the light emitted occupies diverse positions would seem to nullify instantaneous transmission¹⁶⁸). The several moments simply cannot be measured by one instant, even though this be primal. The analogy with time's measurement of a plurality of movements seems to hinge on an equivocal use of plurality. True, the time seated in the primary motion does measure a well-nigh innumerable set of physical motions; here we doubtless do have a single time measuring several different motions. But we must not let this plurality divert our eyes from the singularity at its core. At any juncture one segment of the numbered primary motion that is time measures all the other motions at once. Here the various motions, though diverse, betray a singularity — they occur at

¹⁶⁸) *Ibid.*, l. 27, fol. 111c-d (under *At vero prius*). See nn. 124-126 above.

the same position in cosmic history and are comprised under or measured by a single span of time. Thus a single interval of time measures a singular set of diverse motions. The motions occur just at this juncture : they are not strung out differentially, they do not occupy different segments of the time-line. They occupy only one, a singular time-span or segment of the cosmic time-line. The one time-segment at a certain juncture in cosmic history can measure only a certain span of diverse motions : it is a singular measure of a singular set of motions. So the one now at any juncture measures not a succession of *mutata esse* or moments but only a singular set of moments marking instantaneous changes in nature. At this moment, a man dies; at a corresponding moment, a child is conceived; at another corresponding moment protein is converted into tissue of the body. Each of these moments belongs to a singular set measured by a singular instant.

From our privileged vantage point it is comparatively easy to discern the paradox implied in one instant's encompassing several discretely strung-out moments. But it would seem historically obtuse to miss the pressures within the context of this subtle theorizing. Giles was striving to analytically justify what many in his day took to be the unassailable fact of instantaneous illumination. Lacking the wisdom of our hindsight, he was driven to construct an ingenious theory in which one instant somehow enfolded in its oneness discrete moments related as prior and posterior. Various nineteenth-century physicists who were tortured by the problem of the ether would have probably accorded him more than a little sympathy ¹⁶⁹). Because light shows wave qualities, physicists were led to assume understandably but falsely that light vibrating through empty space must have a medium in which its waves occurred : the luminiferous ether. If ether is a fluid, light waves are longitudinal. Polarized light, however, travels with a transverse wave motion. To reconcile and to save the phenomena some physicists went on to argue that ether is both a fluid and a solid. Thus schematized, the ether is absolutely rigid but absolutely

¹⁶⁹) Alexander Kolin, *Physics : Its Laws, Ideas, and Methods* (New York : Mc Graw-Hill, 1950), pp. 658-659. In *Theonas : Conversations of a Sage*, trans. F.J. Sheed (New York : Sheed and Ward, 1933), p. 63, Jacques Maritain picturesquely speaks of « the ether wherein the physicists used to put out their blackest contradictions to pasture... ». Edmund Whittaker, *A History of the Theories of Aether and Electricity*, I (*The Classical Theories*) (2nd. ed. : London : Nelson, 1951), pp. 279-303, examines in a sober, highly professional way the various mathematical-physical contrivances devised by physicists of the stature of W. Thomson, Kirchhoff, FitzGerald, and even the great Maxwell to explain « electric, magnetic and gravitational forces by the action of an intervening aether » (p. 279).

flexible. Maxwell's electromagnetic field theory opened the way for dispensing with the ether. With a sophisticated understanding of field theory and the discovery of the photon, ether has dropped out of the contemporary physical picture. It would be historically unjust and childish to sneer at or brand as fools the physicists who invented an ungainly ether. They were compelled to construct such a logically odd object to account for light-phenomena within the framework of an austerly mechanical model of nature that they took to be basically and impregably true.

(ii) Giles's heroic efforts to account for a hypothetical fall in a perfect vacuum turn out to be equally fruitless¹⁷⁰). Aside from the natural-philosophical truth that a perfect vacuum in the strict sense seems physically impossible, successive stages in the fall cancel out instantaneity. The impasse seems insuperable: if there is a succession marked by diverse moments, there cannot be only one instant measuring the entire fall. Succession betokens a plurality that is incompatible with a oneness of instant. On the natural level moment and instant are congruous: each moment is measured by a particular instant, and several moments, whether or not conceived apart from a track of motion, are respectively measured by several instants. Giles's very adroit claim that the now of time, which derives from the now of eternity, shares in the comprehensive character of the eternal now is voided by one major point of disanalogy: precisely as comprehensive, the now of eternity is utterly dissimilar from, and therefore imparticipable by, the now of time¹⁷¹). As eternal, the now of eternity measures the immutability of God. It is a *nunc stans* in the absolute sense; it is as unchangeable, as inevitably always the same as the divine immutability it measures. Because it is infinitely «standing» in its duration, the now of eternity embraces and comprehends in its stable unicity all inferior types of duration, all events, all instants, past, present, and future. As eternal, as transcending the whole of nature, the now of eternity is comprehensive. But the now of time is not transcendent but immersed in nature. It is a thing of nature that measures the *primum mobile* and, in virtue of it, all other mobiles and moments in nature. Though one in itself or *secundum rem*, though subjectively self-identical, the now of time is unceasingly diverse, inevitably other *secundum rationem* according to the continuous course of

¹⁷⁰) *In phys.*, IV, l. 27, fol. 111c-112c (under *At vero prius*). See nn. 126-136 above.

¹⁷¹) *Ibid.*, l. 25, fol. 108b (under *Mensurabit autem tempus*). See nn. 87-89 above.

the *primum mobile*. The self-identity of the temporal now is analogous to the self-identity of the eternal now; its subjective stability shares in the absolute stability of the eternal now. But its otherness *secundum rationem*, an otherness rooted in the mobility of natural things, annuls any possibility of a sharing by the now of time in the comprehensiveness of the now of eternity, a comprehensiveness rooted in the transcendent immutability of God.

As in the demurrals with regard to instantaneous illumination, strictures passed on Giles here have to be reserved and soft-voiced. Giles considered a fall in a perfect vacuum impossible, but permitting this impossible thing to be possible ¹⁷²), mulling over a fall *in vacuo* as a pure hypothesis, he attempted to construct the general lines of its analytical justification. No doubt he failed but he did not fail miserably. We can only admire the power of his conceptual imagination in appealing to the comprehensiveness of the eternal now as a model for participation, according to which the one now of time can encompass a succession of moments without sacrificing its unity and without blotting out the plurality of moments. Caught in what he called a veritable labyrinth, he merits credit for the virtuosity he brings to bear in trying to escape from a maze that, in fact, has no exit. If we inadvertently isolate the problem from its actual historical context, we may feel disturbed and upset by the spectacle of a prodigal expenditure of logical acuity netting only what seem to be freakishly illogical dividends. Torn out of its concrete setting, Giles's magnificent maneuvering may appear to generate only an immense muddle. But sympathetically situated within the limits of his inquiry, Giles's carefully hedged conclusion is the outcome of a dexterous, fine analysis that is rendered ultimately unacceptable by the severe curbs implicit in asking impossible questions and in hunting for ways to reconcile irreconcilables.

3. *Temporal unicity*. The extension of the formal-material distinction to the domain of unicity also seems somewhat misguided. Time is specifically one, Giles insists, because it is formally abstract number, whereas it is individually or numerically one in the material sense, through its subjective identity with the primary motion ¹⁷³). The

¹⁷²) *Ibid.*, l. 27, fol. 112c (under *At vero prius*): « Tamen si tale impossibile poneretur, sequeretur quod essent aliqua mutata esse non reducta in motu caelesti... ». See n. 135 above.

¹⁷³) *Ibid.*, l. 28, fol. 113d-114b (under *Aut non omne* and *Si enim et*). See nn. 159-160 above.

oneness of time is remarkably comparable to the detachment and applicability of the number seven to physical objects. But Giles presses this analogy too far, so far that he is hobbled and trapped by it. To the deadly objection that he seems to be turning time into abstract number rather than keeping it numbered or physical number, Giles replies that time is numbered number as imbedded in the primary motion, but is numbering or abstract number in its measurement of all other motions in nature ¹⁷⁴). But this attempt to square a formal unity rooted in time or abstract number with time as numbered number issues in two inconveniences. First, if time is physical number subjectified in the primary motion, and if it is in virtue of its residence in the primary motion that it measures other diverse motions, it is inconsistent to transform it into abstract number in its application to other diverse motions. If time as numbered number in the primary motion is applied to other diverse motions, it cannot become abstract number in its very mensurational application, for it is precisely as physical number that it is applied to other motions. Second, a time that becomes formally abstract number in its measurement becomes formally mathematicized; as strictly mathematicized, it cannot be a physical entity. Here as elsewhere Giles's near-automatic resort to what has become for him an all-answering formal-material leitmotif lures into inconsistencies. In fact, time is formally numbered number, and therefore formally, and not merely materially, time is numerically one. As physical or numbered number, time resides in the numerically one primary motion. In virtue of this numerically one primary motion, it measures all the dazzling diversity of motions in the cosmos. Formally causative throughout nature, inevitably present wherever there is motion, it remains formally the numerically one and the same time.

4. *Minor difficulties.* We need devote no more than a word or two to five minor points of dissatisfaction.

(i) It sounds odd to maintain that time numbers the primary motion but does not strictly measure it ¹⁷⁵). The *ratio* of measure is found *per prius* in number; number is the first analogate in which measure is verified. Or, in terms of implication, what numbers a thing must, in a second stage, measure it. Giles's reluctance here is somewhat understandable, since, for some, a measure as such is superior to what it

¹⁷⁴) *Ibid.*, fol. 114a-b (under *Si enim et*). See n. 162 above.

¹⁷⁵) *Ibid.*, fol. 114d (under *Propter hoc autem*). See n. 164 above.

measures. But surely the relationship of time to primary motion is a unique case; and while the role of time as measure may suggest superiority, the fact that time is a *passio* of the primary motion insures a subjective superiority for the primary motion, within the framework of which the measurational superiority of time is only relative, because subordinate and ancillary. (ii) The now as never-changing is said to be *secundum rem* and the now as ever-changing is said to be *secundum rationem* ¹⁷⁶). This terminology seems awkward and potentially misleading, since it plants the linguistic germ for the idea that the now is really always the same while it is pluralized not really but only intentionally by operations of the soul that actualize the nows as numbered. This inadequate language indeed produces a puzzle that Giles grapples with but, within the frame of this somewhat gauche terminology, he finds himself unable to solve: how can the *ipsum mobile* be other *secundum rationem* yet its parts be really (*realiter*) distinct ¹⁷⁷). (iii) A thing and its activity are subject to different measures (the now measures a substance and time its motion), but, we are told, one and the same measure, namely, time, measures motion as *actus mobilis* and its *esse* (its spreadoutness in prior and posterior parts) ¹⁷⁸). Yet the homogeneity of measure and measured, a criterion that Giles curiously invokes to substantiate this claim, demands that the *actus mobilis*, as indivisible, be measured not by time but by the indivisible that is the now. Taken apart from its subjectivity in the continuum of magnitude, the *actus mobilis* is equivalent to a *mutatum esse* or moment to whose measurement the now is necessarily appointed. One inductive step in the build-up of the concept of time expressly makes the point that time emerges not from motion as *actus mobilis* but from motion as continuum, motion as marked (extrinsically to the strict definition of motion) by prior and posterior phases. Time numbers and measures motion *secundum esse*, according as it is a continuum, but the similarity of indivisibles calls for the measurement of motion as *actus mobilis* by the now. (iv) Giles seems to vacillate a bit on the question of the per se corruptive influence of time. *Ratione sui* it corrupts only incidentally but *ratione motus*, we are told, it is a per se corruptive cause ¹⁷⁹). However, it seems that since time is physical

¹⁷⁶) *Ibid.*, l. 21, fol. 102a-d (under *Sequitur enim sicut* and *Ratione autem aliud*). See nn. 99-104 above.

¹⁷⁷) *Ibid.*, l. 23, fol. 104d (under *Et idem autem*).

¹⁷⁸) *Ibid.*, l. 24, fol. 106b (under *Et est motui*). See n. 80 above.

¹⁷⁹) *Ibid.*, l. 27, fol. 111a (under *Quod quidem igitur*). See n. 96 above.

number, i.e., number applied to and imbedded in motion, it exhibits no features *ratione sui* except in union and connection with motion. In short, for the very reason it is per se corruptive in the line of the formal cause *ratione motus*, it has to be also designated per se corruptive *ratione sui*. (v) Giles seems too severely restrictive in maintaining that only primary motion comes under the definition of time ¹⁸⁰). This exclusivism would seem to conflict with the claim that in perceiving and knowing any motion, we perceive and know time. Worse, it would seem to imply that only those acquainted with the primary motion — a very small percentage of the earth's population — are able to achieve a concept of time. Surely even savage tribesmen capable of distinguishing days and weeks and months are equipped with a sound, however primitive and philosophically unarticulated, notion of time. It might be more accurate then to say that the definition is said primarily of the primary motion yet secondarily and really also of all the other motions in nature.

Summary

Dialectic. (1) The nonexistence of its parts apparently cancels the existence of time. The present taken as an interval overlaps both past and future; and by definition neither past nor future can claim actual physical existence. Again, the now, the supposed unit of time, seems self-contradictory. Viewed as pluralized, it has to be absurdly generated and corrupted. Viewed as unchangingly one, it remains the single instant in which, incredibly, all events in time occur. (2) The dialectic of the nature of time tries and finds wanting two opinions, whose examination and rejection pave the way for the induction of time. (i) A first opinion identifying time with the motion of the heaven issues in two inconveniences: a part of a circular motion would be equivalent to the whole motion; and, given the hypothesis of several heavens, there would be several parallel times — an impossibility. (ii) A second opinion identifying time with the heavenly sphere is vitiated by a crude error in formal logic and a gross equivocation.

Definition of time. (1) Time is neither wholly identical with nor separable from motion. Time differs from motion: it is ubiquitous and uniform whereas motion is always specified and fast or slow. On the other hand, we have no awareness of time without an awareness of motion. (2) Time, while not the same as motion, is *aliquid motus*, something

¹⁸⁰) *Ibid.*, l. 28, fol. 113c-d (under *Dubitabit autem aliquis*). See n. 157 above.

intimately connected with motion. Sharpened and specified, time as *aliquid motus* yields the definition in three steps. (i) Time is related to motion as motion to magnitude; time is a derived continuum. (ii) Time follows not upon motion as such but upon motion stamped with the prior and posterior. (iii) Time is the number of the prior and posterior in motion. We become fully aware of time at the moment we number the prior and posterior as two *nows*. (3) Time is numbered number; it is applied or physical number, i.e., number as applied to motion in its prior and posterior phases. (4) The chief attribute of time flowing from the definition is its role as measure of motion. (5) In addition, because it is joined to a corruption-oriented motion, time is said to be a cause of corruption; but a cause in the line of measure, i.e., a formal cause.

Meaning of the now. (1) Comparison with a mobile thing reveals that the now stays the same *secundum rem*. The now is to time as a mobile thing is to motion; like the one mobile thing persisting throughout change, one now perdures throughout time. (2) Yet differently viewed, the same comparison throws light on the variability of the now. A mobile thing passes through several places in its motion, so that *secundum rationem*, i.e., according to the *ratio* of place, it shows itself successively other. The now that remains one and the same *secundum rem* also shows itself successively other and different *secundum rationem* in the course of time. (3) To consider the now *secundum rationem* is to consider it *secundum esse diffinitivum*. (i) The now may be defined, first, as the formally other unit or subject of time. From a slightly different standpoint, it is the diversity of the *nows* that constitutes the number that is time. (ii) The now may be defined, secondly, as the number of time. (iii) We may define the now, thirdly, Giles suggests, as the unity-of-the-number of a mobile thing. (4) In addition, because it is intrinsically more knowable, the now is the measure of time. (5) In the instantaneous transmission of light one and the same instant measures the diverse moments marking the diverse places in the transmission of light. Similarly, in the purely hypothetical case of the instantaneous fall of a body in a vacuum the one instant functioning as a comprehensive measure can encompass a succession of positions and instants.

Existence of time. Time is both dependent upon and independent of the soul. (1) As number, time cannot exist apart from the soul; for if a soul capable of numbering cannot exist, no number can exist. (2) But time also has physical reality independent of the soul insofar as it is one with motion. Formally, as number, time depends on the soul, but materially, as imbedded in motion, time can exist apart from the soul.

Unity or unicity of time. (1) Because it is rooted in the one or unique primary motion, time is numerically one or unique. Thus, strictly speaking, time is the number of the primary motion. (2) Existentially, time is numerically one, but quidditatively, it is specifically one. Time's specific unity arises from its formal character of number whereas its numerical unity is rooted in its residence in the primary motion.

Some difficulties. Giles's views on the objectivity of time, instantaneous transmission, and temporal unicity seem to land him in paradoxes. (1) The physical reality of time cannot be materially grounded in motion because motion, like time, is successive; and as successive, it can be grasped as a totality only by intentional acts of the soul. (2) The claim that a single instant can measure a plurality of moments (just as the one time measures a plurality of motions) relies on an equivocal use of plurality. In their measurement by time the diverse motions are a singular set occurring at one juncture. But Giles mistakenly has a singular instant measuring moments strung out differentially rather than as members of a singular set. Again, unlike the transcendent now of eternity, the now of time is unceasingly other and hence cannot serve as a comprehensive measure. (3) It seems incongruous to regard time in the primary motion as numbered number but turn it into numbering number in the application of time to sub-primary motions. (4) Finally, a few additional remarks canvass difficulties in less substantive areas.

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