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Résumé de l'article

Nous considérons ici le développement de la notion de quantité physique continue, d'Aristote à Thomas d'Aquin à Suarez. Nous concluons que la définition d'Aristote en termes de divisibilité ne parvient pas à dégager le noyau ontologique de la quantification matérielle. Encore que le germe fondamental de la solution au problème soit découvert par Thomas d'Aquin, c'est Suarez qui articule pleinement l'essence de la quantité physique continue, grâce à son concept explicite d'extension « aptitudinale » — dont les implications théologiques sont cruciales.

# AQUINAS AND SUAREZ ON THE ESSENCE OF CONTINUOUS PHYSICAL QUANTITY

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*RÉSUMÉ : Nous considérons ici le développement de la notion de quantité physique continue, d'Aristote à Thomas d'Aquin à Suarez. Nous concluons que la définition d'Aristote en termes de divisibilité ne parvient pas à dégager le noyau ontologique de la quantification matérielle. Encore que le germe fondamental de la solution au problème soit découvert par Thomas d'Aquin, c'est Suarez qui articule pleinement l'essence de la quantité physique continue, grâce à son concept explicite d'extension « aptitudinale » — dont les implications théologiques sont cruciales.*

*ABSTRACT : The development of the notion of continuous physical quantity is traced from Aristotle to Aquinas to Suarez. It is concluded that Aristotle's divisibility definition fails to excavate the ontological core of material quantification. Although the basic germ of the solution to the problem is discovered in Aquinas, it is Suarez who fully articulates the essence of continuous physical quantity with his explicit concept of aptitudinal extension — which has crucial theological implications.*

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Rival philosophical schools compete on the nature of physical quantity. At one extreme, the Ockhamist position relegates such quantity to the status of an intrinsic mode of material substances and their sensible qualities ; for the Nominalists in general, quantity denotes no real entity in itself, but merely connotes a perspectival aspect of substances and sensible qualities, obliquely naming their co-relational condition. At the other extreme, the Cartesian position endows such quantity with so much entitative density that local extension serves as the essence of material substance, while sensible accidents are consigned to the level of mere modes of extended things. Both camps, although diametrically opposed in their views on the character of physical quantity, share a common denial that such quantity constitutes a unique category of material reality. The Ockhamist school, while retaining the distinct categories of physical substance and their ontological accidents of sensible qualities, entirely eliminates quantity as a distinct category of being. Correspondingly, the Cartesian school, by reducing material substance to *res extensa* and thereby elevating physical quantity to a virtual identification with material substance, conflates the two categories. At stake here is the reality of physical quantity as a category of being truly

distinct from material substance, from sensible qualities, and from other accidents (particularly place). Theological ramifications also arise (especially for Eucharistic metaphysics). Can a philosophically viable middle course be traveled to steer clear of these contrary views ?

We must emphasize at the outset that we are confining ourselves to the field of philosophical cosmology ; hence, we intend to consider *only* physical quantity — not mathematical quantity, which can exist formally as such merely as an ideal abstraction in the mind.<sup>1</sup> In addition, we even exclude discrete physical quantity (a real plurality of material things subject to a standardized unit of enumeration), focusing on continuous physical quantity alone. Lastly, we prescind from continuous physical quantity insofar as it is successive (such as time and its basis in motion), fixing our attention almost solely on continuous physical quantity *qua* abiding or relatively permanent (hence a “static” feature of bodies). More on these distinctions later.

It seems that the topic of continuous physical quantity can fruitfully be examined only after the central hylomorphic doctrine of material substance has been established.<sup>2</sup> Indeed, Aristotle pursues this order of investigation in the *Categories*, where a chapter on quantity immediately follows his discussion of material substance. Even in the philosophical lexicon of *Metaphysics* Δ, quantity is treated as the first predicament after a somewhat earlier exposition of substance. Moreover, Aquinas refers to quantity as consequent upon matter,<sup>3</sup> and Suarez devotes two of his *Metaphysical Disputations* to quantity after an encyclopedic account of substance (including matter and material substance). Finally, in the thought of all three men, quantity turns out to be the proximate foundation for the remaining attributes of material substance.

Because these philosophers recommend an order of exploration eminently conducive to logical development, we shall undertake our own inquiry within the historical framework that they built. Thus, we shall commence with the ancient background pioneered by Aristotle, and thence proceed to Thomas Aquinas and Francisco Suarez (two of the greatest representatives of the Scholastic tradition in Medieval philosophy). We aim to demonstrate, with their competent assistance, that continuous physical quantity is a genus that is philosophically intelligible and really distinct from the category of substance as well as from the other accidental categories (particularly place).

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1. See AQUINAS' *Commentary on De Trinitate of Boethius*, q.5, a.1, c, in *The Division and Methods of the Sciences*, trans. Armand Maurer, Toronto, PIMS, 1963, p. 8 : “[...] there are some things that, although dependent upon matter for their being, do not depend upon it for their being understood, because sensible matter is not included in their definition. This is the case with [...] the kind of objects with which mathematics deals.” Also, q.5, a.3, c, p. 31 : “And abstract objects of this kind are the concern of mathematics ; it treats of quantities and the properties of quantity, such as figures and the like.” In addition, cf. *Summa Theologiae*, I, q.85, a.1, ad 2.
  2. See David P. LANG, “The Thomistic Doctrine of Prime Matter”, *Laval théologique et philosophique*, 54, 2 (June 1998), p. 367-385.
  3. Cf. AQUINAS' *Commentary on Aristotle's Physics*, III, trans. Blackwell, Spath and Thirlkel, London, Routledge & Kegan Paul, 1963, lect.5, n.322, where Aquinas derives in a schematically logical manner Aristotle's ten categories. At one point he asserts that “quantity properly follows upon matter”.

Furthermore, granted that a material thing *must* be somehow quantified (lest it be some sort of spiritual entity), in what sense(s) must it be quantified ? What precisely are the absolutely minimal requirements for a body insofar as it is receptive to quantification ? What are the limiting possibilities of corporeality *per se* within the category of quantity — the ontological boundaries that cannot be transgressed without invading the realm of purely spiritual being ? In short, what is the bare essence of continuous physical quantity ?

## I. ARISTOTLE

Aristotle achieves an unprecedented philosophical advance in his insights about continuous physical quantity. Nevertheless, in the end (as we shall see) he does not succeed in fully plumbing the depths of its essence, because some key notions that he discovers to resolve the problem are insufficiently integrated, leaving too many unanswered questions.

First of all, in his *Categories* Aristotle never attempts to furnish an essential definition of physical quantity, but is content with a more superficial description. The relevant Chapter 6 begins with a classification of quantity into the discrete and the continuous,<sup>4</sup> which are discussed in turn.

Discrete quantity consists of parts having no common boundaries ; rather, the parts “are always separate”. Examples include numbers and vocal utterances.<sup>5</sup> Perhaps “numbers” encompass numbered entities.

Continuous quantity is composed of parts joined completely at common boundaries.<sup>6</sup> In *Physics* V, Aristotle elaborates, subsuming the continuous under the contiguous as a special case. For two things to be contiguous, it is simply required that they be ordered in such a way that they touch ; in other words, their adjacent boundaries do not necessarily merge, but may preserve their actual distinctiveness. Something is called continuous, however, when its parts are contiguous in such a way that any sequential boundaries really meld into a shared indistinguishable border ; i.e., “the touching limits of each become one and the same and are [...] contained in each other : continuity is impossible if these extremities are two”. Thus, “continuity belongs to things that naturally in virtue of their mutual contact form a unity”.<sup>7</sup> So continuity entails contiguity which involves ordering of parts, but the converse implications do not hold, for mere order of parts does not oblige contact nor does tactile togetherness demand fusion or conjunctive unification.<sup>8</sup> Important instances of

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4. *Categories*, 6 : 4b20 (p. 14). Note : All page references to ARISTOTLE's texts are taken from Richard MCKEON, ed., *The Basic Works of Aristotle*, New York, Random House, 1941.

5. *Cat.*, 6 : 4b23, 25-36 (p. 14).

6. *Cat.*, 6 : 5a1-2 (p. 14). The denial of real physical continua would mean that all bodies, even down to the subatomic domain, contain interstitial spaces ; this would entail an endless regress resulting in no bodies at all.

7. *Physics*, V,3 : 227a9-15 (p. 307).

8. *Phys.*, V,3 : 227a17-27 (p. 307-308).

continuous quantities are lines, surfaces, solids, place (or space — both terms are used), and time.<sup>9</sup>

Since the definitions of discrete and contiguous quantity are mutually exclusive, Aristotle does wind up producing an exhaustive division from both texts taken together. But, from another angle, it would seem that the mere touching of actually demarcated parts is incidental, so that contiguous wholes as such could be aptly assimilated with discrete quantities. To the degree that a contiguous whole is composed of more basic continuous parts, a more appropriate exhaustive classification would then be the one with which Aristotle begins *Categories* 6 : namely, discrete versus continuous quantities.

Another dichotomy Aristotle mentions arises from quantities consisting of “parts which bear a relative position each to each, or of parts which do not”. The former class consists of quantities that are both continuous (or at least contiguous, more generally) and abide. The latter class contains quantities that are either discrete or else continuous with parts lacking an “abiding existence”. Here, where it is a question of countable pluralities or speech or time (as opposed to solids and space), only a priority of order can be distinguished.<sup>10</sup>

Aristotle declares that all the types of quantity delineated above, and only these, are strictly speaking quantities *per se*, whereas certain aspects of other predicamental realities (such as the magnitude of some surface quality or the duration of some action) are not intrinsically quantitative, but at most denominated quantities in a reductive, secondary sense.<sup>11</sup> Nevertheless, he himself seems to conflate categories when he imports a relation to place (external reference to other bodies) or position (internal orientation of parts) to aid his explanation of the nature of continuous quantity — thereby leading us to wonder whether the predicaments of place and posture remain distinct or whether they have been absorbed as species of quantity. Perhaps location and situation, while generically diverse from quantity, serve a peculiar role as specific differences for demarcating continuous quantity from discrete quantity.

Aristotle argues at some length that quantities (like substances) have no direct contraries. If someone objects that “large” and “small” involve such extreme opposition, Aristotle proffers the cogent rejoinder that these terms are purely relative. Nothing is large or small absolutely. Indeed, Aristotle clarifies his thesis by reminding us that he is not concerned with an “external standard”, by reference to which a quantity can vary in its magnitude depending on the rule of measure or time of comparison. Otherwise, a quantity would be simultaneously larger and smaller than itself, if we were to view it from different perspectives.<sup>12</sup> No, Aristotle is clearly talking about “definite quantities”, whether particular dimensions or determinate corporeal

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9. *Cat.*, 6 : 4b24, 5a1-13 (p. 14-15).

10. *Cat.*, 6 : 5a15-37 (p. 15).

11. *Cat.*, 6 : 5a38-b10 (p. 15-16).

12. *Cat.*, 6 : 5b11, 14-26, 28-6a1, 6a2-10 (p. 16-17).

magnitudes.<sup>13</sup> Concisely put, “A man may contend that ‘much’ is the contrary of ‘little’, or ‘great’ of ‘small’, but of definite quantitative terms no contrary exists.”<sup>14</sup>

Quantity shares another characteristic with material substance, for neither admits of variation of degree. No determinate brand of quantity is more truly precisely that quantity than another,<sup>15</sup> just as no kind of substance is more or less that kind than another member of the same species.<sup>16</sup> This statement is not true of quality, which *can* vary in intensity at different times within the same subject or at the same time with regard to diverse subjects.<sup>17</sup>

Nevertheless, quantity differs from substance in a major respect. Aristotle declares, “The most distinctive mark of substance appears to be that, while remaining numerically one and the same, it is capable of admitting contrary qualities.”<sup>18</sup> No other mode of being can claim this ability.<sup>19</sup> He repeats that “one and the self-same substance, while retaining its identity, is yet capable of admitting contrary qualities.”<sup>20</sup> Although “substance is capable of admitting contrary qualities”<sup>21</sup>, he intones yet again, this “capability is found nowhere else”.<sup>22</sup> We are forced to conclude, according to Aristotle’s asseverations, that quantity is naturally incapable of admitting contrary qualities. (This is problematic. Perhaps he means that contraries ultimately reside in the substantial subject, never being rooted in a magnitude as such.) It follows that quantity cannot be identified with substance, and hence constitutes a distinct category of reality. In particular, it is a predicamental accident of material substance. This thesis assails the Cartesian enterprise of reducing material substance to quantitative extension (see *Principles of Philosophy* I,53 ; II,4-11).

Corroboration that Aristotle repudiates this mechanist reduction is found in passages of the *Physics* and *Metaphysics* where he unequivocally proposes exactly four types of change : in substance, quantity, quality, and place.<sup>23</sup> Obviously, if quantitative change is other than substantial change, it must belong to the genera of accidental changes. At any rate, physical quantity cannot be equated with material substance.

Additional texts in other Aristotelian works lead to the same result. In *On Generation and Corruption*, Aristotle shows that the quantified as such or quantity-in-general never comes to be. Rather, what is realized by growth is always material substance *qua* subject to definitely increased magnitude. In other words, through vital

13. *Cat.*, 6 : 5b11-13, 27 (p. 16).

14. *Cat.*, 5 : 3b30-32 (p. 12).

15. *Cat.*, 6 : 6a19-25 (p. 17).

16. *Cat.*, 5 : 3b32-38, 4a5-9 (p. 12-13).

17. *Cat.*, 5 : 3b39-4a4 (p. 12-13).

18. *Cat.*, 5 : 4a10-12 (p. 13).

19. *Cat.*, 5 : 4a13-17 (p. 13).

20. *Cat.*, 5 : 4a17-19 (p. 13).

21. *Cat.*, 6 : 6a1-2 (p. 16).

22. *Cat.*, 5 : 4a21 (p. 13).

23. Cf. *Phys.* III,1 : 200b33-201a6 (p. 253) ; *Phys.*, V,2 : 226a24-25, 30-32 (p. 305) ; *Metaphysics*, XII,2 : 1069b9-13 (p. 872-873).

augmentation “a matter accedes” which is potentially living bodily tissue and which “also potentially possesses determinate quantity”.<sup>24</sup> Since substance *is* generated *per se*, it cannot be identified with its quantity.

Further support comes from *Metaphysics* Zeta 3, where Aristotle boldly asserts that “length, breadth, and depth are quantities and not substances (for a quantity is not a substance), but the substance is rather that to which these belong primarily.”<sup>25</sup> No statement could be more transparent, as well as more challenging to mechanism: continuous physical quantity is merely an accident of material substance and not its very essence.

Thus far we have been engaging primarily in an exercise of “negative quantology”: we have learned from Aristotle what quantity is *not*. Now we must try, in a more positive vein, to discover what quantity *is*. Aristotle maintains that the “most distinctive mark of quantity is that equality and inequality are predicated of it”, and this characterization is unique to quantity.<sup>26</sup> This feature is an interesting property applicable to all quantity (whether mathematical or physical, discrete or continuous), but we have still not captured the essence of physical quantity *qua* physical.

But a crucial definition awaits us in the opening sentence of *Metaphysics* Δ 13. There Aristotle lays down the principle that a “quantum” (which signifies a concrete quantified thing) is “that which is divisible into two or more constituent parts of which each is by nature a ‘one’ and a ‘this’”.<sup>27</sup>

Aristotle undoubtedly intends to capture the generic essence of quantity here, and not to adduce merely a “distinctive mark” or property, as in *Categories* 6. The key-notes of his formula are divisibility, multiplicity of composition, and parts which are naturally separable into entities that can exist in their own right. In order to isolate the essence of continuous physical quantity, though, we need a further specification of this divisibility-into-integral-parts, so that the result is what we intuitively expect an unbroken magnitude to mean.

Indeed, a positive clue in this direction is suggested in the last book of the *Physics*, where Aristotle supplies the tantalizing hint: “... what is of a certain quantity extends itself over a certain space unless something prevents it”.<sup>28</sup> Here the useful notion of *extension* makes an early manifestation in the history of cosmology, eventually provoking interminable controversy. For one thing (important in the sequel), “extension” is bi-valent: it may connote either actual location or merely an inherent tendency to occupy a place (an inclination that could be hindered). At any rate, the category of place enters the scene to inform divisibility-into-integral-parts with more specific content.

24. *On Generation and Corruption*, I,5 : 322a16-21, 29-30 (p. 491).

25. *Metaphys.*, VII,3 : 1029a14-16 (p. 785).

26. *Cat.*, 6 : 6a26-35 (p. 17).

27. *Metaphys.*, V,13 : 1020a8-9 (p. 766).

28. *Phys.*, VIII,4 : 255b23 (p. 366).

The remainder of the chapter *Metaphysics* Δ 13 mostly recapitulates, rather briefly, the doctrine of *Categories* 6. The familiar initial subdivision of quantified things is now exhibited under the rubrics of a “plurality” and a “magnitude”. The former is “that which is divisible potentially into non-continuous parts”, and hence is discrete or “numerable” (which would appear, from a certain vantage point, to subsume a merely contiguous whole). The latter, in the strict sense, is “that which is divisible into continuous parts”, and is thus “measurable” rather than countable.<sup>29</sup>

Nevertheless, there are some slight alterations or idiosyncratic variations here on the theme of the classification system proposed in *Categories* 6. Aristotle retains the basic concept of the intrinsically quantified, but now makes the relatively opposed terms (such as “much and little”), which had been adamantly banished from functioning in the role of contrariety, into “modifications”, “states”, and “attributes” of quantities themselves. Of course, this addition in no way contradicts his previous teaching. When the realities of movement and time crop up, though, Aristotle somewhat lowers their status to incidentally quantified facets, because the space on which they depend is a continuous quantity in itself (and not only the divisible material substance moving through that space). Therefore, time is no longer put on a par with space, as it seemed to be in the earlier context. The primary continuously quantified things are, consequently, material substance and space, whereas the secondary ones are local motion and time.<sup>30</sup>

It appears that Aristotle has unearthed most of the major ingredients for explicating the essence of continuous physical quantity. They are, however, not adequately interwoven into a clearly coherent complex. How do divisibility and spatial extension relate to each other? Is one of them more fundamental than the other? If so, which one, and why? Can spatial extension itself be further analyzed? What exactly is the role of the category of place in understanding the category of physical quantity, and how crucial is the notion of place? We are left with many such questions, for which the Stagirite fails to provide the answers. We depart the illustrious Greek philosopher, pondering whether or how divisibility and spatial extension pertain to the essential core of a singular physical substance *qua* continuously quantified.

## II. AQUINAS

We shall see that St. Thomas does penetrate more profoundly than Aristotle the essence of continuous physical quantity. Unlike Aristotle, who is preoccupied with the divisibility description (while not entirely neglecting the notion of extension), Aquinas seems to achieve greater success by concentrating more of his attention on dimensive extension. For him divisibility is subsequent and secondary to dimensive extension. Nonetheless, within the conceptual domain of extension, Aquinas’ principal breakthrough is present only implicitly or germinally via his broadened revision

29. *Metaphys.*, V,13 : 1020a10-13 (p. 766-767).

30. *Metaphys.*, V,13 : 1020a14-32 (p. 767).



in the meaning of accidental inherence. But a fully explicit treatment awaits the mind of Suarez.

Perhaps the best spot to pick up Aquinas' treatment of quantity is his commentary on the text of Aristotle where we just left off: i.e., *Metaphysics*  $\Delta$  13. In analyzing Aristotle's definition of the quantified as "what is divisible into constituent parts", Thomas provides two additional elucidations. First, the quantitative as such excludes the kind of division found in a mixture whose elements are so inextricably dissolved that they are no longer "present in it actually, but only virtually". Thus, mere division is not solely involved here, but also a qualitative change or an "alteration". Second, the constituent parts must be naturally singular, demonstrable entities, thereby eliminating the metaphysical "division" of a thing into its substantial "parts" of matter and form.<sup>31</sup> Hence, a chemical compound has such complex unity that it surpasses the scope of the essence of quantification, whereas a hylomorphic composite taken alone has such simple unity that it falls short of admitting quantification (under the divisibility criterion). Evidently, both extremes must be avoided, according to Aquinas' nuanced exegesis of Aristotle's formulation.

The classification of quantity into the major broad groupings of "plurality or multitude" and "magnitude or measure" is a straightforward review of the discrete and continuous that we have already discussed.<sup>32</sup> Similarly, the distinction between the essentially and the accidentally quantitative needs little comment. Thomas, however, does observe the discrepancy between Aristotle's handling of place, motion, and time in the *Categories* versus the *Metaphysics*. He easily explains the disparity, though, because in the *Categories* Aristotle regards place and time from the viewpoint of logic as essentially different species of quantity due to their diverse manners of measuring a magnitude, whereas in the *Metaphysics* he focuses totally on their being as derived from (or dependent upon) quantity and thus just incidentally quantified. Since motion is not a measure at all, Aquinas deems it (along with time) as "subsequently" quantified, receiving its character from the space through which a continuous subject passes.<sup>33</sup>

Some passages of Aquinas approach physical quantity from the perspective of divisibility and others incorporate the theme of dimensionality (which seems to play the role of extension in space). We commence with propaedeutic remarks.

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31. AQUINAS' *Commentary on Aristotle's Metaphysics*, V, trans. John Rowan, Chicago, Henry Regnery Comp., 1961, lect.15, n.977, p. 375. Aquinas is reading from the Latin translation of Aristotle's definition of the quantified. As given in the Marietti edition (1950), it reads: "Quantum vero dicitur quod est divisibile in ea quae insunt, quorum utrumque aut singulum, unum aliquid, et hoc aliquid, aptum natum est esse." Cf. also AQUINAS' *Commentary on De Trin.*, q.4, a.1, c, in *Faith, Reason and Theology*, trans. A. Maurer, Toronto, PIMS, 1987, p. 91: "[...] division does not require that both of the items divided one from another be a being [...]."

32. *Commentary on Metaphys.*, V, lect.15, n.978 (p. 375).

33. *Commentary on Metaphys.*, V, lect.15, nn.980-982, 985-986 (p. 375-377).

Thomas holds that “all continuous quantity is in matter”.<sup>34</sup> He does not mean to imply that form is not required. Rather, his point is that some accidents resulting from form are intrinsically independent of matter, whereas other accidents, such as quantity, are more intimately associated with material substances *qua* material.<sup>35</sup> Conversely, “no corporeal substance is without quantity”,<sup>36</sup> although the exact nature of this necessarily inseparable type of “quantity” remains to be clarified. In any case, material substance and quantity are somehow co-implicatory, albeit not occupying equivalent ontological ranks, since the accident of quantity inheres in a supporting physical substance. Nevertheless, these facts mandate a discursive progression of topics : first matter, then quantity.

Next, given the preceding nexus between quantity and matter, it is not surprising that Aquinas would link quantity with (passive) potentiality. At this step divisibility enters the scene.

[E]verything possessed of quantity is in a certain manner in potency. For a continuum is potentially divisible to infinity, while numbers can be increased to infinity. But every body has quantity and is therefore in potency.<sup>37</sup>

This divisibility that continuous quantity shares with substance is unique among all the other predicamental accidents, binding quantity more intimately to material substance :

But it must be borne in mind that of all the accidents quantity is closest to substance. [...] For next to substance only quantity can be divided into distinctive parts. [...] And it is for this reason that only in the genus of quantity are some things designated as subjects and others as properties.<sup>38</sup>

In another work Thomas repeats : “Now among accidents quantity alone has of itself the special characteristic of division.”<sup>39</sup>

Consequently, there is an unambiguous order of priority among the categories of physical reality. Material substance by nature precedes quantity, but quantity in turn is the secondary foundation for sensible quality (such as the common sensible of shape and the proper sensible objects specifically detectable by each sensory power

34. *Summa contra Gentiles*, III, trans. Anton Pegis, Notre Dame, Indiana, University of Notre Dame Press, 1975, c.69[25]. This statement is true almost by definition, if “quantity” is taken as an absolutely inherent physical accident.

35. *On Being and Essence*, c.6[4], trans. A. Maurer, Toronto, PIMS, 1968, p. 68 : “[...] other accidents deriving from form do have something in common with matter [...]. But no accident results from matter without having something in common with form.”

36. *Summa contra Gentiles*, II, trans. English Dominican Fathers, London, Burns Oates & Washbourne, 1923, c.91[6].

37. *Summa contra Gentiles*, I, trans. Anton Pegis, Notre Dame, Indiana, University of Notre Dame Press, 1975, c.20[3] ; cf. also c.20[2] : “Every body, being a continuum, is composite and has parts.”

38. *Commentary on Metaphys.*, V, lect.15, n.983 (p. 376) ; cf. also n.984 (p. 376), as well as *Summa Theol.*, I, q.76, a.8, c, on the indirect division or incidental quantification of homogeneous qualities.

39. *Commentary on De Trin.*, q.4, a.2, ad 3, p. 99. Also, *Summa contra Gentiles*, II, c.49[4] : “[...] by division of quantity, without which substance is indivisible” ; and *Summa contra Gentiles*, IV, trans. Charles J. O’Neil, Notre Dame, Indiana, University of Notre Dame Press, 1975, c.65[4] : “[...] with the quantity gone all substance is indivisible”.

alone).<sup>40</sup> But although the substance is the ultimate and primary subject by which an accident (such as sensible quality) is sustained, nevertheless one accident (say, a proper sensible) can inhere in a substance (say, a body) through the proximate intermediation of a prior accident (here, quantity). In an analogous sense, then, one accident is said to be the “subject” of another accident.<sup>41</sup>

We now encounter a complicated thicket of concepts. For divisibility is rendered possible by quantity, which is related to a condition of dimensionality, in turn bringing about the pluralization of material substances within a given species.

Matter [...] is divisible only through quantity. Thus the Philosopher says<sup>42</sup> that if quantity were taken away, substance would remain indivisible. Accordingly, matter is made to be *this* and designated owing to the fact that it is subject to dimensions.<sup>43</sup>

We should note that the etymology of “dimension” is rooted in the Latin word for “measure” (*mensura*). Indeed, Aquinas declares: “What is in the genus of quantity does not have matter as one of its components, but it is related to matter as its measure.”<sup>44</sup> Even more stark is his pronouncement that “quantity ... is the measure of substance”,<sup>45</sup> clearly referring to material substance alone. Synthesizing the notions of matter, quantity, dimensionality, and divisibility, Thomas writes:

Dimensions of quantity are accidents consequent to the corporeity which belongs to the whole matter. Wherefore matter, once understood as corporeal and measurable, can be understood as distinct in its various parts [...].<sup>46</sup>

In order to comprehend Aquinas’ theory of the numerical pluralization of a species-form, we must rehearse his doctrine of prime matter. Matter, as pure formless potency, lacks any distinguishable mark whereby it could diversify a received form into the many singular members of a physical species. Thus, in order for form to be multiplied and individualized as a concrete material substance, it must be “received in *this* particular matter, determined to this place and this time”.<sup>47</sup> In short, “a form is individualized through being in matter subject to quantity”.<sup>48</sup> Such matter, marked (or signed) by quantity, is called “signate” matter.

40. *Summa contra Gentiles*, IV, c.63[9]; *Summa Theol.*, I, q.78, a.3, c, ad 2; q.85, a.1, ad 2.

41. *Summa Theol.*, I, q.77, a.7, ad 2; *Summa Theol.*, I-II, q.50, a.2, ad 2, and q.56, a.1, ad 3; *Quaestiones de Anima*, q.13, ad 8; *Commentary on Phys.*, III, lect.5, n.322.

42. The allusion is an interpretation of *Phys.*, I,2 : 185b16 (and possibly *Phys.*, III,5 : 204a10-11).

43. *Commentary on De Trin.*, q.4, a.2, c, p. 97; cf. also *Summa contra Gentiles*, IV, c.65[4].

44. *Commentary on De Trin.*, q.4, a.2, c, p. 95.

45. *On Being and Essence*, c.6[9], p. 71.

46. *Summa Theol.*, I, q.76, a.6, ad 2. All translations of *Summa Theologiae* are from the English Dominican Fathers, Westminster, Maryland, Christian Classics, 1981.

47. *Commentary on De Trin.*, q.4, a.2, c, p. 97.

48. *Summa Theol.*, I, q.115, a.1, ad 3. Against the standard objection that mere accidents cannot fulfill the task of pluralizing and individualizing a physical substance, see *Commentary on De Trin.*, q.4, a.2, ad 2, p. 99: “Because dimensions are accidents, they cannot by themselves be the source of the unity of an individual substance. But matter, as the subject of these dimensions, is understood to be the principle of such unity and plurality.”

On the one hand, Thomas emphasizes that quantity is a predicamental accident of material substance, as we see displayed in the ensuing two passages.

Obviously, the mathematician does not treat of the kind of body that is in the category of substance, whose parts are matter and form, but rather the body in the category of quantity, constituted by three dimensions. Body, in this sense of the term, is related to body in the category of substance (of which physical matter is a part) as an accident to its subject.<sup>49</sup>

[W]e find dimensions in sensible bodies, namely, length, width, and depth, which are quantities and not substances. For it is evident that quantity is not substance, but that substance is that to which the foregoing dimensions belong as their first subject.<sup>50</sup>

Yet, on the other hand, he appears to make quantity a predicable property of matter, naturally concomitant with it :

[D]imensiv quantity seems to belong immediately to matter, since matter is divided in such a way as to receive different forms in its different parts only by means of this kind of quantity.<sup>51</sup>

Hence, rather than constituting the essence of quantity, divisibility is engendered by this even more primordial property of material substance. But the nature of this elusive “dimensive quantity” itself remains something of a mystery, if it is not simply identified with divisibility.

We can, nonetheless, elaborate on how matter “subject to dimensions” functions as the so-called “principle of individuation” for Aquinas, in his own words.

Now dimensions can be understood in two ways. In one way inasmuch as they are determinate, and by this I mean that they have a definite measurement and shape. In this sense, as complete beings, they are located in the genus of quantity. Now when dimensions are understood in this way they cannot be the principle of individuation, because there is often a variation in such determination of dimensions in the same individual, and thus it would follow that the individual would not always remain the same in number. In another way dimensions can be taken as indeterminate, simply as having the nature of dimensions, though they can never *exist* without some determination. [...] Taken in this way dimensions are located in the genus of quantity as something incomplete. It is through these indeterminate dimensions that matter is made to be *this* designated matter, thus rendering the form individual. In this way matter causes diversity of number in the same species.<sup>52</sup>

49. *Commentary on De Trin.*, q.5, a.3, ad 2, p. 34-35. Cf. *On Being and Essence*, c.2[6], p. 38 : “[...] the term ‘body’ can have several meanings. In the genus of substance we give the name ‘body’ to that which has a nature such that three dimensions can be counted in it ; but these three determined dimensions themselves are a body in the genus of quantity.” Also cf. *Summa Theol.*, I, q.18, a.2, c : “[...] the word *body* is used to denote a genus of substances from the fact of their possessing three dimensions ; and is sometimes taken to denote the dimensions themselves : in which sense body is said to be a species of quantity.” The same double signification occurs in *Summa Theol.*, I, q.7, a.3, c, and in *Summa contra Gentiles*, IV, c.81[7].

50. *Commentary on Metaphys.*, VII, lect.2, n.1283 (p. 499).

51. *Ibid.*

52. *Commentary on De Trin.*, q.4, a.2, c, p. 97-98. Cf. also *On Being and Essence*, c.2[4], p. 36-37 : “What we must realize is that the matter which is the principle of individuation is not just any matter, but only designated matter. By designated matter I mean that which is considered under determined dimensions.” In order to make this account consistent with the preceding one, we are compelled to resort to the temporal construction delineated in the main body of this paper. Apply this same interpretive observation to

Therefore, the dimensions demarcating an individual material substance from all other formally identical specimens are definite or determinate at any instant in time, but are variable (undoubtedly within an appropriate range, depending on the species) over spans of time. It is these “indeterminate” dimensions that define signate matter.

Even though prime matter is “one” as a universal, undifferentiated, sheer potency for physical substance, dimensive quantity prevents individual (or signate) matter from collapsing into a monistic unity of all generable and corruptible things.<sup>53</sup> But what is it precisely about dimensive quantity that enables it to exercise this office? The explanation is propounded in the following text.

Matter is the principle of numerical diversity only inasmuch as, being divided into many parts, and receiving in each part a form of the same nature, it constitutes many individuals of the same species. Now matter can be divided only if we presuppose quantity in it; if that is taken away, every substance remains indivisible. So the primary reason for the diversification of things of one species lies in quantity. And this is due to quantity because position, which is the arrangement of parts in place, is contained in its notion as a kind of formal difference. So even when the intellect has abstracted quantity from sensible matter, it is still possible to imagine numerically different things in the same species, for example, several equilateral triangles and several equal straight lines.<sup>54</sup>

Therefore, it is by virtue of “position” (*situs*) that dimensive quantity precludes the fusion of all material substance into the condensation of an indivisible point. As the next passage explains, dimensions can perform the role of individuation because “the arrangement of parts in place” is itself uniquely determined.

So dimensions of themselves have a certain character of being individual with reference to a definite position, position being a quantitative difference. Thus a dimension is individual on two scores: because of its subject, just like any other accident; and also because of itself, insofar as it has position. [...] So it rightly belongs to matter to individuate all other forms because it is the subject of that form which of itself has the trait of being individual.<sup>55</sup>

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*Commentary on De Trin.*, q.5, a.2, ad 1, p. 23: “Matter is the principle of individuation only insofar as it exists with determinate dimensions [...]” Aquinas goes so far as to assert that “indeterminate” (temporally variable) dimensions are the basis for the “determinate” (fixed at a given point in time) dimensions. Note the quotation from *Commentary on De Trin.*, q.4, a.2, ad 3, p. 99: “Indeed even determinate dimensions themselves, which are grounded in the already completed subject, are in a sense individuated by matter that has been rendered individual by the indeterminate dimensions that we conceive beforehand in matter.” See *De Malo*, q.16, a.1, ad 18: “[...] materia dimensionibus subjecta est principium distinctionis numeralis in his quibus inveniuntur multa individua unius speciei; hujusmodi enim non differunt secundum formam.” By contrast, however, cf. *De Veritate*, q.2, a.6, ad 1: “materia signata est individuationis principium”, where by “signate matter” Aquinas here means sensible matter considered with determinate dimensions.

53. *Commentary on De Trin.*, q.4, a.2, ad 1, p. 98.

54. *Commentary on De Trin.*, q.5, a.3, ad 3, p. 35. Cf. *Commentary on De Trin.*, q.4, a.1, c, p. 89: “One part [of a magnitude] is divided from another by having a different position, which is as it were the formal difference of continuous quantity having position.” Also, cf. *Commentary on Phys.*, IV, lect.17, n.577: “[...] magnitude is quantity which has position.” Finally, cf. *Summa contra Gentiles*, IV, c.65[4], where Aquinas asserts that dimensive quantity “has position” (which is “the order of parts in the whole”).

55. *Commentary on De Trin.*, q.4, a.2, ad 3, p. 99. Cf. *Summa contra Gentiles*, IV, c.65[4]: “[T]he quantity tending to measure has [...] this property: that it is in itself individuated.” See Joseph BOBIK, “St. Thomas on the Individuation of Bodily Substances”, in H. KOREN, ed., *Readings in the Philosophy of Nature*, Westminster, Maryland, The Newman Press, 1965, p. 334-335: “To the objection, then, that quantity, like every accidental form, needs to be individuated by reason of its subject, St. Thomas replies by drawing a

The first reason Aquinas supplies for the individuality of dimension (namely, its subject) begs the question for us, because we are attempting to discover precisely why the subject is itself distinguished from the other members of its species. If someone replies that dimensive quantity is this cause, then of course we are caught in circularity. The second reason, at first glance, may also appear to eventuate in a circular argument. For it is alleged that material substance is individuated through dimensive quantity, which in turn depends on position, which itself revolves around place.<sup>56</sup> Yet place, as we saw in Aquinas' commentary on Aristotle's *Metaphysics* Δ 13, hinges entitatively on quantity ! Moreover, the categories of quantity and place have become conflated according to this analysis — unsatisfactory for any faithful Peripatetic cosmology (such as the Scholastic philosophy of Thomas Aquinas).

The only way to escape the twin traps of circular reasoning and categorial merger is to attend more closely to what Aquinas has really said (and not said). Let us take serious note of the fact that, in the two preceding parallel texts cited, Thomas portrays position as a sort of “formal difference” within quantity, perhaps implying that we should conceive of continuous physical quantity as a genus, one of whose species is dimensive quantity constituted by the specific difference of position. Thus, dimensive quantity is specifically quantity having position or quantity having an ordering of parts in place. But continuous physical quantity itself, generically speaking, need *not* be localized. Consequently, we have averted the charge of invalid circular argumentation, while salvaging and preserving the irreducible integrity of the predicaments of quantity and place. So we know what quantity is *not*.

Unfortunately, we have still not captured the essence of continuous physical quantity in general. Indeed, Aristotle's definition in terms of divisibility into separate parts suffers from the defect of unnecessary narrowness ; it leads to the specific factors of individualization and dimensionality, thereby ultimately resting on the categories of situation and place. As we have shown, unless we reject this insufficiently broad starting-point, we fall into the double-jeopardy quagmire of circularity and categorial blurring. We are forced to conclude that Aristotle's view of physical quantity, while indisputably adequate for a vast range of phenomena, nonetheless has a too limited scope of applicability : the very definition he proposes will not bear the weight of a more profound metaphysical probing.

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distinction. Quantity, considered as *accidental form*, i.e., as inhering in a subject, must be individuated by reason of the subject. Considered as *quantity*, however, i.e., according to its distinctive nature, it accounts for the possibility of its own division and multiplication (could it exist in a separated state) ; and not only for its own, but for that of which it is the intrinsic measure, namely material substance which is its quantity. In other words, dimensive quantity, because it is an accident, is individuated, like every accident, by reason of its subject. Because it is dimensive quantity, however, it can, unlike any other accident [...], individuate its subject with that same individuating vitality whereby it can individuate itself.” On p. 339-340, note 48, Bobik adds : “Although there is a reciprocal individuation between the subject (composite) and its quantity, it is not circular ; for in each direction it is individuation in a different respect. Quantity *qua* quantity individuates its subject ; quantity *qua* accidental form (and *not qua* quantity) is individuated by its subject.”

56. Also cf. *Commentary on De Trin.*, q.4, a.3, c, p. 105 : “Matter [...], taken in itself, is not in place [...]. [I]t is related to place by being subject to dimensions.”

What further recourse remains? Have all resources been exhausted? We have found that we cannot take refuge in merely experiential descriptions, like divisibility into particularized segments nor dimensional extension in space. Aquinas blocks another possible avenue when he states that “addition of quantity does not add weight”.<sup>57</sup> That the latter judgment is correct has been verified by modern experimental physics, since it has been demonstrated that weight is entirely relative to the so-called “gravitational field” produced by a massive body. Hence, both volume (which is abstractly equivalent to tri-dimensional extension) and weight are discarded as aspects of the formula for the quiddity of quantity.

Aquinas furnishes a small clue towards a deeper scrutiny when he avers that “all quantity consists in a certain multiplication of parts”.<sup>58</sup> Notice what Thomas does *not* say. He employs, not the word “divisibility”, but instead “multiplication”, which can be construed as a broader term, since it does not connote entitative separability of constituents. But “multiplication” without qualification would overshoot the target, because non-quantified substances (such as the spiritual human soul and angels) possess multiple “parts” (i.e., the powers of intellect and will), too, at least analogically.

To better understand the multiplicity of parts intrinsic to the physical quantity of material substances alone, we quote a very important passage drawing a key distinction between the ways in which an accident can inhere in a substance [emphasis added].

Accidents are sometimes caused in perfect actuality by the essential principles, like heat in fire, which is always actually hot. But sometimes accidents are caused only as *aptitudes*, and they are completed by an external agent, like transparency in the air, which is complemented by an external luminous body. In cases like these the *aptitude* is an inseparable accident, whereas the completion that comes from a source external to the essence of the thing, or that does not enter into its constitution, will be separable from it, like movement and other accidents of this kind.<sup>59</sup>

Herein appears the novel and brilliantly bold concept of *aptitudinal accident*. This is a philosophically viable notion, arising from reason’s reflection on sensible experience, as attested by the mundane examples Aquinas adduces. Nor does it contradict the accepted meaning of “accident”. Of course, an accident confers an actuality or perfection. But actualities or perfections are analogical, and hence need not exist in exactly the same manner. For example, in the case of the powers of living things, mainstream Scholastic philosophers (particularly Thomas himself) distinguish an ascending hierarchy of accidental perfection within certain psychic powers: the initial raw condition of remote potency, the intermediate stable disposition of proximate potency called “habit” or “first actuality”, and the final executed operations putting a power in a state of what is called “second act”.<sup>60</sup> Each stage is more excellent or “actual” than its predecessor.

57. *Summa Theol.*, I, q.115, a.1, ad 3.

58. *Summa contra Gentiles*, I, c.69[12].

59. *On Being and Essence*, c.6[7], p. 69-70.

60. For example, cf. *Summa Theol.*, I, q.79, a.6, ad 3; *Summa Theol.*, I-II, q.49, a.3, ad 1; q.50, a.2, ad 3.

As Aquinas indicates in the above passage, an accident may inhere to an imperfect degree — simply as an “aptitude”. Such an accident is real, is utterly “inseparable” from the substance modified, and thus is an absolutely necessary property of that substance. Yet its complete manifestation is “separable”, in the sense that its full actualization is non-essential to both the substance considered in potency to it and to the accident considered minimally in itself.

If we apply this model to continuous physical quantity, we arrive at the remarkable concept of *aptitudinal dimensionality* (or *aptitudinal extension*) as a candidate for its essence. Indeed, several times Thomas refers to the kind of quantity “*tending to measure*” (or having a *tendency* to be dimensive).<sup>61</sup> Anticipating an official amplification by Suarez later, we might at this point describe aptitudinal extension as a radical exigency for the part-by-part exteriorization of a physical substance — a dynamic inclination that need not be actualized in local extension. At least this notion has the virtue of being more general than full-fledged spatial extension, yet is delimited enough so as not to impinge on the realm of immaterial (hence non-quantifiable) substances.<sup>62</sup> Additionally, it offers us a coherent, intelligible resolution avoiding the quandaries entailed in the alternative explanations of physical quantity that we have witnessed (especially Aristotle’s divisibility theory).

This daring idea is not highlighted in Aristotle’s treatment of quantity, probably because he lacked the benefit of an extrinsic influence from Divine revelation. Nevertheless, we saw earlier a surprising intimation of the idea in his assertion that “what is of a certain quantity extends itself over a certain space unless something prevents it”. Aristotle may have had in mind something like the example of a fluid material, whose dimensive spread is blocked by a container. On the other hand, his statement may be construed to imply that quantity is an absolute accident whose extensive effect can be totally impeded (that is, a continuously quantified physical thing need not undergo actual extension in place at all), although Aristotle may not have been aware of this possible repercussion. By contrast, his Scholastic descendants accepted on faith (or at any rate were aware of the dogma) that in the sacrament of the Eucharist the substance of the Body of Christ is truly present, but without its normal local extension. Since His substance is corporeal, it must possess some sort of inseparable quantity ; otherwise (it seems reasonable to infer), He would be a pure spirit. Because this inseparable quantity is not an actually dimensive extension according to place, the suggestion that the essence of continuous physical quantity lies in an “aptitudinal” extension is ineluctable.

It is intriguing that this conception of accidents arises in a purely philosophical context, yet is thoroughly consonant with (and foundational for) some of Aquinas’ theological writings (namely, his disquisition on Eucharistic physics). We do not

61. *Summa contra Gentiles*, IV, c.63[9,12], c.65[2,3,4], according to the translation by Charles J. O’Neil.

62. For more discussion on quantity as “aptitudinal extension”, see John O’NEILL, *Cosmology : An Introduction to the Philosophy of Matter*, Vol. I, London, Longmans, Green and Co., 1923, p. 183-201, esp. p. 191. Also, see John F. McCORMICK, *Scholastic Metaphysics*, Part I, Chicago, Loyola University Press, 1928/1940, p. 116-120.



claim, though, that Thomas himself ever explicitly employs the nomenclature of “ap-  
titudinal extension”. Rather, what we do maintain is that Aquinas implicitly uses the  
basic kernel of this notion : it can be teased out of his writings.<sup>63</sup> In particular, as we  
noted before, Thomas refers several times to a kind of quantity that has a *tendency*  
toward mensuration. The specific terminology of “apitudinal extension”, however,  
becomes the centerpiece of Suarez’s thesis on the essence of continuous physical  
quantity, as we shall see.

### III. SUAREZ

En route to his final illumination of the essence of continuous physical quantity,  
Suarez expends most of his energy engaging the Nominalists in some dense and often  
abstruse debates. But he begins his Disputation on continuous quantity with a pains-  
taking analysis of Aristotle’s description in *Metaphysics* Δ 13.

He first observes that Aristotle, wherever he lists the highest genera of reality  
(whether in the *Categories*, the *Metaphysics*, or elsewhere), always grants quantity  
preeminent rank among the predicamental accidents, because, with respect to our  
knowledge as starting from corporeal things, quantity is prior and fundamental to the  
other accidents. In the *Categories*, however, Aristotle forgoes an attempt at a general  
definition, but instead immediately subdivides quantity into its continuous and  
discrete varieties, because its essential meaning eludes capture by a universal formu-  
lation. Nevertheless, this restriction does not pose an insurmountable obstacle to un-  
derstanding its nature, since the basic character of quantity is discovered in the con-  
tinuous : discrete quantity is merely a multitude of continuously quantified things.<sup>64</sup>

Suarez quotes Aristotle’s opening sentence of *Metaphysics* Δ 13 according to the  
following rendition : “The quantified is that which is divisible into those things which

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63. It must be confessed that AQUINAS does not accord a more highly privileged status to any of his various  
descriptions of physical quantity (whether in terms of divisibility, measurability, or dimensionality) in  
preference over any of the other ones in the texts cited thus far ; however, it seems certain that our inter-  
pretation using the phraseology of “apitudinal extension” is the formulation most compatible with the mi-  
lieu of the *Treatise on the Eucharist* in *Summa Theol.*, III, q.76, aa.3-5, and with the tenor of *Summa contra*  
*Gentiles*, IV, cc.62-67, though not actually invoked in either work. Indeed, witness the appearance of the  
key word *aptum* in the Latin rendering of ARISTOTLE’s opening sentence of *Metaphys.*, V,13, reproduced  
in the first quotation of note 31 above. In the absence of an *ex professo* disquisition on quantity (beyond  
brief commentaries), we must resort to this textually diachronic method, attempting a synthetic reconcilia-  
tion of various passages in different works. SUAREZ thinks that Aquinas, in at least one text, views the ba-  
sic character of quantity as consisting in measure. Cf. *Metaphysical Disputations*, XL, Sec.3, par.2. Per-  
haps Suarez’s verdict is confirmed by the fact that in *Summa contra Gentiles*, IV, cc.63,65, AQUINAS refers  
several times (in 63[9,12],65[2,3,4]) to quantity with a *tendency* to measure (or to be dimensional).

64. SUAREZ, *Metaphysical Disputations*, XL, Intro. *Note* : The summaries of Francisco Suarez’s positions  
come from my own translations into English of the Latin texts of the *Disputationes Metaphysicae* and of  
the adjacent Spanish texts of the *Disputaciones Metafisicas*, translated in 7 volumes from Latin to Spanish  
by S. Romeo, S. Sanchez, A. Zanon, Madrid, Biblioteca Hispanica de Filosofia, Editorial Gredos, 1960-  
1966, except where otherwise indicated. Henceforth, I will use the abbreviation MD to denote *Metaphysi-  
cal Disputations*.

are in it, of which things either each or any one of them has an aptitude for being something one and particular [or a definite individual].”<sup>65</sup>

He immediately anticipates several possible criticisms that may be leveled against the Aristotelian procedure and content. First, it may be objected, Aristotle proffers a quasi-definition of the concrete quantified thing instead of quantity in the abstract, whereas it would be more suitable to explain quantity in an abstract manner. Since concrete things are called quantified in *per se* and *per accidens* senses, and since his proposition covers both, he has not penetrated to the essential core of quantity itself.<sup>66</sup>

Secondly, it may be objected, Aristotle’s entire formula misses the mark in two ways : (a) it fits many things that are not quantified and (b) fails to fit some things that are ordinarily deemed quantified.

Examples supporting the anterior objection (a) are hylomorphically composed substances, which are really divisible into matter and form as distinct constituents. Also, the mode of union of soul with body is divisible, as verified when a portion of the body is removed and hence a part of the union of the soul with body ; yet there remains another (partial) union of the soul with the rest of the body’s parts. Now neither type of divisibility in these instances entails quantification.<sup>67</sup>

On the other hand, with regard to (b), examples like the sky (celestial space) and the successive realities of motion and time show that some quantified things are not divisible according to Aristotle’s criterion, since their “parts” are either not particular entities (in the case of space) or abiding individuals (in the case of motion and time). Lastly, number is quantified, but not divisible, since it is already actually divided.<sup>68</sup>

Notwithstanding these arguments, Suarez undertakes a defense of Aristotle’s teaching by refuting each objection in turn. First, Suarez insists that Aristotle’s description is sufficient and the best possible one, considering his intention, for in the whole book of *Metaphysics*  $\Delta$  his purpose is simply to clarify the meanings of terms rather than uncover the essences of the things signified. Moreover, via this *a posteriori* approach commencing from the concrete and familiar, we gain some access to the abstract cause (quantity itself) through its effects (the divisibility characterizing quantified things).<sup>69</sup> In addition, Suarez explains, the exposition of quantified things in the concrete is adequate for elucidating the abstract meaning of quantity, because quantity has the peculiar attribute that (like the physical substance which it

65. MD, XL, Sec.1, par.2 : “Ex sententia [...] Aristotelis dicendum est *quantum esse quod est divisibile in ea quae insunt, quorum utrumque vel unumquodque, unum quid et hoc aliquid aptum est esse [...]*.”

66. *Ibid.*

67. MD, XL, Sec.1, par.3.

68. MD, XL, Sec.1, par.4.

69. MD, XL, Sec.1, par.5. For Aquinas’ confirmation that the human mind does not directly intuit the specific differences of sensible substances, but knows them only indirectly through the accidental properties flowing from their essences, see, for example, *On Being and Essence*, c.5[6], p. 63 of Maurer. Also *Summa Theol.*, I, q.77, a.1, ad 7 : “[...] substantial forms, which in themselves are unknown to us, are known by their accidents [...]”

renders quantified as an inherent form) it itself is “quantified” in the sense of being extended and divisible ; indeed, quantity cannot extend something else unless it is co-extensive with it — its own “parts” corresponding to the parts of its substrate. Thus, insofar as quantity (the form by which) and the material substance (the subject which) coincide in the property of possessing parts locally excluding other parts, they can be concretely identified.<sup>70</sup>

Before responding to the second set of paired objections, (a) and (b), Suarez makes a point already noted by Aquinas : namely, that the things into which a quantified being is divisible must be formally present in it and not merely virtually, as happens with the elements in a complete mixture. Mere division does not serve to actualize the parts as individual substances in this instance, even though a mixture is (somehow) resolvable into its elements.<sup>71</sup> Genuine continuous quantification requires that the components be able to exist as singular, definite wholes in their own right, separate from all the other parts. (This fact implies that the divisibility of a quantified thing is a potentially infinite process ; if it could end, it would terminate in non-quantified items, but this properly pertains to discrete quantity alone.)<sup>72</sup>

Now Suarez returns to address the aforementioned criticisms. First, concerning (a), it is patently true that a hylomorphic compound as such is not strictly divisible, because, although matter and form are its constituents, they lack the aptitude after separation to endure as determinate individuals. Indeed, certainly the form is lost (speaking generally and according to the natural workings of things) ; and, even in the exceptional instance of the spiritual human soul, the matter does not remain *per se* but instantaneously acquires new form(s).<sup>73</sup> Regarding the other alleged counter-example about modes of union, Suarez replies that there is no question here of material divisibility. Such modes can vary in intensity, but not be properly divided in the sense that after division two or more of these purportedly plural modes of union could retain their separate identities relating the soul simultaneously to most of the body and also to excised portions of it.<sup>74</sup> Thus, it is false that the divisibility test is met by non-quantified things. If something is not quantified, then to that degree it is not divisible.<sup>75</sup> By contraposition, whatever is divisible as such is quantified.

As for the converse (which addresses the last objection (b) in the series), Suarez rebuts the purported disproof invoking the heavens, by drawing a distinction. He says that something can be divisible in two ways : first, in an extramentally practical manner, and secondly, by a mental designation. Obviously, the first sense does not pertain to the very essence of a quantified thing, but the divisibility entailed in quantification must include the second meaning, because in any quantified thing one part outside another can always be indicated. Hence, a quantified thing, by virtue of its quantity,

70. MD, XL, Sec.1, par.6.

71. MD, XL, Sec.1, par.7.

72. MD, XL, Sec.1, par.8.

73. MD, XL, Sec.1, par.9.

74. MD, XL, Sec.1, par.11.

75. MD, XL, Sec.1, par.12.

is divisible in itself and sometimes even in reality. Nevertheless, since we are now dealing with the extension of a continuous quantity, a quantified thing, on account of the matter or subject in which the quantity exists, may not be actually divisible. The latter state of affairs holds in the case of the sky, which is, after all, merely an expanse among cosmic bodies. But still, this quantified reality is virtually divisible, whether by the mind's designation of its sectors or at least by the Divine power.<sup>76</sup>

Concerning successive realities, Suarez answers that, since they are quantified *per accidens* and since parts inhere in a quantified thing in a manner proportionate to the being of the thing, it necessarily follows that the "parts" of motion and time exist therein successively. He concludes that these quantified wholes are still (proportionately) divisible into their ephemeral "parts", at least by a mental consideration.<sup>77</sup>

Before providing a rejoinder to the objection about number, Suarez briefly treats the customary subdivision of quantity into magnitude (that which is conjoined in continuous parts) and multitude (that which is divisible into discrete or non-continuous parts).<sup>78</sup> But we have already sufficiently confronted this dichotomous classification.

Now Suarez appeals once again to division by a mental process. Indeed, the intellect can separate the unities comprising a number, in accordance with an ordering of parts related to the totality. Hence, a number is potentially divisible by discrete division, even though it is already actually divided when viewed from the perspective of continuity. So the divisibility of continuous quantity is of a different nature from that of discrete quantity.<sup>79</sup> After all, the parts into which a physical magnitude is divisible are really substantial beings, whereas a numerical whole has merely ideational components which, nonetheless, are in some sense determinate singulars.

Suarez has therefore established to his current satisfaction that everything quantified is truly divisible (in its own way or analogously). Combining this result with the previous conclusion, we logically deduce that a thing is quantified if and only if it is divisible (meeting the stringent requirements articulated in Aristotle's formula which opens *Metaphysics*  $\Delta$  13). For all the troublesome arguments assailing Aristotle's quasi-definition have been refuted via the detailed vindication launched by Suarez.<sup>80</sup> It remains to be seen, though, whether the descriptive definition of quantity offered by Aristotle in his lexicon of terms in book  $\Delta$  lays bare the essence of physical quantity according to Suarez's final thought. Or perhaps there is latent in Aristotle's formulation, as translated by Suarez, more than the Greek philosopher appreciated or suspected.

76. *Ibid.*

77. *MD*, XL, Sec.1, par.13.

78. *MD*, XL, Sec.1, pars.14-15.

79. *MD*, XL, Sec.1, par.15.

80. We have not given *all* of the objections and Suarez's replies on behalf of Aristotle, but just the main ones (in the interests of succinctness). However, these are typically representative.

In the next section of this Disputation, Suarez's principal aim is to demonstrate rigorously the reality of continuous quantity and especially the real distinction between continuous physical quantity and bodies.<sup>81</sup> His chief opponents are the Nominalists, whose identification of continuous physical quantity with the very entity of material substance he undertakes the task of demolishing. They claim that bodies and even corporeal qualities have *per se* (through their very entities themselves) their own proper extensions of parts : quantity is merely a label under which material substances or sensible accidental forms are considered insofar as they are viewed as possessing diverse parts. From this perspectivist interpretation advocated by Nominalism, it follows that there are as many "quantities" as there are distinct material entities within a physical composite ; moreover, these quantities interweave to the degree that the material forms, with which they correspond, do.<sup>82</sup> A major proponent of this theory is, of course, William of Ockham.

Suarez immediately detects some ambiguity in this school of thought, because, although they explicitly deny a real distinction between quantity and material substance, they are unclear about whether they embrace some sort of distinction (whether modal or merely a major distinction of reason) within the physical thing. Yet this haziness conflicts with their affirmation that sometimes a physical substance can exist without its proper quantity (e.g., the Body of Christ in the Sacrament of the Eucharist).<sup>83</sup>

Suarez recounts several of the main Nominalist arguments for their view on the nature of quantity. (A) First, the Nominalists invoke the canon of philosophical economy (the so-called principle of "Ockham's razor") that explanatory entities must not be multiplied beyond necessity. They reason from this premise that, since every real being is already distinguished from every other real being through itself, by the very fact that a thing is understood to have one part outside another (whether locally or just entitatively) quantity is automatically entailed : no really distinct accident is required.<sup>84</sup> (B) Second, if quantity were something ontologically distinct from material substance, the almighty power of God could separate them and conserve a physical substance without that quantity ; yet the substance conserved in this manner would remain intrinsically quantified (its diverse parts not coalescing), and so it is impossible that quantity be a reality distinct from such substance.<sup>85</sup> (C) Third, a related objection is that God could reduce a material substance to an arbitrarily minuscule size, ultimately to an indivisible point, while preserving all its accidental forms ; in this event, however, the substance would no longer be quantified, showing that quantity is

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81. *MD*, XL, Sec.2, par.1.

82. *MD*, XL, Sec.2, par.2.

83. *Ibid.* For more information on the kinds of distinctions mentioned here, see note 107, *infra*.

84. *MD*, XL, Sec.2, par.3. For a prolonged discussion of Ockham's theory of matter and his denial of an absolute distinction between quantity and material substance, see Allan B. WOLTER, "The Ockhamist Critique", in E. McMULLIN, ed., *The Concept of Matter*, Notre Dame, Indiana, University of Notre Dame Press, 1963, p. 144-166 (esp. p. 146, 157-159).

85. *MD*, XL, Sec.2, par.4.

not a really distinct accident.<sup>86</sup> (D) Fourth, Ockham appeals to Aristotle's teaching in the *Categories* that substance through itself can receive contrary qualities ; hence, employing his precept of parsimony, he finds no need to posit an intermediary accident of quantity, because substance could receive qualities immediately without the superfluous supposition of real quantity.<sup>87</sup>

Before continuing, let us concede that the above Nominalist arguments are formidable. Nevertheless, the first three seem to beg the question (or ignore the issue) of the core essence of continuous physical quantity by assuming that such quantity should be construed in a maximal (or full-fledged) sense, rather than a minimal (or absolute) sense. The fourth objection makes an unwarranted assumption about the way in which material substance sustains material qualities, but perhaps this is an inevitable result of the incautious wielding of a merciless philosophical weapon while neglecting the other blade of the two-edged sword : namely, the law of sufficient reason, taken in balanced counterpoise with Ockham's sharp foil.

Suarez will return to combat these four assaults later, but meanwhile he parries the Nominalist attack with the shield of the contrary position espoused, according to his citations, by such notable philosophers and theologians as Albert the Great, Thomas Aquinas, Duns Scotus, and Capreolus. For specific counter-arguments, however, he relies on Aristotle, who, in numerous texts from the *Categories*, the *Physics*, and the *Metaphysics*, distinguishes quantity from substance as an accident inhering in it. Suarez explicitly quotes the transparent passage from Zeta 3, which we have already seen.<sup>88</sup> Yet Suarez does not confine himself solely to reciting *ipse dixit* pronouncements from mainstream authorities, without bothering to furnish some proof. He presents the forceful demonstration of Aristotle's *De Anima* II,6, where the Greek philosopher declares that, while substance is merely sensible *per accidens*, quantity is sensible *per se* (the so-called "common sensible objects" of number and size).<sup>89</sup> Suarez, like Aquinas, also reminds us of Aristotle's contention (in *Physics* I) that substance is not divisible in itself, but only through quantity.<sup>90</sup>

Not content with the Greek philosopher's apparently cogent rebuke anticipating the later Nominalist thesis, Suarez now embarks on an expedition into theological terrain. Despite his employment of what one might deem a practically incontrovertible proof by the most renowned pagan thinker of ancient times, Suarez insists that the real distinction between physical quantity and material substance cannot be adequately demonstrated by natural reason. We are convinced of its truth, he maintains, primarily on account of the dogma of the Eucharist, wherein the quantity of bread en-

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86. *MD*, XL, Sec.2, par.5.

87. *MD*, XL, Sec.2, par.6.

88. Cf. *supra*, note 25.

89. Cf. ARISTOTLE's *De Anima*, II,6 : 418a6-25.

90. *MD*, XL, Sec.2, par.7.

dures apart from its substance, which has been converted into the substance of the Body of Christ.<sup>91</sup>

Of course, acceptance (in the light of faith) of this mystery of Divine conservation of quantity without the original substance's persistence does appear to guarantee the real distinction between physical quantity and material substance,<sup>92</sup> but by emphasizing the superlative value of this purely theological argument Suarez seems to be assuming at this point that a real distinction between substance and quantity almost *requires* their ontological separability (at least by God's power). To this degree he is guilty of transgressing the border (however fragile it may be in spots) between the provinces of philosophy and sacred theology. Fortunately, though, he does provide a couple of key rational proofs justifying the "natural necessity" for asserting a real distinction between physical quantity and corporeal substance (although he evidently regards them as inferior from the vantage of a Christian believer).

Suarez's first proof along this line begins with the observation that some aspects of a given material substance are extended in themselves, yet so intimately conjoined among themselves that they compenetrates, simultaneously existing in the same space without mutual interference. (From the context of the entire discussion, he is here referring to sensible qualities and perhaps the substantial form.) On the other hand, we also perceive that corporeal substances (and their integral parts) are spatially incompatible, by nature incapable of occupying the same place at the same time. Hence, this reciprocal exclusion of bodies must stem from some reality distinct from physical

91. *MD*, XL, Sec.2, par.8. Cf. Frederick COPLESTON, *A History of Philosophy*, Vol. 3, *Late Medieval and Renaissance Philosophy*, Part II, Garden City, New York, Doubleday & Company Image Books, 1963, p. 197: "In his preface (*Ad lectorem*) to the *Disputationes metaphysicae* Suarez says that he intends to play the part of philosopher in such a way as to have always before his eyes the truth that 'our philosophy ought to be Christian and the servant of divine theology' [...]." Cf. also Jorge GRACIA, "Francisco Suarez: The Man in History", *American Catholic Philosophical Quarterly*, LXV (Summer 1991), p. 262-263, where the author states that "like Thomas and other medieval theologians before him, Suarez points out that he never loses sight of Christian doctrine while he philosophizes and, indeed, that he intends his philosophy to be both Christian and an instrument of theology." Nevertheless, Suarez maintains a "very clear and rigorous idea of the distinction between metaphysics and theology and of his roles as philosopher and theologian." In fact, as Suarez informs us in the Preface to his *Metaphysical Disputations*, his "aim is to show the reader how to apply metaphysical principles to theology rather than to use theology to prove philosophy."

92. The Nominalists, however, do not concede the premise that the quantity of the bread's substance perdures after the Consecration, due to their reduction of quantity to the essence of the thing quantified. Rather, they say, it is the quantity or extension of the sensible qualities which are preserved that remains, for every absolute physical reality has its own quantity identifiable with the thing proximately quantified by it (not necessarily with the ultimate substantial subject). Cf. *MD*, XL, Sec.2, par.9. But SUAREZ refuses to grant credence to this explanation. His principal rationale for rejecting it is the fact that the consecrated Host cannot be penetrated by another body. Now the extension of qualities does not preclude their compenetration, whether mutually among themselves or by the quantity of the bread's substance, for they are all intertwined at the same place and time. Hence, it must be admitted that in the sacramental accidents after Consecration there remains a reality (different from the relatively feeble sensible qualities) which confers a natural incompatibility on the Host for local penetration by, say, another Host. Since the substance of bread is no longer present in either Host, as the Catholic Nominalists would profess, the reality responsible for preventing interpenetration must be the *quantity* of the original wheat substance. Thus, despite the Nominalists, the Eucharistic doctrine does imply a real distinction between physical quantity (construed as an ontological accident, and not a mere phenomenon of perception) and material substance. Cf. *MD*, XL, Sec.2, par.10.

substance and from its qualities.<sup>93</sup> We infer that the source of this hindrance derives from the predicament bestowing global extension, namely quantity.

The second proof depends on the major premise that the actual extension of the parts of a material substance according to place is not identifiable with the very quantity of the substance. To establish this critical (but controversial) thesis, Suarez initially reverts to invoking the Eucharistic mystery, which discloses the Body of Christ truly present physically and therefore with material quantity, yet lacking actual local extension. Happily, he does not stop with this appeal to faith in a religious dogma, but proceeds to supply an argument strictly from human reason (though shored up by the probative force of the extrinsic influence emanating from Divine revelation). He maintains that the spatial presence of a body is in reality founded on situational extension; thus, the presence itself is extended and quantified *per accidens*. Nonetheless, this presence is not quantity itself, for quantity abides the same, even if the body changes its presence and hence the foundational ordering of parts in relation to place. (It seems obvious Suarez is correct about bodies that display a certain plasticity or elasticity; but to some degree all bodies can undergo deformation, and hence a change in situation, without losing any of their intrinsic quantity.) Having decided that quantity really differs from actual local extension, Suarez concludes that quantity is a reality intermediate between physical substance and situational extension.<sup>94</sup>

In both proofs Suarez has evidently shown a real distinction between material substance and quantity conceived as an accident conferring actual local extension — not between substance and quantity understood in some other (still to be elaborated) sense that may be more essential. One wonders why he does not utilize a simpler proof based on the augmentation in size of living things (the customary example of quantitative change), if he merely wants to deduce a real distinction between physical substance and actual local extension. At any rate, that there truly exists an intermediary accident of quantity distinct from both material substance and situational extension has not been definitively demonstrated up to this stage.

He does hint at another approach to quantity in the sequel, when he anticipates a possible Nominalist rejoinder that *aptitudinal* local extension, then, should be identified with physical substance. In order to refute this claim, however, Suarez again resorts to the paradigm of the Eucharist, setting up a dilemma for the Nominalists, each horn of which leads to a contradiction of their professed positions on the nature of quantity and its relation to bodies.<sup>95</sup> This maneuver, once its dogmatic underpinning

93. *MD*, XL, Sec.2, par.11. For the Nominalist objection to this argument and SUAREZ's reply (which is based partly on unaided reason and partly on the doctrine of the Eucharist), consult Sec.2, pars.12-13.

94. *MD*, XL, Sec.2, par.14. A parallel passage occurs in his *Commentary on Aquinas' Summa Theologiae*, III, q.76, a.2, where in *Disputation*, LI, Sec.2, par.2 (end), arguing against the Nominalists, he says: "Nominales [...] non admittunt rem aliquam, vel realem modum, inter substantiam et actualem extensionem in loco. Unde necesse est, ut vel fateantur, substantiam per se ipsam formaliter esse quantam, [...] vel certe formaliter fieri quantam per ipsam actualem extensionem in loco, et consequenter quantitatem nihil aliud esse quam actualem ipsam extensionem, et, hac mutata, mutari etiam quantitatem, quo nihil absurdius dici potest."

95. *MD*, XL, Sec.2, par.15.



is postulated, does imply the reality of a predicamental quantity distinct from the extremes of pure unextended material substance and actual local extension. Unfortunately, it suffers from the defect of a recourse to an extra-philosophical principle. This tendency of Suarez to stray from the domain of rational metaphysics is unnecessary for validating certain crucial theses, in view of an upcoming section of his treatise. Perhaps the temptation is too strong to resist on account of the ease and usefulness of the theological illustration. Again, when menaced by the Nominalists with a distinction of reason alone between aptitudinal extension and physical substance, he blocks their attempted escape route with an admixture of more dialectical (or *ad hominem*) refutation plus the mystery of the Blessed Sacrament.<sup>96</sup>

We now summarize Suarez's rebuttals to the four main Nominalist arguments initially outlined — labeled (A), (B), (C), (D).

(A) First, although Suarez concedes that matter contains parts entitatively distinct through their very selves, he denies that something is quantified solely by virtue of the fact that its parts occupy distinct partial spaces, but rather because they necessarily demand of themselves such local extension. Indeed, even incorporeal beings (like angels) are capable of existing in diverse spaces (namely, through their transitive actions on the physical world endowing them with definitive presence), yet they are certainly not quantified. It is quite another story, however, to be unable to exist naturally *except* in different spaces — a state of affairs pertaining to the parts of material substance and requiring quantity, for otherwise they could exist indifferently either in a single place or in a multiplicity of places. The reason why matter is so disposed as to have this natural exigency via a distinct reality (and not through itself alone) is due to the disparate functions of matter, form, and quantity. Matter *per se* is neither substantially informed nor accidentally qualified, and form as such bestows determinate character (absolute in the case of substantial form and relative in the case of accidental form). Both are limited to their special offices : matter with respect to potentiality and form with respect to actuality. Consequently, an entity really diverse from both matter, form, and (by implication) the composite physical substance is primarily responsible for conferring this natural inclination to spatial extension.<sup>97</sup> Suarez seems to have succeeded here in constructing a solid proof from pure reason for the real distinction between material substance and quantity, where the latter is construed as an accident at a lower rung than full-fledged situational extension.

(B) Second, having admitted that God could conserve corporeal substance without quantity (understood in context as actual local extension), Suarez also grants that such a substance would retain an internal distinction, composition, and union of parts. Nevertheless, contrary to the Nominalists, these things would not suffice for the substance to be quantified, since it would lack the proximate capacity to repel other bodies from the site whence its activities proceed. And if someone were to retort that this penetrability would deprive it of its materiality and render it (so to speak) an-

96. *MD*, XL, Sec.2, pars.16-17.

97. *MD*, XL, Sec.2, par.20.

gelic, Suarez repudiates this inference, because (as in (A) above) the substance would still possess the natural demand for quantitative mass — unlike a spirit having no affinity for quantity whatsoever.<sup>98</sup> We here encounter an equivocation in the term “quantity”, one kind being separable (at least by Divine power) and the other incapable of being subtracted from a physical substance. Of course, this entire discussion postulates an unproved premise (straddling the fence between philosophical cosmology and dogmatic theology) about the separability of bodies from actually extended quantity.

(C) As for the third Nominalist objection, Suarez responds by rejecting the assumption that all really distinct accidental forms can be preserved in a material substance without the quantified remaining. Indeed, this assertion does seem gratuitous. Moreover, if a physical substance were reduced to an arbitrarily small space, even to an indivisible point, Suarez would nonetheless ascribe quantity to it, because quantity does not mandate actual extension in space. Rather, the substance would require for its quantification only the inherent aptitude for an ordering of parts in place. (Suarez is again intimating what will be definitively established in an approaching section of the treatise about the essence of continuous physical quantity.) As usual, he buttresses his case by adducing the evidence of the Body of Christ in the Sacrament of the altar.<sup>99</sup>

(D) Lastly, Suarez dismisses the fourth Nominalist argument with the concise statement that substance receives contraries as their primary (or ultimate) subject, whereas quantity is their proximate subject.<sup>100</sup> His terse remark could be read as a remedial clarification of Aristotle’s differentiation in *Categories* 5-6, where we are told that quantity is not receptive of contraries, unlike substance. But Aquinas’ lengthier exegesis is more perspicuous, as we saw earlier.<sup>101</sup>

After this tortuous journey (with apologies to the reader), we finally reach the destination to which Suarez has been guiding us all along : namely, the essence of continuous physical quantity. We shall trace his development of this climactic theme, although we have already had previews of his resolution, thanks to the none-too-subtle hints interspersed among the problems discussed in previous sections.

Suarez initially reports two prevalent opinions concerning the primary meaning of quantity. The first view holds that it is what constitutes a thing *per se* divisible into similar parts. Some reasons justifying this position include Aristotle’s definition from *Metaphysics* Δ 13 and the fact that the species of quantity are gathered precisely in accordance with its various modes of divisibility (continuous quantity differing from discrete quantity because the former is divisible into parts united in a common limit, whereas the latter is divisible into things not partaking of a common limit).<sup>102</sup>

98. *MD*, XL, Sec.2, par.21.

99. *MD*, XL, Sec.2, par.22.

100. *MD*, XL, Sec.2, par.23.

101. Consult note 41 and the accompanying explanation in the body of this paper.

102. *MD*, XL, Sec.4, par.2.

The second camp avers that the proper function of quantity is the extension of parts in place. The fundamental rationale on which this perspective rests is that divisibility is made possible only derivatively from the distinction of parts effected by the formal character of extension. Hence, divisibility cannot claim primacy, but there can be no prior reason why quantity has a distinction of parts since it is *per se* of such a nature.<sup>103</sup>

Suarez favors the truth of the second school in what it affirms, but believes that it undeservedly disparages the first school of thought, because some of the controversy stems from a verbal dispute. In fact, he sympathetically cites Capreolus (a proponent of the first position) as drawing a distinction between two senses of division : separation of parts from each other and mutual negation of parts by each other. Capreolus had denied that divisibility in the first sense is the essence of physical quantity, but had approved it in the second sense. Indeed, according to Suarez, extension seems nothing else than the reciprocal exclusion or otherness of parts within a material substance. Consequently, divisibility is the same as extension regarding the thing signified, except that the aptitude for division, regarding the manner of signifying, connotes an extrinsic denomination. So he concludes, in eventual agreement with the second stance, that divisibility (taken with logical rigor) does not constitute the essential meaning of quantity, but is rather a certain property of it. Yet he finally comments that even the second camp's interpretation of quantity as situational extension arises through an extrinsic transference from our real experience or mental conception of space ; therefore, it is likewise a property (and by implication not the essence) of continuous physical quantity.<sup>104</sup> Suarez will not completely surrender extension, though ; he declares that the major difficulty resides in how it must be understood, insofar as it is said to pertain to the essential notion or primary formal effect of quantity.<sup>105</sup>

He continues his analysis by drawing a twofold distinction of his own among the parts of matter subject to quantity : one entitative and the other situational. Suarez then asserts that situational distinction indubitably arises radically from quantity, but that this is false and impossible for entitative distinction of parts.<sup>106</sup> His chief reason for this latter judgment is his general principle that something with a true and proper reality cannot be distinguished from another similar thing through an entity distinct from itself. Indeed, transcendental unity already makes a thing through its very self to be undivided in itself and other than what it is not. Moreover, distinction between two realities via a third entity would instigate an infinite regress. It follows that the entitative parts of matter are not distinct on account of quantity, but through themselves alone.<sup>107</sup> Thus, matter in and of itself has a multiplicity of parts but does not have

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103. *MD*, XL, Sec.4, par.3.

104. *MD*, XL, Sec.4, par.4.

105. *MD*, XL, Sec.4, par.5.

106. *MD*, XL, Sec.4, par.7.

107. *MD*, XL, Sec.4, par.8. For an application of SUAREZ's general metaphysical precept in the context of his denial of a real distinction between actual essence and actual existence, see *Metaphysical Disputation*, XXXI : *On the Essence of Finite Being as Such, On the Existence of that Essence and their Distinction*,

extension, unless we agree to use the term “extension” in a broad sense by speaking of it as “entitative” or “substantial”.<sup>108</sup> In typically Suarezian fashion, he confirms his new distinction in the Eucharistic Sacrament, where the Body of Christ contains, beyond the substantial distinction of the parts of matter, a quantitative extension of parts which are ordered among themselves but not in place.<sup>109</sup> This sublime theological doctrine does not as such enter his demonstration (which explicitly depends on his theories of matter<sup>110</sup> and of distinction<sup>111</sup>), but it certainly performs an obliging service for Suarez.

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trans. Norman J. Wells, Milwaukee, Marquette University Press, 1983, ed. James H. Robb, Sec.1, par.13, p. 52 : “[...] some thing cannot be intrinsically and formally constituted in the character of a real and actual being by something distinct from it. For, by the very fact that one is distinguished from another, as a being from another being, both have the status of a being, as equally distinct from the other, and consequently not [constituted] formally and intrinsically by that [other].”

108. *MD*, XL, Sec.4, par.13.

109. *MD*, XL, Sec.4, par.14. Cf. F. COPLESTON, *op. cit.*, p. 191.

110. *MD*, XL, Sec.4, par.9 : “[...] matter [...] has being prior by nature to its receiving quantity ; therefore, it is also understood with a natural priority as having its whole entity, in which it receives all its quantity, and having the diverse parts of its substance, in which it receives the diverse parts of quantity ; thus, it does not have a distinction of parts from quantity.” It is notorious that SUAREZ rejects “signate” matter (matter marked by dimensive quantity) as the principle of individuation for physical substances. As background, see *MD*, XL, Sec.4, par.12 (end), where Suarez insists that the “pure potency” of matter does not militate against its possessing a “proper entity” permitting it of itself a “substantial distinction and composition of parts”, since “for this it suffices that it actually have its partial essence or substance”. Finally, see *Metaphysical Disputation*, V : *Individual Unity and its Principle*, trans. Jorge Gracia, Milwaukee, Marquette University Press, 1982, where, in Sec.6, par.2, p. 122, SUAREZ argues that prime matter is “individual and singular in itself”, and that “the foundation of such unity is its entity by itself as it is in reality” ; he denies that the basis of this unity is the substantial form, or a relation to any form, “since, when any substantial form changes, the matter remains always numerically the same, which [matter], although it may actually be united to this or that form, nevertheless expresses of itself a common and indifferent relation to any form it can receive.”

111. For an exhaustive discourse on SUAREZ’s classification of distinctions, see *Metaphysical Disputation*, VII : *On the Various Kinds of Distinctions*, trans. Cyril Vollert, Milwaukee, Marquette University Press, 1947/1976. Suarez enumerates three types of distinctions : the real, the mental (or conceptual), and the modal. Real distinctions, which intervene between two things independently of the mind’s operation (whether or not these realities are truly separable), are treated in Sec.1, pars.1-3, 22-26, and Sec.2, pars.9-21. Conceptual distinctions, which are covered in Sec.1, pars.4-8, and Sec.2, par.28, are subdivided into those produced by the mind with simply no foundation in reality (a “distinction of the reasoning reason” or minor rational distinction) and those conceived as the result of the mind’s activity but with a basis in the nature of things (a “distinction of the reasoned reason” or major rational distinction). However, there is a group of distinctions greater than merely conceptual ones, yet not admitting such ontic density that they satisfy the standard for real differentiation between things. These “modal” distinctions, discussed in Sec.1, pars.16-20, and Sec.2, pars.6-8, obtain between or arise from positive aspects of reality that “modify” entities by endowing them with a further seal beyond their perfect natural essence as individual. These “modes” are not accidents (like quantity or proper sensible qualities) existing as absolute entities in substance, but are rather final bonds of cohesion (such as the very inherence itself) that add no new entity. Another example is the very subsistence of an actually existing substantial essence. Obviously, these kinds of “presence, union, and termination” [Vollert, p. 30] are incapable of constituting a real being in itself (and are certainly not separable), but still they are antecedent to the work of the human mind ; thus, they fall between real and conceptual distinctions, less ontologically firm than the former yet surpassing the latter. A sign of a modal distinction is non-mutual separation, whereby one of the terms is destroyed while the other extreme survives. Finally, in Sec.1, par.21, Suarez proves that this classification of distinctions is an “adequate” (i.e., exhaustive) partition, by logically subdividing the possible ways things may be distinguished from each other.

After all the meanderings of his preceding explorations (together perhaps with an inductive process of elimination), Suarez at last unhesitatingly avers that the extension which quantity confers consists in this : the thing affected by quantity is innately empowered to have extension of parts in relation to place.<sup>112</sup> Thus, he says, there are three kinds of extension : entitative (which does not pertain to the effect of quantity as such, but can be found among the parts of substance and quality without quantity), local or actual (which is posterior to quantity), and *aptitudinally* situational (which is the formal meaning of quantity).<sup>113</sup> We recall that Suarez had planted clues along the road. For instance, in his altercation with the Nominalists, he had referred to a type of quantity as that extension which a body has in itself by reason of which it is apt to occupy this or that space and to have this or that situation of parts : in other words, an extension which can be called “aptitudinal” with respect to place.<sup>114</sup> Later he had made the transparent proposal that quantity is not actual extension in space, but rather *aptitudinal extension*.<sup>115</sup>

Should someone protest that this formula does not enunciate the essence of quantity any more than aptitudinal divisibility, Suarez replies that we have achieved enough if we can clarify the essence through that property which is first among all and closest to a given thing, because the human mind can seldom explain the essences of things insofar as they exist in themselves. Besides, Suarez answers, he is not claiming that the essence of quantity resides in the aptitude for expelling or resisting another body lest it invade the same space, because this is indeed rightly counted among the properties of quantity. Instead, he is proclaiming that the essential character of quantity lies in being an inherent form bestowing corporeal mass or extension on material substances ; but what it means to have corporeal mass we cannot articulate except through an ordination to this effect, whereby another body is apt to be excluded from occupying the same space simultaneously. Consequently, continuous physical quantity is a form endowing a body with the disposition for situational extension — which is the sole *per se*, absolutely necessary, proper and primary effect of quantity (even though we can boast no direct intellectual intuition into this form).<sup>116</sup>

Now someone might pursue the Nominalist thesis that matter through its entity, without quantity, has the capacity and aptitude for local extension. Hence, such a person would argue, this sort of extension cannot be the formal effect of quantity.<sup>117</sup> Another might counter, however, that if quantity were removed, then extension could not remain in the parts of matter, since those parts would not retain any order among

112. *MD*, XL, Sec.4, par.15 : “Dicendum ergo est extensionem quam confert quantitas in hoc consistere quod res affecta quantitate, ex vi illius nata est habere extensionem partium in ordine ad locum [...]”

113. *Ibid.* Cf. also Sec.4, par.28 (end) about “quantitative order”.

114. Cf. *MD*, XL, Sec.2, par.15. See the body of this paper governed by note 92.

115. Cf. *MD*, XL, Sec.2, par.22 : “[...] quantitas non est actualis extensio in spatio, sed aptitudinalis [...]” Observe the use of “*aptum*” in the Latin translation of Aristotle’s definition of quantity given in note 62 above. Also, see the body of this paper governed by note 96.

116. *MD*, XL, Sec.4, par.16.

117. *MD*, XL, Sec.4, par.18.

themselves ; *a fortiori* they could not retain an ordination to place.<sup>118</sup> Suarez seems to alter this reply, though, in accordance with his theory of matter : namely, entitative extension would perdure in the substance, but not actual local extension. Yet, because material substance and the affinity for local extension are so intimately connected, the latter affinity will necessarily remain, and so the assumption that quantity in the strict minimal sense is removable must be denied. Nevertheless, the Nominalist equation of the two does not follow, because physical substance and quantity (even in its absolutely essential meaning) are “diverse realities” with intrinsically distinct effects identifying them.<sup>119</sup>

Suarez broaches the problem of rarefaction and condensation — processes in which apparently the same quantity, without gain or loss of matter, occupies a greater or lesser volume. Someone could therefore deny that the formal effect of quantity consists in the radical extension of parts in ordination to place or the tendency for so affecting each other that they can exercise reciprocal exclusion from the same space. Suarez admits that the way in which these events occur is a difficult physical question. Hence, he refuses to enter a cursory discussion here over how they happen. Nonetheless, although he sidesteps an explanation of the manner of occurrence, he holds that there is nothing incongruous with his theory of the essence of quantity. Quantity still plays the role of extending substance and giving it corporeal mass, but without determining a definite limit in relation to the space which the substance becomes capable of filling. Thus, quantity remains the accidental form bestowing aptitudinal extension on material substance.<sup>120</sup> This seems to be a satisfactory general answer consonant with an appropriate level of philosophical abstraction. The details can be left to experimental physics or chemistry.

Suarez concludes that whatever quantity has exists for the sake of substance and on account of substance. Quantity is instituted primarily for endowing physical substance with the property that it consist of parts which by nature expel each other from simultaneous occupation of the same space, and this attribute is then communicated to material forms and other corporeal accidents.<sup>121</sup> So, despite his spirited defense (within the disputation’s opening section) of Aristotle’s description of quantity in terms of divisibility, it turns out that Aristotle’s formula merely encapsulates or enshrines a property of dimensive quantity or actual local extension — it does not isolate the essence of continuous physical quantity. The philosophical basis for Suarez’s definition is rather to be found in Aquinas’ germinal idea of aptitudinal accidents near the close of *De Ente et Essentia*.<sup>122</sup>

As a final tie-in between quantity and matter, let us mention Suarez’s explicit avowal that they mutually imply each other : every material composite is necessarily quantified and every quantified substance is necessarily composed of matter. Since

118. *MD*, XL, Sec.4, par.19.

119. *MD*, XL, Sec.4, par.25.

120. *MD*, XL, Sec.4, par.29.

121. *MD*, XL, Sec.4, par.30.

122. Cf. again note 58, *supra*.

they are inseparable concomitants, there must be some natural connection between them. Now, the essence of matter is potency to form ; described negatively, it is formless in itself, lacking active power, ingenerable and incorruptible, and unknowable directly. Hence, quantity is compared to matter as a property of it, because the above characterizations display matter as substance, thus making quantity an accident. Consequently, their nexus is a non-reciprocal dependence, whereby quantity is rooted in the foundation of material substance. Nevertheless, quantity is a true and real property having an entity of its own, though naturally and necessarily conjoined with the entity of matter.<sup>123</sup> It is unclear in what sense Suarez is taking quantity here, but, considering the overall architecture of his work, we would have to interpret it according to its minimal essential meaning of aptitudinal extension (as dictated by the foregoing development).

#### IV. SUMMARY

Suarez reaches some conclusions about the essence of continuous physical quantity that are totally consistent with those of Aquinas, but much more explicitly elaborated (with no grounds for charges of vagueness). Thomas would undoubtedly concur with Suarez that continuous physical quantity is an absolutely inherent accident of material substance, really distinct from it, and conferring on it aptitudinal extension or the propensity for the ordering of parts in place. Aquinas would evidently also accept the following salient Suarezian rejoinder to the Nominalist reduction of quantity to a mode of physical substance and proper sensible qualities : namely, that local extension (fully actualized quantity) functions as a proximate quasi-subject imparting differentiation yet cohesiveness to relatively tenuous sensible qualities, which otherwise would be compenetrated by other material substances or merely exhibit a nebulous association among themselves.<sup>124</sup> Moreover, they agree, quantity can fulfill this task because it is itself somehow (unlike the other predicamental accidents) intrinsically individuated — although Suarez risks circularity when he calls quantity itself quantified (thereby conjuring up the possible threat of an infinite regress of forms by which the previously quantified reality is rendered so).

It may appear that Suarez's intrusion of an article of religious revelation into his discussion of the real distinction between material substance and physical quantity constantly imperils the contours of philosophy. Indeed, a certain tension persists between philosophy and sacred theology here. But theology plays chiefly an extrinsic role, as befits the rightful arenas of the two disciplines.<sup>125</sup> Nevertheless, the tenet that the minimal absolute requirement for continuous physical quantity (hence its essence) consists in aptitudinal extension is ultimately vindicated by the doctrine of the Eucha-

123. *MD*, XIII, Sec.14, par.15.

124. *MD*, XL, Sec.2, pars.11,17 ; *Commentary on Summa Theologiae*, III, Disp. 56, Sec.3, parts. 2,4.

125. Cf. *MD*, VII, Sec.2, par.10, trans. Vollert, *op. cit.*, p. 48 : "[...] supernatural mysteries, the knowledge of which is a great aid to an understanding of natural things. Thus through the mystery of the Eucharist we are made more certain that quantity is a thing distinct from substance than would be possible through purely natural contemplation."

rist. Consequently, dogmas of faith (even if only entertained as possibilities and not embraced as assumptions) can fuel human thought, offering clues to (and perhaps shedding additional light on) truths about the most profound ontic depths of the physical universe.<sup>126</sup>

In any event, categorial confusion is successfully averted via the subtle concept of “aptitudinal extension”: quantity is truly other than place. There seems, however, to be an unavoidable degree of categorial circularity in the endeavor to describe these supreme genera of physical reality. For quantity depends in some way (if only tentatively) on position and therefore place, yet physical place (and hence position or situation) depends ontologically on material substance *qua* quantified.<sup>127</sup> Perhaps we have gained insight into a categorial “circumincession” among the triad of material substance, physical quantity, and place — a dim and remote analogy mirroring the mutual indwelling of the three Persons of the Blessed Trinity at the summit and source of all being.

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126. For the metaphysics of quantity under the aspect of final causality, see George KENDALL, “Space-Time and the Community of Beings: Some Cosmological Speculations”, *The Thomist*, LI (July 1987), p. 480-500, in which extension is viewed as a compensatory striving to overcome the finiteness of physical beings away from isolated discrete points toward a community of substances engaged in mutually perfective interaction. This theme is reminiscent of ARISTOTLE’s pronouncement on the perpetual generation of species as the instinctive inclination of living things to fulfill their potentialities by imitating, insofar as is possible for their natures, the Pure Actuality of the Divine Unmoved Mover (cf. *De Anima*, II,4 : 415a25-b8) who is the eternal, perfect object of ultimate attraction and orderly cosmic development (cf. *Metaphysics*, I,3 : 984b14-22 and XII,7 : 1072a19-b29). BOETHIUS proposes a similar mimetic relationship between the mobile temporal condition of finite beings and the immutable Eternity of God, whose endless life is possessed simultaneously (cf. *Consolation of Philosophy*, V, Prose 6). AQUINAS also corroborates Kendall’s insights when he writes: “Moreover, it is not true that quantity impedes the action of a form, except accidentally; that is to say, insofar as all continuous quantity is in matter, and form existing in matter, having lesser actuality, is consequently less powerful in acting. Hence, a body that has less matter and more form [...] is more active. But, if we consider a kind of action which a form existing in matter may have, then quantity helps to increase rather than to diminish the action.” (Cf. *Summa contra Gentiles*, III, c.69[25].) Aquinas and Kendall thus directly exhibit the purposefulness of quantity in the physical universe, whereas Aristotle and Boethius do so indirectly, through the teleology of motion. In this connection, we might add that extension manifests radical intentionality on the material level: it is both *of* something (i.e., quantity is an accident of material substance) and *for* something (the end of a perfection of material substances).

127. According to AQUINAS in his *Commentary on Aristotle’s Physics*, IV (lect.7, n.475), situation or position is a specific difference of quantity, involving nothing more than an ordering of parts in the whole. He also implies that situation or position or posture (internal orientation of parts) entails place or location (external relation to other bodies).