Hume's "Malezieu Argument"
Todd Ryan
Hume Studies Volume 38, Number 1 (2012), 105-118.

HUME STUDIES
Volume 38, Number 1, 2012, pp. 105–118

Hume's "Malezieu Argument"

TODD RYAN

Abstract: At T 1.2.2.3 Hume offers an argument against the infinite divisibility of finite extension, which he ascribes to "Mons. Malezieu." Scholars have long been aware that the ultimate source of the argument is the *Élémens de Géométrie de Monseigneur le Duc de Bourgogne*, first published in 1705. Although the argument has figured prominently in several recent discussions of Hume's metaphysics, there exists as yet no adequate English translation of Malezieu's text. Furthermore, very little is known about Hume's immediate sources for the argument. In this article, I provide the original French text with translation. I then inquire into Hume's knowledge of the text. Drawing on evidence internal to the Treatise passage itself, I consider two plausible sources: a contemporary review of Malezieu's work in the *Nouvelles de la République des Lettres* and a critical discussion of the argument in Le Gendre's *Traité de l'opinion* (1735). Based on the available evidence, I suggest that the latter was most likely Hume's source.

In section 1.2.2 of *A Treatise of Human Nature*, Hume offers a "strong and beautiful" argument against the infinite divisibility of any finite extension. Hume's formulation of the argument, which he attributes to "Mons. Malezieu," runs as follows:

> 'Tis evident, that existence in itself belongs only to unity, and is never applicable to number, but on account of the unites, of which the number is compos'd. Twenty men may be said to exist; but 'tis only because one, two, three, four, etc. are existent; and if you deny the existence

Todd Ryan is Associate Professor of Philosophy at Trinity College, 300 Summit Street, Hartford, CT 06106. Email: todd.ryan@trincoll.edu.

> of the latter, that of the former falls of course. 'Tis therefore utterly absurd to suppose any number to exist, and yet deny the existence of unites; and as extension is always a number, according to the common sentiment of metaphysicians, and never resolves itself into any unite or indivisible quantity, it follows, that extension can never at all exist. 'Tis in vain to reply, that any determinate quantity of extension is an unite; but such-a-one as admits of an infinite number of fractions, and is inexhaustible in its sub-divisions. For by the same rule these twenty men *may be consider'd as an unite*. The whole globe of the earth, nay the whole universe *may be consider'd as an unite*. That term of unity is merely a fictitious denomination, which the mind may apply to any quantity of objects it collects together; nor can such an unity any more exist alone than number can, as being in reality a true number. But the unity, which can exist alone, and whose existence is necessary to that of all number, is of another kind, and must be perfectly indivisible, and incapable of being resolv'd into any lesser unity. (T 1.2.2.3; SBN 30–31; Hume's emphasis)[1]

Though scholars have long been aware that the ultimate source of the argument is the *Élémens de Géométrie de Monseigneur le Duc de Bourgogne*, there exists as yet no adequate English translation of the relevant passages.[2] Moreover, very little is known about Hume's immediate sources for the "Malezieu argument," as it has come to be known. In this note, I will provide a translation of the text of Malezieu's argument and briefly discuss possible sources of Hume's knowledge of the argument.

As its title suggests, the *Élémens* purports to be the work of the young Louis de France, Duke of Burgundy and grandson of Louis XIV. In time, however, the book came to be attributed to Nicolas de Malezieu, who served as tutor of mathematics and philosophy to the young prince, and who was instrumental in bringing the manuscript to press. As recounted in the preface, Malezieu's pedagogical method was designed to encourage his pupil to work through the chain of geometrical demonstrations with care and precision. To this end, Malezieu required the prince to write out at the start of each lesson an orderly exposition of what he had been taught the previous day.[3] The published work is presented as a compilation of the geometrical reasonings produced in this manner by the future duke. Initially published in 1705, revised editions of the text appeared in 1722 and (posthumously) in 1729. A final edition was published in 1735.

It is difficult to determine to which edition of the work Hume might have had access. However, the section in which the argument appears is substantially the same in all four editions, with only minor variations in orthography and punctuation. The argument occurs in a section entitled "Reflections on

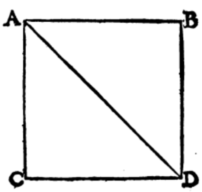
Incommensurables," which follows Proposition 4 of Book 9.[4] Having proved in the demonstration of that proposition that the diagonal of a triangle is incommensurable with its side, Malezieu offers an extended discussion of the implications of this result. He first argues that the existence of incommensurables demonstrates the infinite divisibility of matter, which Malezieu understands to be equivalent to the claim that physical extension cannot be composed of indivisible points.[5] He then offers two arguments for the opposite conclusion that matter must be composed of indivisibles. The first is a geometrical argument concerning the point of contact between a sphere and a plane surface. The second is the "strong and beautiful" metaphysical argument to which Hume appeals. Having advanced what he takes to be irrefutable arguments for each of two contradictory propositions, Malezieu closes his remarks with the observation that there are questions that surpass our understanding and that recognition of the limitations of human reason should make us less bold to challenge the mysteries of Christian faith.

In what follows I provide both the original text of the "Reflexions sur les Incommensurables" taken from the 1705 edition of the *Élémens* and a translation. For ease of reference, I have added paragraph numbers to both Malezieu's French text and the accompanying translation.

Text and Translation

Reflexions sur les Incommensurables.

[1] Rien n'est plus étonnant que ces verités démontrées touchant les Incommensurables. La ligne *AC*, & la ligne *AD*, ont chacune une infinité d'Aliquottes pareilles, & dans ce nombre infini, je ne puis jamais en trouver une seule, qui puisse être l'Aliquotte des deux lignes.



[2] Je puis prendre, par exemple, la centmilliéme partie de la ligne *AC*; la deux centmilliéme, la quatre centmilliéme, & ainsi doublant toûjours à l'infini, sans que jamais aucune de ces petites parties puisse être contenuë précisément un certain nombre de fois dans la ligne *AD*.

[3] Je puis même choisir une infinité d'Aliquottes de la ligne *AC*, d'un ordre tout different. Je puis prendre la trois centmilliéme partie; la neuf centmilliéme, & ainsi triplant toûjours à l'infini, sans que jamais dans cette infinité d'infinis, je puisse trouver une partie qui mesure exactement la ligne *AD*.

[4] Cette vérité démontrée, démontre invinciblement la divisibilité de la matiere à l'infini, ou pour s'exprimer autrement, que l'étenduë ne peut être composée d'indivisibles; car si le côté du quarré, par exemple, étoit composé d'indivisibles, il en contiendroit necessairement un certain nombre, ainsi l'un de ces indivisibles seroit aliquotte de ce côté. Prenant maintenant l'un de ces indivisibles ou aliquotte, pour mesurer la Diagonale, il y sera contenu précisément un certain nombre de fois, ou avec un reste. Si vous dites qu'il y est contenu précisément un certain nombre de fois; voilà la Diagonale commensurable au côté, ce qui a été démontré impossible. Si vous dites que cet indivisible est contenu dans la Diagonale un certain nombre de fois avec un reste; je vous demande ce que c'est que le reste d'un indivisible, ce reste sera necessairement plus petit que l'aliquotte dont il est reste, & par consequent cette aliquotte n'étoit pas indivisible, contre la supposition; donc l'étenduë n'est pas composée d'indivisibles.

[5] Il n'y a rien de démontré, si cela ne l'est pas: car de dire comme certains gens, qu'il n'y a point de quarrés parfaits, par consequent point de côtés ni de Diagonales, c'est raisonner pitoyablement.

[6] Il n'est pas necessaire qu'il y ait au monde ni des quarrés, ni des triangles, ni des cercles, pour établir la verité des Démonstrations geometriques, il suffit de leur possibilité. Quand Dieu n'eût jamais créé la matiere, elle eût toûjours été possible. Un être intelligent à qui il lui auroit plû reveler les verités geometriques, les eût parfaitement entenduës. Cet Estre Souverain, source de toute verité, auroit bien sçû du moins qu'un triangle possible, étoit moitié d'un parallelogramme possible. On ne peut pas même pousser assés loin l'extravagance, pour oser dire, que quand bien il n'y auroit à present dans l'Univers aucun Agent creé qui pût tracer un quarré parfait, il fût impossible à celui qui a creé la matiere, d'en enfermer une petite portion dans un espace parfaitement quarré; ainsi la verité des incommensurables subsiste invinciblement.

[7] Voilà donc les points démontrés impossibles. Mais voicy bien autre chose.

[8] Si le point est impossible, qu'est-ce donc que la rencontre des deux côtés qui forment l'angle du quarré. Si le point est impossible, le cercle est impossible. Car si Dieu forme une boule parfaite, et qu'il la pose sur un plan parfait, le point de contingence aura-t-il quelque étenduë; s'il a quelque étenduë, il est surface ou pour le moins ligne; ainsi la tangente & le cercle auront une étenduë commune, contre ce qui est démontré dans la 11^e^ Proposition du troisiéme Livre; dirés-vous, que Dieu ne sçauroit faire un cercle parfait? Vous aurés plûtôt fait de dire que Dieu n'est pas, que de borner si ridiculement sa puissance.

[9] D'ailleurs quand je considere attentivement l'existence des estres; je comprens très-clairement que l'existence appartient aux unités, & non pas aux nombres. Je m'explique.

[10] Vingt hommes n'existent que parce que chaque homme existe; le nombre n'est qu'une dénomination exterieure, ou pour mieux dire, une répetition

d'unités ausquelles seules appartient l'existence; il ne sçauroit jamais y avoir de nombres, s'il n'y a des unités; il ne sçauroit jamais y avoir vingt hommes, s'il n'y a un homme: cela bien conçû, je vous demande ce pied cubique de matiere, est-ce une seule substance, en sont-ce plusieurs? Vous ne pouvés pas dire que ce soit une seule substance; car vous ne pourriés pas seulement le diviser en deux; si vous dites que c'en sont plusieurs, puisqu'il y en a plusieurs, ce nombre quel qu'il soit, est composé d'unités, s'il y a plusieurs substances existantes, il faut qu'il y en ait une, & cette une ne peut en être deux; donc la matiere est composée de substances indivisibles.

[11] Voilà nôtre Raison réduite à d'étranges extremités. La Geometrie nous démontre la divisibilité de la matiere à l'infini, & nous trouvons en même temps qu'elle est composée d'indivisibles. Humilions-nous encore une fois, et reconnoissons qu'il n'appartient pas à une créature, quelque excellente qu'elle puisse être, de vouloir concilier des verités, dont le Créateur a voulu lui cacher la compatibilité. Ces dispositions nous rendront plus soumis aux Mysteres, & nous accoûtumeront à respecter des verités qui sont par leur nature impénetrables à nôtre esprit, que nous venons de trouver assés borné, pour ne pouvoir pas même concilier des Démonstrations mathematiques.

Reflections on Incommensurables

[1] Nothing is more astonishing than these demonstrated truths concerning incommensurables. The line AC and the line AD each have an infinity of like aliquot parts,[6] and among this infinite number, I can never find a single one that can be an aliquot part of the two lines.

[2] I can take, for example, the one hundred-thousandth part of the line AC, the two hundred-thousandth, the four hundred-thousandth and so on, continually doubling to infinity, without any of these little parts ever being able to be precisely contained a certain number of times in the line AD.

[3] I can even choose an infinity of aliquot parts of the line AC of an entirely different order. I can take the three hundred-thousandth, the nine hundred-thousandth and so on, continually tripling to infinity, without ever being able to find within this infinity of infinites a part that exactly measures the line AD.

[4] This demonstrated truth irrefutably demonstrates that matter is infinitely divisible, or to put the point another way, that extension cannot be composed of indivisibles. For, if the side of a square, for example, were composed of indivisibles, it would necessarily contain a certain number of them. Thus, one of these indivisibles would be an aliquot part of the side. If we now take one of these indivisibles, or aliquot parts, to measure the diagonal, it will be contained in it precisely a certain number of times or with a remainder. If you say that it is contained in it precisely a certain number of times, then the diagonal is commensurable with the

side, which was demonstrated to be impossible. If you say that this indivisible is contained in the diagonal a certain number of times with a remainder, I ask what can the remainder of an indivisible be? This remainder will necessarily be smaller than the aliquot part of which it is the remainder, and consequently the aliquot part was not indivisible, contrary to the assumption. Therefore, extension is not composed of indivisibles.

[5] Nothing is demonstrable, if not that. For, to say with some people that there are no perfect squares, and consequently, neither sides nor diagonals, is to reason pitifully.

[6] It is not necessary that there be squares or triangles or circles in the world in order to establish the truth of geometrical demonstrations—their possibility is sufficient. Even if God had never created matter, it would still have been possible. An intelligent being to whom He had been pleased to reveal the truths of geometry would have understood them perfectly. This supreme being, the source of all truth, would have known at least that a possible triangle was half of a possible parallelogram. Surely, one cannot be so extravagant as to dare say that if there were at present in the universe no created being who could draw a perfect square, it would have been impossible for Him, who created matter, to enclose a small portion of it in a perfectly square space. And so, the truth of incommensurables stands irrefutably.

[7] Thus, the impossibility of points has been demonstrated. But here is something very different.

[8] If points are impossible, what then is the meeting of the two sides that form the angle of the square? If points are impossible, circles are impossible. For if God were to form a perfect sphere and place it on a perfect plane, would the point of contact be extended? If it is extended, it is a surface, or at least a line, and so the tangent and the circle would have a common extension, contrary to what was demonstrated in Book 3, Proposition 11. Will you say that God cannot form a perfect circle? You would do better to say that God does not exist than to limit his power in such a ridiculous manner.

[9] Moreover, when I carefully consider the existence of things, I very clearly understand that existence pertains to units and not to numbers. I shall explain my meaning.

[10] Twenty men exist only because each man exists; number is only an extrinsic denomination, or better, a repetition of units to which alone existence pertains. There could never be numbers, if there are no units. There could never be twenty men, if there is not one man. With this firmly in mind, I ask whether this cubic foot of matter is one single substance or several? You cannot say that it is one single substance, since [in that case] you could not so much as divide it in two. If you say that it is several substances, [then] since there are several, this number, whatever it may be, is composed of units. If there are several existing

substances, there must be one; and this one substance cannot be two. Therefore, matter is composed of indivisible substances.

[11] Thus is our Reason reduced to great extremities. Geometry demonstrates the infinite divisibility of matter, and at the same time we find it is composed of indivisibles. Let us humble ourselves once again and recognize that it is not the part of a creature, however excellent it may be, to hope to reconcile truths, whose compatibility the Creator has wished to conceal from it. These dispositions will render us more submissive to the mysteries and accustom us to respect those truths that by their nature are impenetrable to our mind, which we have just found so limited as to be unable even to reconcile mathematical demonstrations.

Hume's Knowledge of the Text

What was the source of Hume's knowledge of the Malezieu argument? Did he consult the *Élémens de Géométrie* itself? Unfortunately, there seems to be no external evidence to corroborate this hypothesis. The *Élémens* does not appear in the catalog of books thought to have belonged to Hume (and his nephew, David).[7] Nor is Malezieu's text mentioned in either Hume's correspondence or the early memoranda.[8] Mossner has rightly puzzled over the circumstances that might have led the Scottish philosopher to seek out an elementary geometry text purportedly written by the then fourteen-year-old Duke of Burgundy.[9] He considers the *Élémens* to be one of several French works that it "seems so astounding for a foreigner to have consulted."[10] Mossner's suggestion that Hume must have encountered the work during his stay at La Flèche, while not implausible, is, by his own admission, a mere conjecture.

Although we have no external evidence regarding Hume's immediate source for the argument, a careful reading of the *Treatise* passage itself nonetheless reveals several important clues. First, there is the narrowness of Hume's focus. One of the most striking features of Hume's invocation of Malezieu is that it is restricted to a single argument contained in paragraphs [9] and [10]. Hume seems to take no account of Malezieu's argument for the other half of the paradox—that is, for the infinite divisibility of matter based on the incommensurability of the diagonal with its side.[11] In light of this, we should consider the possibility that Hume encountered Malezieu's argument indirectly, perhaps in an abbreviated form. One plausible source of just this kind is the contemporary periodicals, which routinely published reviews or abstracts of recent publications. The original edition of the *Élémens de Géométrie* was reviewed in several journals, including the *Nouvelles de la République des Lettres* (7 (Sep. 1705): 351–57), then edited by Jacques Bernard, and the *Mémoires pour l'histoire des sciences et des beaux-arts*, commonly referred to as the *Journal de Trévoux* (129 [Sep. 1705]: 1467–79).[12] Interestingly, both reviewers single out for discussion Malezieu's philosophical reflections on incommensurables.

Of the two, the review that appeared in the *Nouvelles de la République des Lettres* (hereafter *NRL*) is the more interesting,[13] since in it Bernard provides an extract of the metaphysical argument against indivisible points.[14] Bernard presents the argument as one side of a paradox concerning the composition of matter. He states the first half of the paradox as follows: "on the one hand, we find an invincible demonstration of the infinite divisibility of matter, or what is the same thing, that extension cannot be composed of indivisibles."[15] In support of the other side of the question, Bernard quotes the Malezieu argument at length, reprinting the crucial paragraphs [9]–[11], with the omission of only two phrases from paragraph [10]: "an extrinsic denomination, or better" and "There could never be twenty men, if there is not one man." Thus, the *NRL* review provides the text of the Malezieu argument, while omitting any detailed discussion of the opposing argument for infinite divisibility. To this extent it seems an excellent candidate for Hume's direct source. Furthermore, we have good independent reason to think that Hume read the *NRL*. In Part 9 of the *Dialogues concerning Natural Religion*, Hume cites a short article by Fontenelle published in the September, 1685 edition of the *NRL*.[16] Moreover, the *NRL* of 1705 was of particular interest to Hume, since it contained Bernard's two-part review of Bayle's *Continuation des Pensées Diverses*. As J. P. Pittion has shown, not only was the *Continuation* a main topic of the early memoranda, but several of the entries seem to have been culled not from the *Continuation* itself, but rather from Bernard's review of the work published in the *NRL* of February and March 1705.[17] Therefore, there is some reason to believe that it may have been by means of the *NRL* review of September 1705 that Hume became acquainted with the Malezieu argument.

However, this is not the whole story. For the text at T 1.2.2.3 (SBN 30–31) provides further clues. As part of his discussion, Hume not only formulates a version of Malezieu's argument for indivisibles but also goes on to consider a possible objection to the argument. Hume writes, " 'Tis in vain to reply, that any determinate quantity of extension is an unite; but such-a-one as admits of an infinite number of fractions, and is inexhaustible in its sub-divisions." The objection is curious in that it challenges one of the central tenets of the Hume-Malezieu position, namely, that a unit is an indivisible entity. Both Malezieu and Hume understand a unit to be that which is compositionally simple and, therefore, indivisible. Thus, Hume can speak of a "unite or indivisible quantity." The objection attempts to block the Malezieu argument by treating finite determinate bodies as a kind of unit, but such a one as is infinitely divisible. Why did Hume think it necessary to rule out this possibility? Neither Malezieu's original text nor the reviews published in the *Nouvelles de la République des Lettres* or the *Journal de Trévoux* consider such a reply to the argument for indivisible units. Was the objection, then, of Hume's own devising?

While this possibility cannot be ruled out, it seems rather more likely that Hume is responding to some criticism encountered elsewhere in his reading. Here I would offer the following suggestion. In 1735 Gilbert-Charles Le Gendre, Marquis de Saint-Aubin, published a second edition of the *Traité de l'opinion*, a work in six volumes that was reviewed by the *Journal des Sçavans* (Nov. 1735, pp. 341–65). For this revised edition, Le Gendre placed at the head of the third volume an "Avis de l'auteur" in which he attacks the same metaphysical argument for indivisibles offered by Malezieu and reformulated by Hume (recall that the *Élémens de Géométrie* had been reedited earlier that same year). Le Gendre is a proponent of the infinite divisibility of matter and is scandalized by what he takes to be the skeptical implications of Malezieu's paradox. Thus, while praising Malezieu for having demonstrated the infinite divisibility of matter based on incommensurables, Le Gendre objects to Malezieu's argument for indivisible units on the grounds that it begs the question against the defender of infinite divisibility. Le Gendre first quotes Malezieu's argument in its entirety (paragraphs [9] and [10]) and then proceeds to attack its central premise, namely that existence belongs only to units and never to number. Le Gendre writes:

> Malezieu's second argument is no stronger. It is a *petitio principii* as can be easily seen. A cubic foot of matter is as indivisible as a man, *qua* cubic foot and *qua* man. Each of these substances is, in this sense, one single substance. But matter, or body in general, is necessarily a composite substance [*substance multiple*] and composed of parts that are infinitely divisible. In this case, existence necessarily belongs to the united particles. Therefore, it does not always belong to units, and this proposition cannot be offered as a proof, since the question at hand is whether, in the division of matter, we can arrive at an ultimate indivisible unit. . . . Furthermore, Malezieu misuses the term *substance*. A material substance that can be annihilated by division only exists through unity [*par unité*]. Thus, a cubic foot of matter, or a man when divided in two no longer has the existence of a cubic foot or a man. But matter itself cannot be destroyed by division. It is a substance that can be annihilated only by the omnipotence of the creator—[matter is] a substance that, far from existing through unity, exists only through the multiplicity of its parts.[18]

The argument is not altogether clear. Taking as an example the one cubic foot of matter mentioned by Malezieu, Le Gendre first attempts to establish that there is a sense in which any determinate quantity of matter can be considered a unit, that is, an indivisible entity. As Le Gendre puts the point, a cubic foot of matter is indivisible *qua* cubic foot. The key principle seems to be that a thing of kind F is indivisible *qua* F if and only if it can be separated into parts none of which is of kind F. This is suggested by Le Gendre's later assertion that "a material substance that can be annihilated by division only exists through unity. Thus, a cubic foot of matter, or a man, when divided in two no longer has the existence of a cubic foot or a man." Thus, a human being is indivisible *qua* human being, because it can be separated into parts none of which is a human being. Similarly, Le Gendre argues, a cubic foot of matter is indivisible *qua* cubic foot, since it can be divided in such a way that none of the resulting parts is a cubic foot. In this sense, the cubic foot of matter, like the human being, is an indivisible entity, and so a unit. Thus, Le Gendre denies Malezieu's claim in paragraph [10] that the cubic foot of matter cannot be considered "one single substance."

Le Gendre then observes that while the cube is indivisible in the sense just explained, it is at the same time a material object and so has the nature of matter in general. In speaking of "the nature of matter in general," he presumably refers to those properties that are common to every material thing solely by virtue of being a material object. Excluded from consideration would be any species-dependent qualities (those qualities it has by virtue of being an oak tree or a lump of coal, for example) as well as any determinate quantity of the material object. Now, according to Le Gendre, it is the nature of matter to be a composite of material substances—that is, to be composed of material parts that are themselves composed of material parts, and so on to infinity. Considered as matter, existence belongs not to the parts individually but to the agglomerated parts taken as a whole. As Le Gendre puts the point, "in this case, existence necessarily belongs to the united particles." Thus, while affirming that matter is essentially composite, Le Gendre denies that the existence of matter as matter is dependent upon the prior existence of its component parts.

In sum, Le Gendre's strategy is to draw a distinction between the cube considered as cubic foot and the same cube considered as material object. Considered in the first sense, the cubic foot of matter is indivisible and so a unit. But considered in the second sense (as a thing having the nature of matter in general), it is an infinitely divisible composite—that is, a multiplicity whose parts can only exist collectively. Of course, nothing in particular turns on the choice of a cubic foot. Thus, Le Gendre can reasonably be thought to generalize his conclusion to finite material bodies of any size.

If this is right, we are now in a position to explain the objection that Hume puts to himself following his formulation of the Malezieu argument. Recall that according to that objection, we can treat "any determinate quantity of extension" as a unit, albeit one which is "inexhaustible in its sub-divisions." While

Hume's language does not precisely echo that of Le Gendre, it can be read as a succinct summation of the latter's view. For as we have just seen, Le Gendre holds that a cubic foot, and more generally, any finite quantity of extension can be considered an indivisible unit. However, considered as matter, the cube is infinitely divisible. Thus, for Le Gendre, the cubic foot of matter is at once a unit that can be divided "inexhaustibly." Likewise, taking Le Gendre as the author of the "vain" objection helps make sense of Hume's trenchant response. According to Hume, "that term of unity is merely a fictitious denomination, which the mind may apply to any quantity of objects it collects together; nor can such an unity any more exist alone than number can, as being in reality a true number" (T 1.2.2.3; SBN 30–31). Taken as a critique of Le Gendre's position, Hume's response makes good sense. For to consider a given determinate quantity as a unit on the grounds that it cannot be divided into parts of the same determinate quantity seems unavailing in the present context. It is trivially true that a cubic foot of matter can be separated into parts none of which will be precisely one cubic foot. Thus, even if we grant that in some sense of the term 'unity,' a cubic foot, *qua* cubic foot, is a unity, this hardly seems to be the kind of metaphysical unity that Malezieu and Hume think required for the existence of all multiplicities.

Finally, there is one other feature of Hume's text that is worth mentioning. Whether out of deference or otherwise, the reviews published in the *NRL* and the *Journal de Trévoux* ascribe authorship of the *Élémens* to the Duke of Burgundy. The same holds for contemporary references to the work by Leibniz, Bayle, and Malebranche. By contrast, Le Gendre who is writing some twenty years after the death of Louis de France, attributes the arguments exclusively to Malezieu, without any mention of his royal pupil. This comports with Hume's own attribution of the argument to "Mons. Malezieu." While this, of course, does not guarantee that Hume's knowledge of the text was owing to LeGendre, it does indicate that Hume had some additional knowledge of the work beyond what was strictly available in these journals.

Whether Le Gendre proves to be the ultimate target of Hume's reply, based on the available evidence, it would seem that he is the most plausible source of Hume's knowledge of the Malezieu argument. Hume could have encountered the argument either in the *Traité de l'opinion* itself or in a review of the work published in the *Journal des Sçavans*, since the latter includes the crucial paragraphs [8]–[10] of Malezieu's text as well as Le Gendre's objections.[19] Finally, it is worth emphasizing that none of this precludes the possibility that Hume may have followed up his reading by consulting one or another edition of the *Élémens* itself. However, it does suggest we should be cautious in assuming more extensive familiarity with the work than what is to be found in these secondary sources.

NOTES

I would like to thank Donald Baxter and two anonymous referees for helpful comments on an earlier draft of this paper.

1 References to the *Treatise* are to David Hume, *A Treatise of Human Nature*, ed. David Fate Norton and Mary J. Norton (New York: Oxford University Press, 2000), cited in the text as "T" followed by Book, part, section, and paragraph, and to *A Treatise of Human Nature*, ed. L. A. Selby-Bigge, revised by P. H. Nidditch, 2nd ed. (Oxford: Clarendon Press, 1978), cited in text as "SBN" followed by page number.

2 The French text of Malezieu's "Reflexions sur les Incommensurables" is reproduced in full in Appendix D of Norman Kemp Smith's *The Philosophy of David Hume* (London: MacMillan, 1941), 340–42. A portion of the text also appears in John Laird, *Hume's Philosophy of Human Nature* (London: Methuen and Co., 1932), 69–70.

3 Nicolas de Malezieu, *Élémens de Géométrie de Monseigneur le Duc de Bourgogne* (Trévoux and Paris, 1705), 2.

4 Malezieu, *Élémens*, 133–36.

5 This assumption also plays an important role in Hume's discussion of infinite divisibility. Cf. Donald Baxter, *Hume's Difficulty: Time and Identity in the* Treatise (London and New York: Routledge, 1998), 22–23.

6 As Malezieu explains in book 6, an *aliquot part* is a part that "taken a certain number of times is equal to the whole" (Malezieu, *Élémens*, 57). That is, a part is *aliquot* if it is precisely contained within the whole a certain number of times without remainder. Thus, for example, two is an aliquot part of six because it is precisely contained in it three times, whereas five is not an aliquot part of six, since it is contained with remainder. *Like aliquot parts* are parts that are precisely contained in their respective wholes the same number of times (ibid). Thus, two and three are like aliquot parts of ten and fifteen respectively, since each is precisely contained in its whole five times. Cf. Anon. *The Elements or Principles of Geometrie* (London, 1684), chap. 3, definition 35.

7 David Fate Norton and Mary J. Norton, *The Hume David Library* (Edinburgh: Edinburgh Bibliographical Society, 1996).

8 E. C. Mossner, "Hume's Early Memoranda, 1729–1740: The Complete Text," *Journal of the History of Ideas* 9 (1948): 492–518.

9 Beginning with the 1712 edition of the *Recherche de la Vérité*, Malebranche recommended the *Élémens* as a general introduction to "ordinary geometry." However, he offers no details concerning its contents and in particular, no hint of the Malezieu argument. Indeed, the entire reference consists of a single sentence: "For ordinary geometry, I recommend the book by the duke of Burgundy." *RV* 6.2.6 in *Oeuvres Complètes de Malebranche*, vol. 2, ed. André Robinet (Paris: Vrin, 1958–1978), 375; *The Search After Truth*, trans. Thomas M. Lennon and Paul J. Olscamp (Columbus: Ohio State University Press, 1980), 483.

10 E. C. Mossner, *The Life of David Hume* (Oxford: Clarendon Press, 1980), 102.

11 The argument for the infinite divisibility of matter based on incommensurability was not original to Malezieu. It would have been available to him from a number of contemporary sources, including Jacques Rohault's *Traité de physique*, book I, chap. 9 (Paris, 1671) and (in more abbreviated form) the *Port Royal Logic*, part IV, chap. 1 (Antoine Arnauld and Pierre Nicole, *La Logique ou l'Art de Penser*, ed., P. Clair and F. Girbal [Paris: Presses Universitaires de France, 1965]).

12 A brief review, consisting largely of a summary of the contents of the work, also appeared in the *Acta Eruditorum* of February 1707: 92–93. No mention of the Malezieu argument is made in this review.

13 It is worth noting that the review in the *Journal de Trévoux* also provides extracts of portions of the text. Specifically, paragraphs [1], [2], [4], [8], and [11] are reproduced almost verbatim.

14 Both Bayle and Leibniz mention Malezieu's paradox in their correspondence and both cite the *NRL* review as the source of their knowledge. However, Bayle offers no discussion of the Malezieu argument itself (paragraphs [9]–[10]). See Bayle to Des Maizeaux, Oct. 16, 1705, in *Oeuvres Diverses de M. Pierre Bayle*, vol. 4 (The Hague, 1727–1731; reprinted by Hildesheim: Georg Olms, 1968–1982), 865b. By contrast, Leibniz discusses the argument at length in a letter to Sophie (Oct. 31, 1705) in *Die philosophischen Schriften von G. W. Leibniz*, ed. C. J. Gerhardt, 7 vols. (Berlin, 1875–1890; reprinted by Hildesheim: Georg Olms, 1965), 7: 558–65.

15 "On y voit d'un côté la divisibilité de la matiére à l'infini démontrée invinciblement, ou, ce qui est la même chose, que l'étenduë ne peut être composée d'indivisibles" *NRL* (Sept. 1705): 356.

16 David Hume, *Dialogues concerning Natural Religion*, ed. Dorothy Coleman (Cambridge: Cambridge University Press, 2007), 66.

17 J. P. Pittion, "Hume's Reading of Bayle: An Inquiry into the Source and Role of the Memoranda," *Journal of the History of Philosophy* 15 (1977): 373–86. Pittion summarizes a portion of his findings as follows: "Generally, we can conclude that section II of Hume's Memoranda reveals a reading of Bayle's *Réponse [aux questions d'un provincial]* heavily dependent on a number of periodicals for the year 1705–1706" (380).

18 Gilbert-Charles Le Gendre, *Traité de l'opinion ou Memoires pour server à l'histoire de l'esprit humain*, 2nd ed., vol. 3 (Paris, 1735) in "Avis de l'Auteur," unpaginated. "*Le second raisonnement de Malézieu n'a pas plus de force. C'est une pétition de principe aisée à appercevoir. Un pié cubique de matiére est aussi indivisible qu'un homme, en tant que pié cubique & en tant qu'homme. Chacune de ces substances, en ce sens, est une seule substance. Mais la matiere ou le corps, en général, est nécessairement une substance multiple, & composée de parties divisibles à l'infini. En ce cas, l'existence appartient nécessairement à des parcelles réünies. Elle n'appartient donc pas toûjours aux unités, & cette proposition ne peut être donnée pour une prevue, puisque la question est de sçavoir si, en divisant la matiére, on peut parvenir à une derniére unité indivisible. . . . Malézieu abuse encore du terme de substance. Une substance matérielle, qui peut être anéantie par la division, n'existe que par l'unité. Ainsi un pié cubique de matiére, ou un homme, divisés en deux n'ont plus l'existence d'un pié cubique ou d'un homme; mais la matiére elle-même ne peut être détruite par la division; & c'est une substance,*

qui ne peut être anéantie que par la toute-puissance du créateur, une substance, qui bien loin d'exister par l'unité n'existe que par la multiplicité de ses parties."

19 *Journal des Savans* (Nov. 1735): 360–65.