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Descartes's Legacy in Kant's Notions of Physical Influx and Space-Filling: *True Estimation and Physical Monadology*

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Abstract: This paper examines Kant's pre-Critical distinction between the capacity of an immaterial simple substance to occupy space by having a spatial location and the sphere of its activity, in contrast to the power of material compound bodies to fill space by their extension and solidity. I highlight some important features of Descartes' metaphysical and physical models of the contingent locality of simple unextended substances and challenge the recently articulated view that Henry More's model of extended but metaphysically indivisible spirits is an archetype for, or at least a precursor to, Kant's dynamic monads. I claim that, *contra* More and the Newtonians, Kant is indebted to Descartes for this idea of how simple substances take up space and can be extended in an 'analogous' way by means of the effects of their activity.

Keywords: Kant, Descartes, *vis motrix*, *vis activa*, physical influx, physical monadology, dynamics, space-filling, mind-body problem.

Introduction¹

Retracing at least "echoes" of neglected influences, a recent trend in scholarship reconstructs the scientific and philosophical debates of the period in which the

¹ This paper represents the second result of a two-year research project funded by the University of Trieste (FRA 2014): "Il luogo e lo spazio dell'anima: il problema dell'unione con il corpo in Cartesio e nei primi scritti kantiani", the first result of which is Ferrini, Cinzia: *L'invenzione di Cartesio. La disembodied mind negli studi contemporanei: eredità o mito?* Trieste 2015, Chapt. 4. For helpful discussion of various points in previous drafts, I wish to thank Silvia De Bianchi, Matteo Favaretti Camposampiero and Paolo Pecere. Special thanks are also due to Brunello Lotti for very detailed comments on the penultimate draft. An anonymous referee for *Kant-Studien* provided valuable advice. My prose was kindly checked and polished by Ken Westphal and Carolyn Benson.

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young Kant was maturing his original attempts to solve the metaphysical knots of his time. This paper examines evidence which can increase our appreciation of the nature and significance of Kant's early notions of causal interaction between unextended and extended substances and space-filling, against the background of his metaphysical concern with the mind-body problem.

First (§§ 2–4), I focus on Kant's criticism of motion as an action of the body requiring *vis motrix* in Chapter I of his 1747 *True Estimation*. I highlight the Cartesian legacy of a crucial strand of Kant's idea that substances in space endowed with a *vis activa* are able to stand in causal relations because they share a spatial framework, though this is a necessary, not a sufficient, condition for physical influx (§ 2). I then analyze how, in the *Meditationes* and the *Principia* (Kant's private library contained early editions of both works),² Descartes offers a model for conceiving of the contingent locality of simple unextended substances and for determining the place of a body by the common surface it shares with neighboring bodies, by distinguishing between external location and filling space (§ 3). In § 4, I dispute the view that Descartes regards spatial extension as sufficient for being physical by contrasting Henry More's view that the soul or self is spatially extended. I argue that in Descartes' view, without being extended, simple substances may be conceived (consistently) to have external presence and an extensive quantity by forming a sphere of activity within a spatial region. In my second step (§§ 5–6), I argue that in the *Monadologia physica* Kant counters More's model by using some aspects of Descartes' metaphysical and physical account to propose a monadology which accounts for the composition of matter and allows for physical influx and causal interaction between unextended and extended substances. Although mutual interaction between categorically distinct substances, which lack common principal attributes (such as extension and thought), appeared to be contradictory and hence impossible, I highlight how Descartes both accounted for the logically consistent presence of simple substances within extension and explained their causal agency within space. He did so by re-conceiving mental substances as being in space without filling or occupying it and by appealing not to their essential (unextended) nature but rather to their (contingent) power, virtue or force. My final claim (§ 6) is that Kant's appreciation of this Cartesian model illuminates his own metaphysical solution to the mind-body problem, which affords Kant a distinctive alternative to pre-established harmony. To clarify the context and significance of this proposal we must first consider (§ 1) the state of the scholarship on Kant's early metaphysical and physical concerns, in contrast to his Critical philosophy of nature.

² Both published in Amsterdam, 1650: see Warda, Arthur: *Immanuel Kants Bücher*. Berlin 1922, 47.

§ 1 Recent Scholarship on Kant's pre-Critical and Critical Philosophy of Nature

About two decades ago, scholars moved away from regarding Kant's reference to Newtonian physics merely as a "transcription" of Newton's mechanics *à la* Cassirer, or as a "contingent circumstance" *à la* Buchdahl which "could be systematically cut off from the transcendental foundation of natural science in general."³ This shift re-examined the Newtonian aspects of the relations between Kant's metaphysics of nature and his mature transcendental theory. This shift, however, oversimplified and reduced our appreciation of Kant's pre-Critical period. Friedman's prominent work *Kant and the Exact Sciences* (1992) underestimates Kant's early writings on space, forces and matter, mentioning them only in his Introduction. He reads the pre-Critical philosophy of natural science in terms of Kant's self-conscious attempt to refashion the Leibnizian-Wolffian tradition so as better to harmonize metaphysics with Newtonian natural philosophy. Accordingly, Kant's attempts throughout the pre-Critical period to defend a modified version of physical influx – the theory asserting intersubstantial causation amongst created heterogeneous finite substances – are read as having been explicitly modeled on the Newtonian theory of universal gravitation.⁴

Significant reactions to Friedman's reconstruction reinvigorated discussions of eighteenth-century dynamism and reflections upon the development of Kant's theory of matter.⁵ Recently, scholars such as Falkenburg, Laywine, Lefevre, Schön-

3 As Pecere has recently put it, from Reichenbach's influence to the neo-Kantians in Europe, echoed by Gerd Buchdahl's work on Kant's metaphysics of nature in the late 1960s in America, Kant scholarship: "has been dominated by the idea that Kant would have merely provided a 'foundation' or 'justification' of Newtonian physics [...] The basic reason of this is the urgent need to defend criticism in the context of 20th century physics, thereby underscoring the validity of Kant's approach *beyond* the historically contingent boundaries of the science of his time" (Pecere, Paolo: "Kant's Newtonianism: A Reappraisal," in *Estudos Kantianos* 2, 2014, 155–182, 158).

4 Friedman, Michael: *Kant and the Exact Sciences*. Cambridge, Ma./London, GB 1992, xiii.

5 See Watkins, Eric: "The Development of Physical Influx: Leibniz's Reception in 18th Century Germany," in *Review of Metaphysics* 49, 1995, 295–339; id., "From Pre-established Harmony to Physical Influx: Leibniz's Reception in 18th Century Germany," in *Perspectives of Science* 6, 1998, 136–203; id., "Forces and causes in Kant's early pre-critical writings," in *Studies in History and Philosophy of Science*, 34, 2003, 5–27; id., *Kant's Metaphysics of Causality*. Cambridge 2005. Since 1995, Eric Watkins has been providing evidence for important developments in the model of physical influx available to the pre-Critical Kant, from Gottsched through Knutzen to Crusius. Edwards – referring also to Campo (Kant, Emanuele: *Le quattro dissertazioni latine*. Introduzione e Note a cura di Mariano Campo. Como 1944; and Campo, Mariano: *La genesi del criticismo kantiano*. Parti I–II. Varese 1953) – showed that the attempt to set up a 'Newtonian' Kant over and against a 'Leibnizian' Kant regarding theory of matter lacks historical justification and is concep-

feld, Watkins, Grillenzoni and Pecere,⁶ to name just a few, have thus drawn attention both to physics and metaphysics in Kant's pre-Critical period and to Kant's anti-Newtonian tendencies by reconstructing his scientific and philosophical contexts. Some intriguing and relatively forgotten characters repopulate the scene today: entrants such as Jean-Jacques Dortous de Mairan,⁷ Johann Heinrich Gottlob Justi⁸ and George Erhard Hamberger stand side-by-side with the perennial veterans Leibniz, Wolff and Newton. In 2013, a special issue of *Studies in History and Philosophy of Science* was dedicated to the “fast-moving area at the key juncture between Newton's and Kant's scholarship”. According to the guest editor, Michela Massimi, “a clear leitmotiv emerges” from this collection:

Kant's philosophy of natural science is more than just a synthesis of two grand traditions (the Newtonian and the Leibnizian). Instead, it was born out of Kant's life-long engagement with *both* traditions, *each of which* – in its own ways – betrays a terribly complex story of cross-philosophical influences.⁹

In sum, current research presents itself as an innovative, critical departure from the received wisdom, according to which a Leibniz-Wolffian Kant, having been

tually misguided (Edwards, Jeffrey: *Substance, Force, and the Possibility of Knowledge. On Kant's Philosophy of Material Nature*. Berkeley, Los Angeles, London 2000, 231).

6 Laywine, Alison: *Kant's Early Metaphysics and the Origins of the Critical Philosophy*. Atascadero, Ca 1993; Grillenzoni, Paolo: *Kant e la scienza*. Vol. I. 1747–1755. Milano 1998; Falkenburg, Brigitte: *Kants Kosmologie*. Frankfurt a. M. 2000; Schönfeld, Martin: *The Philosophy of the Young Kant. The Precritical Project*. Oxford 2000; Watkins, *Kant's metaphysics*, op. cit.; Pecere, Paolo: *La filosofia della natura in Kant*. Bari 2009.

7 The Cartesian Jean-Jacques Dortous de Mairan is at the center of Massimi and De Bianchi's attempt to show “how some important Cartesian echoes, clearly evident in *True Estimation*, have played a role in shaping some seminal ideas of Kant on dynamical forces” (Massimi, Michela and De Bianchi, Silvia: “Cartesian echoes in Kant's philosophy of nature,” in *Studies in History and Philosophy of Science* 44, 3, 2013, 481–492, 481). For references to de Mairan's reply to M.me de Chatelet (Dortous De Mairan, Jean Jacques: *Lettre de M. De Mairan [...] a Madame la Marquise Du Chastellet*. Paris 1741), see Grillenzoni, op. cit., 89–90 and 129–130. Two decades after the publication of the last important works on Dortous de Mairan (McNiven Hine, Ellen: “Dortous de Mairan, the Cartesian,” in *Studies on Voltaire*, 266, 1989, 163–179; id., “Dortous de Mairan and eighteenth century ‘system theory’,” in *Gesnerus*, 52, 1995, 54–65), a thematic issue of the *Revue d'histoire des sciences* (68, 2, 2015) dedicated a “dossier” to this complex mediator (“passeur”) between scientific cultures.

8 On the reference in *True Estimation* § 49 to Justi, see Tonelli, Giorgio: *Elementi metodologici e metafisici in Kant dal 1715 al 1768. Saggio di sociologia della conoscenza*. Torino 1959, 221 f., note 236, and Pecere, *La filosofia della natura*, op. cit., 84.

9 Massimi, Michela: “Philosophy of natural science from Newton to Kant,” in *Studies in History and Philosophy of Science* 44, 3, 2013, 393–395, 394 (my emphasis).

awoken by Newton's *Principia*, sought to reconcile German metaphysics with Newtonian science, to integrate our representation of reality and to insure the strict universality of natural-scientific generalizations.¹⁰ This recent trend exhibits growing sophistication and depth, along with a methodological readiness to integrate perspectives while appreciating complexities and contrasts, thus opening new avenues of philosophical-scientific research. One case in point, examined in the next section, retraces echoes of Cartesian influences in Kant's pre-Critical attempts to solve problems of Leibnizian-Wolffian philosophy, such as communication between substances, the mind-body problem, the nature of space and the composition of matter.

§ 2 The Cartesian Legacy of Chapter One of Kant's *True Estimation: vis activa* and Physical Influx

In the *True Estimation* (*Gedanken von der wahren Schätzung der lebendigen Kräfte*, 1747), Kant offers an interesting solution to the problem of the coexistence of mind and body within the framework of Cartesian substance dualism. Kant's proposal is grounded on a common principle which governs the coordinated activity of matter and mind, viewed as two independent but complementary domains.¹¹ Similar attempts were made by Wolff, Taurellus, Knutzen and Bülfinger.¹² In his first published work, however, Kant openly rejects pre-established harmony, disputes the notions of *vis viva* and *vis motrix* and, more generally, character-

¹⁰ This is how Anja Jauernig reacted to the “influential and popular story”, à la Friedman, of a Kant who is “a Leibniz-Wolffian by education and who, after an eye-opening encounter with Newton's *Principia*, embarks on the project of reconciling Leibniz-Wolffian metaphysics with Newtonian science in order to provide a unified picture of reality and metaphysical foundations for the Newtonian theory” (Jauernig, Anja: “Kant's Critique of the Leibnizian Philosophy: *Contra* the Leibnizians, but *Pro* Leibniz.” In: *Kant and the Early Moderns*. Eds. Daniel Garber and Beatrice Longuenesse. Princeton 2008, 41–63, 41 f.). However, insofar as she sees these problems as “home-bred” and independent of Newtonian science, she views the shaping of Kant's philosophical path in the attempt to solve them as an alternative to Kant's “alleged desire” to develop a philosophy compatible with Newton's mechanics.

¹¹ On the circumstances in which the *Gedanken* were written see Watkins, Eric, Edwards, Jeffrey and Schönfeld, Martin: “Introduction” to Kant, Immanuel: *Thoughts on the estimation of living forces* [...]. In: The Cambridge Edition of the Works of Immanuel Kant: *Natural Science*. Ed. Eric Watkins. Cambridge 2012, 1–7, 3–4.

¹² See Sytnik-Czetwertynski, Janusz: “Some Eighteenth Century Contributions to the Mind-Body Problem (Wolff, Taurellus, Knutzen, Bülfinger and the Pre-Critical Kant),” in *Axiomathes* 23, 2013, 567–577.

izes force solely as cause of motion.¹³ Moreover, *pro* (not *contra*) Descartes, in Chapter I.3 of the *Gedanken* Kant claims that (i) it is inappropriate to describe the *phenomenon* of motion as a route to causing effects or actions; and (ii) it is therefore incorrect to ascribe to motion a moving force, a *vis motrix*, insofar as motion is merely the outward phenomenon of the state of a body that does not act.¹⁴ In Kant's view, the body endeavors to act ("bemüht ist zu wirken"; GSK, AA 01: 18.24); his further claim is that (iii) the force of a body is a form of potential energy which reaches its highest expression in the state of rest rather than motion, as in the case of a ball which, because of its weight, presses on the table upon which it lies.¹⁵ Kant concludes: "Man wird also die Kraft eines Körpers viel eher eine *vim activam* überhaupt, als eine *vim motricem* nennen sollen" (GSK, AA 01: 18.34–36).

13 See Watkins, "Forces and causes," cit., 7. In this work Kant refers to a traditional, protracted debate between Leibniz and the Cartesians. Unlike the Cartesians, Leibniz did not consider force to be reducible to any quantity (in general), and specifically not to a quantity of motion; he argued instead for the existence of a living force as a self-generating and qualitative, essential component of matter, measured as the product of mass and the square of velocity. In contemporary terms, this quantity is somewhat close to our concept of kinetic energy. By contrast, the Cartesians conceived of force as quantity of matter proportional to velocity or to motion, according to the model of sheer mechanical pushes and pulls. In the vocabulary of the time, this was called "dead force" or "dead pressure" (*vis mortua*), measured by the product of mass and velocity; in current terms this quantity is called *momentum* (see *infra* note 15). The famous *vis viva* controversy concerned which quantity was conserved in physical collisions: whether it was the total quantity of motion (*mv*: see Descartes, *Principia* II.36 and 42. In: *Oeuvres de Descartes*. Eds. Adam, Charles and Tannery, Paul (hereafter AT). Vol. VIII. Paris 1996, 61 and 66) or force (*mv²*), as Leibniz claimed. On this issue see Iltis, Carolyn: "Leibniz and the Vis Viva Controversy," in *Isis* 62, 1, 1971, 21–35.

14 On the distinction between moving force or action (which does not inhere in movable bodies) and motion (as a property of corporeal things, in the same way in which *figura est modus rei figuratae*), see Descartes, *Principia* II.25: "Et dico [motus] esse translationem, non vim vel actionem quae transfert, ut ostendam illum semper esse in mobili, non in movente, quia haec duo non satis accurate solent distingui" (AT VIII: 54). On the modal status of motion (transference) and rest (absence of transference) in bodies, see also *Principia* II.27: "Cum autem hic non agatur de illa actione, quae intelligitur esse in movente, vel in eo qui motum sistit, sed de sola translatione, ac translationis absentia sive quiete: manifestum est hanc translationem extra corpus motum esse non posse [...] adeo ut motus & quies nihil aliud in eo sint, quam duo diversi modi" (AT VIII: 55).

15 In *Principia* II.26 Descartes argues against the deceptive, ordinary view according to which more action or force is required for setting things in motion than for bringing them to rest. This false prejudice is based upon our lack of awareness of causes such as gravity (*cujus vim non sentimus*) and the conceptual confusion of taking action to be the effort (*conatus*) we actually perceive when an object overcomes such resistance and produces motion. In *Principia* II. 43 Descartes states that a body in a state of rest: "ad perseverandum in sua quiete, atque ex consequenti ad resistendum iis omnibus quae illam possunt mutare" (AT VIII: 66). See below.

Both, Kant's view that the body with the most motion is that which is subject to the least resistance (and so does not act and does not deserve the attribution of a force) and his counter-example of the ball on the table as a body *acting* in a state of rest implicitly refer to the Cartesian conception of "dead force" (*force morte*, meaning: *une puissance en équilibre*).¹⁶ One contribution to the above-mentioned 2013 special issue, "Philosophy of natural science from Newton to Kant", highlights some aspects of Kant's pre-Critical account of living forces in the *Gedanken* as 'causes', which "betrays Cartesian allegiances in some important respects."¹⁷ Massimi and De Bianchi detect an echo of Cartesian 'dead forces' (of pressure) insofar as Kant regards these as:

1. forces that originate in bodies at rest (e. g. a ball gently pushed forward by hand), in contrast to living forces;
2. forces the ground of which is inherent in bodies at rest (e. g. forces unleashed or triggered by impact); and
3. forces that are somehow elastic in nature (where elasticity is the first ground of motion, the physical cause or seat of which has yet to be determined).¹⁸

According to Kant's criticism of *vis motrix* (*Gedanken* I.3), it is a metaphysical error to attribute any essential moving forces to bodies, which instead are fundamentally inactive and impotent with respect to self-generated changes of state.¹⁹ Massimi and De Bianchi show how, according to Kant, the elastic collision of bodies confirms Descartes' $|mv|$ law of the conservation of the quantity of motion without violating causality or resorting to miracles *à la* Newton's hand of God:

Cartesian dead forces provided the closest candidate for Kant's search for a new dynamics in 1747, within the context of the heated debate on the nature of matter, *vis viva*, and motion in the Paris Academy of Science.²⁰

¹⁶ See this definition in Dortous De Marain, op. cit., 27. In *Principia* II.43 Descartes elucidates the meaning of the force (*vis*) that any body must exhibit or resist (when it comes from without) in terms of his first law of nature, that is, in terms of the tendency of the body to remain in the state (of motion or rest) in which it finds itself. He measures this force in the following way: "Visque illa debet aestimari tum a magnitudine corporis in quo est, & superficiei secundum quam istud corporis ab alio disjungitur; tum a celeritate motus, ac natura & contrarietate modi, quo diversa corpora sibi mutuo occurrunt" (AT VIII: 67).

¹⁷ See Massimi and De Bianchi, op. cit., 481.

¹⁸ Ivi, 489. On the transference of motion in collisions between rigid, soft and fluid bodies, see Descartes, *Principia* II. 40–42 (AT VIII: 65 f.).

¹⁹ See Laywine, op. cit., 34. See Descartes, *Principia* II.37: "Si [pars aliqua materiae] quiescat, non credimus illam unquam incepturam moveri, nisi ab aliqua causa ad id impellatur" (AT VIII: 62).

²⁰ Massimi and De Bianchi, op. cit., 489.

Furthermore, Kant takes issue with unsatisfactory aspects of Leibniz's own notion of force (or *virtus*, *Kraft*) which is *active* insofar as it contains in itself an act or *entelechia*. In his *De prima philosophia emendatione et de notione substantiae* (1694) and in the *Specimen Dynamicum* (1695), both published in the *Acta eruditorum*, Leibniz presented his new science of dynamics in explicitly anti-Cartesian and anti-Newtonian terms, rejecting both extension as the principal attribute of corporeal substance and direct divine intervention. In 1694 Leibniz introduced a dynamical notion of matter through the idea that the *vis* is *activa* because it is conceived neither as a simple tendency nor as a possibility which requires an external stimulus to become actual. Instead, Leibniz conceived of this *vis activa* as something between the power of acting and the action itself, thus implying a *conatus*. Leibniz illustrated this concept with the example of a drawn bowstring: force is brought to actualization *by its own nature* once it breaks loose. Despite the number of distinctions regarding forces (living, active, passive, primitive, derivative, etc.), Leibniz consistently maintains that force is an activity that causes a change of state.²¹ However, when Kant (*Gedanken* I.3) writes that “Die Bewegung ist nur das äußerliche Phänomenon des Zustandes des Körpers, da er zwar nicht wirkt aber doch bemüht ist zu wirken” (GSK, AA 01: 18.22–24), he paves the way for his suggestion (I.5) that we *always* recall the motion that would result if resistance were removed because we don't clearly discern what goes on *inside* a body that is acting while at rest. According to Kant, this account of motion is misleading, for it assumes a typical common view: “*Allein gemeiniglich* wird die Bewegung als dasjenige angesehen, was die Kraft thut, wenn sie recht losbricht, und was die einzige Folge derselben ist” (GSK, AA 01: 20.04–07, my italics).

Kant concludes his first chapter by proposing a dual classification of motion (GSK, AA 01: 28). He distinguishes between two kinds, both equally real: the motion, say, of a fired bullet, which conserves itself in the body to which it is communicated, which persists indefinitely if no impediment or resistance opposes it and which requires the Leibnizian measure of living force (mv^2); and the motion of a ball gently pushed forward by hand or of bodies that are carried or pulled with moderate velocity, which requires constant external stimulation depending solely on an external action and which immediately disappears when the body is brought to rest. This requires the Cartesian measure of dead forces. From our standpoint, it is worth noting that Kant (*Gedanken* I.6) immediately sees that if the force of matter counts only in terms of motion, so that matter is viewed as doing nothing but causing motion, this gives rise to the difficulty of understand-

²¹ See Watkins, Eric: “Kant on Extension and Force: Critical Appropriations of Leibniz and Newton.” In: *Between Leibniz, Newton and Kant*. Ed. Wolfgang Lefevre. Dordrecht 2001, 111–127, 119.

ing how the soul can act within and upon the body, and how matter can occasion the soul to have certain representations. How can a force that only produces motion generate or occasion representations and ideas? At most, such a force can only displace the soul from its location (GSK, AA 01: 20).

As is well known, in his Second Letter to Clarke (late November 1715), Leibniz stressed that he could not possibly accept any theory of interaction between material and immaterial substances: the presence of the soul in space (in a place, even at a point in the brain) cannot explain the mental representation of what transpires *outside* the soul (which is windowless, according to Leibniz), namely in the body: “Il faut toute autre chose que *la seule présence* pour qu’une chose représente ce qui se passe dans l’autre; il faut pour cela quelque communication explicable, quelque manière d’influence,” adding in the margin: “ou des choses entre elles, ou d’une cause commune.”²² Pre-established harmony is the sole common cause and that which Leibniz regarded as the only true explanation of mind-body interaction (rather than the alternative, physical influx): “les âmes n’ayant point d’influence immédiate sur les corps, ni les corps sur les âmes, leur correspondance mutuelle ne sauroit être expliquée *par la présence*” (my italics).²³

Chapters Two and Three of Kant’s *Gedanken* focus on criticizing Leibniz’s and his followers’ anti-Cartesian positions and arguments in support of living forces; hence relatively less attention has been devoted to the argument Kant developed in Chapter One, where he rejects both this Leibnizian internal, non-relational model of the soul (required by pre-established harmony to resolve the mind-body problem) and the Wolffian notion of *vis motrix* (*bewegende Kraft*) in favor of his own version of *vis activa* (*wirkende Kraft*).²⁴ Kant’s solution to the difficulty of conceiving the communication between two substances affords a dynamic reassessment of a merely positional, relative notion of ‘being in a place’ (*Gedanken*, I.6). The turning point of the following crucial passage is the idea that substances *in* space are able to enter into causal relations in virtue of their *sharing* a spatial framework; the essential force of matter and the essential force of the soul can thus be determined toward an *externally directed* action:

²² *Correspondance Leibniz-Clarke*. Présentée d’après les manuscrits originaux des bibliothèques de Hanovre et de Londres par André Robinet. Paris 1957, 37; my italics (hereafter *Correspondance*). See also Leibniz’s third letter to Clarke (26 February 1716): “La simple présence d’une substance, même animée, ne suffit pas pour la perception” (ivi, 56).

²³ In an earlier draft, Leibniz had written *perception* instead of *correspondance*.

²⁴ Note that in the *Nova dilucidatio* (1755), §III, Prop. XII, Kant supports physical influx by claiming that finite substances can act on each other and change only insofar as they are connected with other substances (PND, AA 01: 410). On the *Nova dilucidatio*’s principles of succession and coexistence, see Watkins, “Forces and causes”, cit., 11–23.

Eine gleiche Schwierigkeit äußert sich, wenn die Frage ist, ob die Seele auch im Stande sei die Materie in Bewegung zu setzen. Beide Schwierigkeiten verschwinden aber, und der physische Einfluß bekommt kein geringes Licht, wenn die Kraft der Materie nicht auf die Rechnung der Bewegung, sondern der Wirkungen in andre Substanzen, die man nicht näher bestimmen darf, setzt. Denn die Frage, ob die Seele Bewegungen verursachen könne, das ist, ob sie eine bewegende Kraft habe, verwandelt sich in diese: ob ihre wesentliche Kraft zu einer Wirkung nach draußen könne bestimmt werden, das ist, ob sie außer sich in andere Wesen zu wirken und Veränderungen hervorzubringen fähig sei? Diese Frage kann man auf eine ganz entscheidende Art dadurch beantworten: daß die Seele nach draußen aus diesem Grunde müsse wirken können, weil sie in einem Orte ist. Denn wenn wir den Begriff von demjenigen zergliedern, was wir den Ort nennen, so findet man, daß er die Wirkungen der Substanzen in einander andeutet [...]. Denn die Materie, welche in Bewegung gesetzt worden, wirkt in alles, was mit ihr dem Raum nach verbunden ist, mithin auch in die Seele; das ist, sie verändert den innern Zustand derselben, in so weit er sich auf das Äußere bezieht. (GSK, AA 01: 20.23–21.18.)

In this connection, I wish to emphasize the key role played by the concept of location; Kant claims that because the soul, a spiritual substance, is “in a place,” i. e. it positions itself in relation to neighboring bodily tissues, it must be able to exercise an outward activity by applying its force to those surrounding tissues. Note that Kant does not claim that standing in a spatial relation is sufficient for causal interaction; as he later makes clear (*Gedanken*, I.9), causality is prior to spatiality: the agent’s exercise of its causal power directed upon the patient’s capacity is ontologically prior to their sharing a spatial framework. Their being spatially related is necessary but not sufficient for their causal interaction. Descartes had already made this point when rejecting the model of the sailor on the ship, where the two substances are related spatially but not causally, as they are in the ‘true’, strictest union or *permixtio* of mind and body.²⁵ When Kant writes that the soul must be able to act externally by reason of the fact that it is in a place and that matter, once set in motion, acts on everything spatially connected with

25 In his exchange with Regius, Descartes famously claims that the mind is really and substantially united with the body *verum modum*, and not *per situm aut dispositionem* (AT III: 493); elsewhere he clarifies that this union is not *ainsi qu’un pilote en son navire* (AT VI: 59), and in Meditation VI he explains that if a human person were a thinking thing placed in a body (like a sailor on his ship) we would not feel pain when our bodies were injured but would only perceive corporeal damage without any effect on our sensation (AT VII: 80–81). I examine this issue in Ferrini, *L’invenzione di Cartesio*, op. cit., 77–86. As is well known, it was in 1640 that Descartes began to view the pineal gland not simply as the location of common sense but as serving the function of “principal siège de l’âme, et le lieu où se font toutes nos pensées” (Descartes to Meyssonier, 29 January 1640, AT III:19, my italics); see on this point Collacciani, Domenico: “Johann Clauberg sull’ unione mente-corpo”. In: *L’uomo, il filosofo, le passioni*. Eds. Carlo Borghero, Antonella Del Prete. Firenze 2016, 29–45, 34–40.

it (and hence also upon the soul insofar as the internal state of the soul relates to what is external to it), it thus appears to me that Kant regards the spatial contiguity between two heterogeneous substances (one extended, solid and impenetrable; the other unextended and immaterial) as insufficient yet necessary for physical influx, *contra* pre-established harmony. Moreover, to support physical influx, Kant changes the terms of a question that Wolff, who characterized the force essential to bodies as a moving force, framed as follows:

Si anima physice influit in corpus, vis quaedam animae transit in corpus & in eo abit in motricem [...]. Quamobrem cum iuxta systema influxus physici anima moveat organa corporis (§ 566), movens autem in mobile transfert vim motricem, dum idem ad motum concitat; anima quoque iuxta istud systema vim motricem in corpus transferre debet, quae ante non inerat. Enimvero vis motrix, quae in motu locali deprehenditur, corporea est seu talis, quae in corporibus tanquam compositis locum habet, nec in anima, quae substantia simplex est (§ 48), locum habere potest.²⁶

Kant's passage in the *Gedanken* quoted above challenges Wolff's argument against physical influx. Wolff claims that physical influx seems implausible because the transfer of moving force (not of motion) from a simple agent or mover (the soul, which lacks parts) to compound movable bodies previously devoid of *vis motrix* is incomprehensible. Note that in *A New System of the Nature and Communication of Substances*, Leibniz had already criticized physical influx because it is inconceivable that an accident of one substance should be transferred to another substance. As noted above, in *Gedanken* I.3 Kant had written, in a Cartesian vein, that it was incorrect to describe motion as a kind of action, and thus to attribute to it a force of the same name; in *Gedanken* I.6 Kant suggests that the idea of a simple substance endowed with the power to act upon corporeal substance, *partes extra partes*, is perfectly sound insofar as the spiritual substance "is in a place." In *Gedanken* I.9 Kant explicitly states that, without the force (*Kraft*) which

²⁶ Wolff, Christian: *Psychologia rationalis methodo scientifica pertractata* [...]. Frankfurt & Leipzig 1734. Sect. III, Cap. II, § 567, 486. This Latin passage can be rendered in English as follows: "If the soul physically influences the body, a certain force of the soul passes into the body, becoming a motive force within it [...]. This is why, according to the system of physical influx, the soul moves the organs of the body (§ 566); by moving, however, the soul transfers the motive force to the movable body as it excites the body to move; according to this system the soul must also transfer motive force to the body – force which was not previously present in that movable body. In fact, the motive force found in local motion is corporeal, or is such as is located within bodies insofar as they are compound, and not in the soul, which is a simple substance (§ 48) in which no motive force can be located" (my translation). On Wolff's claim that the soul is in space see Nuzzo, Angelica: "A Problem for Psychology: Kant and Wolff on Soul and Space." In: *Christian Wolff und die europäische Aufklärung*. Ed. Jürgen Stolzenberg *et al.* Hildesheim 2007, 321–388, 331 f.

substances have and by which they act externally, there would be no *nexus*, no order and therefore *no space* (GSK, AA 01: 23.04–09). It has been remarked that “a kind of dynamical connection among substances is implicit here, from which one can safely infer that Kant is denying Leibniz’s concept of monad, since monads lack spatial extension and do not enter into true causal relations with other monads.”²⁷

One year before publishing the *Monadologia physica*, in his 1755 *Nova Dilucidatio*, Section III, Prop. XIII, Kant presented the *principium coexistentiae* as the second of two principles (the first was the principle of succession) of metaphysical cognition which derive from the principle of the determining ground. Kant claimed that finite, created substances do not, in virtue of the intelligibility of their independent and separate existence alone, stand in any nexus, mutual relation, link or interaction. Kant writes: “relatio [...] per existentiam substantiae in se positam intelligi nequit” (PND, AA 01: 413.06–09); that is, the existence of the substances is entirely insufficient on its own to establish any relation or interrelation between their determinations; their co-existence is not sufficient to establish a connection between them, nor to grant an *external state* (*status externus*: PND, AA 01: 414.07) to any individual substance. Kant here requires both a common cause of all things by which their existence has been designed as standing in relation to other existences and that there should be, in the effective representation of the divine intellect, a scheme conceived in terms of their common origin in a relational nexus. Most importantly, Kant writes that “locus, situs, spatium sunt relationes substantiarum, quibus alias a se realiter distinctas determinationibus mutuis respiciunt, hacque ratione nexu externo continentur” (PND, AA 01: 414.10–13). In other words, place, position and space are relations of substances in virtue of which, by means of their reciprocal determinations, they relate to other substances which are distinct from them so that, for this reason, they are connected in an external nexus.

When Kant attempts to elucidate and specify the meaning of the concept of a simple immaterial substance endowed with the power of reason *versus* everything corporeal in *Dreams* (1766), he focuses on their common outwardness and our acquaintance with the forces of their external presence (*die Kräfte ihrer äußeren Gegenwart*; TG, AA 02: 321.14), which can pertain both to simple spirit-beings *and* to simple material entities. To ensure the conceivability of the presence of spir-

²⁷ Caruso, Francisco – Xavier, Roberto Moreira: “On Kant’s First Insight into the Problem of Space Dimensionality and its Physical Foundations,” in *Kant-Studien* 106, 2015, 547–560, 552f. On Kant’s concept of monadology in the *Monadologia Physica* and then in the Critical period, see Fichant, Michel: “‘Un concept platonicien, en lui-même exact, du monde’: La monadologie selon Kant,” in *Studia Leibnitiana* 45, 2013, 228–259.

it-beings within bodies, Kant grants that the impenetrability of matter consists in resisting, by its force of repulsion, the penetration of other material bodies into space that it fills; he thus ascribes to material substances the property of filling (*erfüllen*) the space in which they operate (TG, AA 02: 323.04) and conceives of the possibility of immaterial beings insofar as their presence involves no space-filling by resistance or solidity. According to Kant, however, there is no contradiction involved in a simple spiritual substance's being in space due to its *Wirksamkeit im Raume* (TG, AA 02: 323.14–15). Kant distinguishes between *einen Raum einnehmen* (to occupy a space by being immediately active within it) and *einen Raum erfüllen* (to fill a space by offering resistance), whereby the former neither contains nor implies the latter. Moreover, it is not contradictory to think of an immaterial substance's occupying space in the sense of having an external sphere of activity, yet without itself being extended: “[...] eine solche immaterielle Substanz [würde] nicht ausgedehnt genannt werden müssen” (TG, AA 02: 323.35).

In my view, what thus emerges from Chapter One of Kant's *Gedanken* is not only a criticism of Leibniz's windowless concept of monads but also an argument against the possibility of explaining mind-body local motions (interaction) in terms of any *transfer of force* from mover to movable. In the next section (§ 3), I provide evidence that this too is a Cartesian view, and that, in contrast to Henry More's view, Descartes contends that the soul may have an 'analogical' extension in terms of a sphere of outward activity, due to its force or virtue rather than its essence. Moreover, we have seen how in the *Gedanken* Kant combines his criticism of Wolff's *vis motrix*, his reappraisal of Leibniz's *vis activa* and his reintroduction of Cartesian dead forces to explain the phenomenon of motion, in order to conceive mind-body causal interaction while maintaining substance dualism. The turning point of Kant's argument in favor of physical influx is that the essential force of matter and the essential force of the soul can be determined with regard to an *externally directed* action and are able to act *outside* themselves, producing changes in other substances. In what follows (§ 4), I provide evidence that this approach is indebted to Descartes' notion of a sphere of action as *extensio potentiae* and to his view that it is not contradictory to conceive of something as being in a place irrespective of whether it corporeally fills or occupies space, which extended matter necessarily *also* does; further, I show that this Cartesian view also contributes to Kant's *Monadologia physica* and to his 1766 distinction between occupying a spatial location (*einen Raum einnehmen*) and filling a region of space (*einen Raum erfüllen*).

§ 3 *Vis movendi*, Space and Place According to Descartes

In his letter to Mersenne of 26 April 1643, Descartes clarifies the view we find in *Principia* II. 25 about motion as “translation” (*translatio*) of matter relative to other pieces of matter:²⁸ motion is nothing but the transportation of a body from the vicinity of those in contact with it to the vicinity of others. Within this conception, only two variables ought to be considered: variations in speed and direction.²⁹ The observable behavior of a body composed of *partes extra partes* can be entirely explained geometrically,³⁰ examined in accord with the laws of mechanics, and confirmed by experience, without assuming any causal agency in the moving matter *per se*. As is well known, for Descartes matter freely left to itself, receiving no impulse from without, would remain fully quiescent. Indeed, matter *per se* has no force to set itself in motion; it has neither autonomy nor spontaneity, as Kant also maintains in the *True Estimation*. Moreover, all causal agency must be (metaphysically) attributed to God (who imparts the original impulse to matter and preserves that same amount of motion or translation in it ever after) or to created minds and spirits, to which God gave the power to act upon bodies.³¹ As Descartes explains to Henry More, to avoid being charged with endorsing the view of God as a world-soul united to matter, the *vis movens* is a mode in a crea-

28 See also Descartes to More (August 1649): “*Translatio* illa, quam *motum* voco, non est res minoris entitatis quam sit figura: nempe est modus in corpore” (AT V: 403).

29 Descartes to Mersenne, April 26, 1643; AT III: 650 f. On the weakness, unclarities and failures of Descartes’ physics (he does not indicate how force is measured; he provides no dynamical characterization of speed; he refers only to the size, never to the mass of a body; he never suggests any difference between mass and weight, etc.), see Scott, John F.: *The Scientific Work of René Descartes (1596–1650)*. London 1952, Chap. XI, 162 ff.

30 See Descartes to Mersenne, 27 July 1638, where Descartes explains his reasons for abandoning the study of abstract geometry, as a form of purely mental exercise. He now wants to dedicate himself at leisure to another kind of geometry, “qui se propose pour questions l’explication des phénomènes de la nature,” such as salt, snow, and rainbows, for: “toute ma Physique n’est autre chose que Géométrie” (AT II: 268). See also Descartes to Debeaune, 30 April 1639, AT II: 542. On the distinctive meaning of Descartes’ mechanics, free of teleology, as a science of things operating through the physical configuration (size, shape, motion) of their parts, see Garber, Daniel: “Descartes, Mechanics and the Mechanical Philosophy,” in *Midwest Studies in Philosophy* 25, 2002, 185–204, 193–200.

31 See Machamer, Peter: “Causality and Explanation in Descartes’ Natural Philosophy.” In: *Motion and Time, Space and Matter*. Ed. Peter Machamer et al. Columbus 1976, 168–199, 178 f., note 8; Descartes to More, August 1649: “Considero *materiam sibi libere permissam et nullum aliunde impulsus susipientem*, ut plane quiescentem. Illa autem impellitur a Deo, tantumdem motus sive translationis in ea conservante, quantum ab initio posuit” (AT V: 404).

ture, though not in God, although it may be the force of God himself conserving as much translation in matter as he put into it at the first moment of creation;³² or it also may be the force of created substance, like our mind, or of any other thing to which God gave the force to move a body (AT V: 403–404).³³

The key concept here is that, as we have seen in Kant's *Gedanken*, according to Descartes's *Principia* II.25, motion is not a force or an action. If matter, as something movable, were able to *act on* other matter, to communicate the mover's force so as to act upon it, then motion would be a real quality, actually existing in nature apart from extended substance, to which it would be superadded. Indeed, only according to the ordinary, common notion of motion is motion nothing but the "action by which any body passes from one place to another" (*Principia* II.24). The change that determines a body to move away from another along possibly different directions can result from different causes, but the transportation or transference of one part of matter or one body from the vicinity of contiguous bodies (which we consider as resting; *Principia* II.29) to the vicinity of others is *in* the body or in the particle that moves; that is, it is a mode of the mobile thing, it is not *in* the mover or in the agent that has the force to move the body (*Principia* II.25).

Note that, when he defines motion as the transportation of a body that leaves the vicinity of the bodies which it touches, Descartes stresses that he does not define motion in terms of transfer from one "place" to another (*Principia* II.28). Space, according to Descartes, is not a container which can exist without matter, within which a body is located, in an "order of situation" *à la* More³⁴ or *à la* Newton. It is not even a relation between things which are consciously observed *à*

32 According to Hutton, "similar to Plato's *anima mundi* (world soul) and the Stoics' *pneuma*, More's Spirit of Nature is a 'Superintendent Cause' that constitutes the interface between the divine and the material." (Hutton, Sarah: "The Cambridge Platonists." In: *A Companion to Early Modern Philosophy*. Ed. S. Nadler. Oxford *et al.* 2002, 308–319, 313).

33 Garber puts Descartes' point in these terms: "Descartes' God is not a 'cinematographer', causing motion by recreating the world in different configurations", but, more directly, "by way of an impulse that moves matter in a way that we can comprehend only through immediate experience, explaining the derivations of the conservation laws as well as the causal powers to minds" (Garber, Daniel: *Descartes' Metaphysical Physics*. Chicago 1992, 277).

34 On More's assumption of an absolute space and an absolute time in his 1650–51 letters to Anne Conway, see Gabbey, Alan: "Philosophia Cartesiana Triumphata: Henry More (1646–1671)." In: *Problems of Cartesianism*. Ed. Thomas M. Lennon *et al.* Kingston and Montreal 1982, 171–250, 192f. Baker points out that, through the mediation of Barrow, Henry More's anti-Cartesian theories of space and time as definite, existing entities independent of matter because they are attributes of God were transmitted to Newton (Baker, John T.: "Pre-Critical Developments of Kant's Theory of Space and Time," in *The Philosophical Review*, 44, 3, 1935, 267–282, 268).

la Leibniz.³⁵ Instead, Cartesian space is a real thing: extension is always extended substance; space and body are the same since we have the same idea of matter as we have of space (*Principia* II. 18).³⁶ This is why in *Principia* II.10 Descartes writes that “*spatium sive locus internus*” and “*substantia corporea in eo contenta*” do not differ *in re* but only in the way we are used to conceiving them: space as internal place is *in re* as the extended substance; that is, extension in length, breadth and depth which constitutes space also constitutes any tridimensional body. In *Principia* II.12, however, Descartes introduces the notion of the *locus externus* of a body, meaning its place among the surrounding external bodies (*situm inter corpora externa*) which determine its space (AT VIII: 47). In *Principia* II.13 he explains: “*Quippe nomina loci aut spatii non significant quicquam diversum a corpore quod dicitur esse in loco, sed tantum ejus magnitudinem, figuram, & situm inter alia corpora designant*” (AT VIII: 47). Here *locus* and *spatium* mean nothing truly different from a body that we say to be here or there, insofar as they indicate only its size, shape and how it is situated among other bodies (*Principia* II.13). In the following article (*Principia* II.14), however, Descartes distinguishes between the notions of place and space. Descartes writes that when we say that “a thing is in this place” (*rem esse in hoc loco*) we do not understand anything but (*nihil aliud intelligimus*) that such a thing has obtained this place among other things (*quam illam obtinere hunc situm inter alias res*). Descartes then defines the idea we have of place entirely in relational terms. Note that for Descartes to conceive of something *located* in a specific place does not suffice to conceive of some determined body with a certain magnitude and figure occupying some region or volume of space at that location; Descartes uses the verb *implere* interchangeably with *occupare*. Indeed, extension and figure must be *added* to the notion of location to understand (*intelligere*) a body of some specific size and shape which occupies exactly a specific region of space, at whatever location (AT VIII: 48).³⁷ Put otherwise: determinate space-filling, which is proper

35 Northrop, Filmer Stuart Cuckow: “Leibniz’s Theory of Space,” in *Journal of the History of Ideas*, VII, 4, 1946, 422–446, 433–434.

36 See also Descartes’ letter to the Marquis of Newcastle of October 1645 (AT IV: 329). According to Normore, this means that extension is not a feature of something else which underlies it, and that for Descartes “quantity is not merely a feature of a substance, not even an essential or inseparable one, but rather is substance itself” (Normore, Calvin G.: “Descartes and the Metaphysics of Extension.” In: *A Companion to Descartes*. Eds. Janet Broughton and John. Oxford *et al.* 2008, 271–287, 275).

37 In *Principia* II. 14 Descartes writes: “& cum *addimus ipsam [rem] implere hoc spatium vel hunc locum, intelligimus praeterea ipsam esse hujus determinatae magnitudinis ac figurae*” (AT VIII: 48, my italics). Euler’s criticism of Descartes’ notion of space seems to overlook his distinction between ‘being in space’ and ‘occupying space’ with respect to ‘place’: “l’idée que

to real, physical parts of matter as extended substance, is a characteristic not analytically contained in the mere topological notion of spatial location; *it must be added to it*. As noted above, according to Descartes there is no place or space that is absolutely empty and devoid of particles of matter, however subtle they may be. What I want to highlight is that the addition of the *implere* introduces a clear conceptual distinction between a physically determined filling of space (extended and divisible) and a merely positional and geometrical notion of being located, of being 'in' space.

As quoted above, in *Gedanken* I.6 Kant writes: "Denn wenn wir den Begriff von demjenigen zergliedern, was wir den Ort nennen, so findet man, daß er die Wirkungen der Substanzen in einander andeutet" (GSK, AA 01: 21.01–03). I read this rather cryptic and compressed statement, according to which the actions of substances on one another are analytically contained in the concept of what we call 'place', in light of Descartes' notion of *locus externus* as strictly meaning *obtinerere hunc situm inter alias res*. Moreover, no *res* is in any *absolute* position, as Descartes illustrates in *Principia* II.13 with the example recalled above of a man on a sailing ship who remains at its helm for the entire journey, and so in relation to the ship does not change his place, insofar as we view him as retaining the same common surface shared with neighboring bodies. Descartes draws from Galileo's (Aristotelian)³⁸ example of something in motion inside a moving object: boxes of goods do not move since, remaining stored in the same place on the moving ship (in the ship's hold), the relation among them does not change, although they change place in relation to other, immobile shores between which the ship sails.³⁹

nous avons de l'espace, renferme sans doute une étendue à trois dimensions, et néanmoins on convient que l'espace seul n'est pas encore un corps: il ne fait que fournir les lieux que les corps occupent et remplissent" (Euler, Leonhard: *Lettres a une Princesse d'Allemagne* [1760]. Ed. Andreas Speiser. Vol. I. Zürich 1960, 150).

38 See Aristotle, *Phys.* IV. 2, b27–29: "the place of any given thing is not a part or a state of that thing, but is separable from it. In fact, people do think of place as being like a vessel (since a vessel is a movable space) and a vessel is not a part of the object it contains" (Aristotle: *Physics*. Transl. Robin Waterfield. Oxford 1996, 82).

39 See Galilei, Galileo: *Dialogo sopra i due massimi sistemi del mondo tolemaico e copernicano* [1630]. Torino 1970, "Dialogo secondo", 144: "[...] tutto quello che si muove, si muove rispetto a qualcosa di immobile [...] il moto il quale sia comune a molti mobili è ozioso e come nullo in quanto alla relazione di essi mobili tra loro, perché tra di essi niente si muta, e solamente è operativo nella relazione che hanno essi mobili con altri che manchino di quel moto;" cf. Arist., *Phys.* IV.5a15–20: "This is why when something is in motion inside a *moving* object (imagine a ship on a river), the container functions as a vessel rather than as a place. Given that place is meant to be immovable, the whole river is really the place for the ship, because taken as a whole the river is immovable" (Aristotle, op. cit., 88.). See also Descartes (*Principia* II.13, AT VIII: 47): "Quippe nomina loci aut spatii non significant quicquam diversum à corpore quod dicitur esse in loco,

If in Descartes's own terms, position is only relative to other bodies, can we attribute to him the claim that the rational soul or mind, as a simple immaterial substance without parts, can share a spatial framework with extended matter as far as it may be said to have a presence in space, without physically occupying or filling it? In § XXX of the *Passions*, Descartes denies that one can conceive of what extension the soul occupies (*quelle estendue elle occupe*) and affirms two apparently contradictory things: (i) the rational soul or *mens* has no relation to the extension of the body, and (ii) it is united to the whole body. Note that in § XXXI he reconciles this *prima facie* opposition without asserting that the mind is divisible, for he represents it as punctually concentrated in a place: the soul exercises *immediately its functions* in a place or *locus* of the brain. This makes the soul's sphere of activity spatial and thus divisible. Indeed, according to Descartes, *active simple substances* (human minds, the essence of which is *cogitatio*) can be present and diffused in each part of their bodies as well as concentrated in one *principal* place or seat (*siège*: the pineal gland, where the soul works most), from which they can exercise and apply their virtue, power or moving force according to their sphere of activity, without filling or occupying with extension (size) any region of corporeal space. In § XXVI Descartes uses the expression *force de l'ame* (AT XI: 356), and in §§ XXIV–XXXVI he describes mind-body interaction in terms of *exercer* and *rayonner*. In particular, the verb *rayonner* refers to a modality of transmission and propagation of the rational soul's power in any part of the body and indicates that mental activities are concentrated in a single place of irradiation and are able to affect a material extension.⁴⁰ In my view, we can make better sense of these sections of the *Passions* against the background of the *Principia's* *conceptual* distinction between 'being in this place' and 'filling' this space or place.

In his *Lectures on Metaphysics L1* of the mid 1770s, when considering our commonly representing the soul as located in the brain, due to the closer dependence on that corporeal place where the soul works most, Kant regards this as an *analogon* of the locations of material bodies (V-Met-L1/Pölitz, AA 28: 225). In *Träume eines Geistersehers* Kant writes: "Wo ich empfinde, da bin ich" (TG, AA 02: 324.31), thus endorsing the Scholastic view that a person's soul is present as a whole in every part of his or her body, locating it where it is natural to locate any of its sensations. However, Kant's expression *meine Seele ist ganz im ganzen Körper und ganz in jedem seiner Theile* (TG, AA 02: 325.04–05) is not at all anti-Cartesian. In fact, this is the German rendering of the Latin expression used in the *Medita-*

sed tantum ejus magnitudinem, figuram, & situm inter alia corpora designant. Et quidem, ut ille situs determinetur, respicere debemus ad alia aliqua corpora, quae ut immobilia spectemus."

⁴⁰ This point I examine in detail in my *L'invenzione di Cartesio*, cit., 129–140.

tions by Descartes, in the “Responses to the Sixth Objections,” when claiming that he clearly conceives mind and body to be coextensive, and his mind to be present as a whole in and throughout his body, in every part. There, Descartes draws an analogy between the notion of *gravitas* (*la pesanteur* equally diffused in the whole body which can also be viewed “as if” it is concentrated in one point when hanging a heavy body by a cord) and the way in which he understands, without doubt (at present: *jam*), the mind as being in the body:⁴¹ “Nec sane jam mentem alia ratione corpori coextensam, totamque in toto, & totam in qualibet ejus parte esse intelligo” (AT VII: 442). Note that Descartes uses the notion of heaviness to model how something incorporeal can exercise an effect on the corporeal by a sort of extension due to its (contingent and variable) application of virtue or force to bodies.⁴² In *Principia* IV.202, Descartes understands the heaviness of a body as depending upon the place and the motion of neighboring bodies: “quam ego nullam in ullo corpore, cum solum spectatur, sed tantum quatenus ab aliorum corporum situ & motu dependet atque ad illa refertur, intelligo” (AT VIII: 325). The nature of *gravitas* is thus conceived in relational terms. Furthermore, the efficacy of its action on a body requires no physical contact or touch by the simple substance. In this regard, it is more like magnetic attraction.⁴³ In the articles of the *Principia* on the properties, nature, power and interactions of the magnet (*Principia* IV.133–183), Descartes employs interchangeably the pair of terms *vis-virtus*, and speaks of a “sphere” of virtue or activity (*Principia* IV. 153).⁴⁴

⁴¹ On this analogy, see Garber, Daniel: “Mind, Body and the Laws of Nature in Descartes and Leibniz,” in *Midwest Studies in Philosophy* VIII, 1983, *Contemporary Perspectives on the History of Philosophy*, 105–133, 113 f.; id., “Understanding interaction: what Descartes should have told Elisabeth,” in *Southern Journal of Philosophy*, 21 suppl., 1983, 15–32, 19–22; Schmaltz, Tad M.: “Substantial Forms as Causes: From Suarez to Descartes.” In: *Matter and Form in Early Modern Science and Philosophy*. Ed. Gideon Manning. Leiden/Boston 2012, 125–150, 144; id., “Descartes and Malebranche on Mind and Mind-Body Union,” in *The Philosophical Review*, 101, 2, 1992, 281–326, 300–302 and 324 f.

⁴² Descartes returns to this *comparatio* in the letter to Arnauld of 29 July 1648: people who take the gravity of the falling stone toward the Earth’s center as a real quality distinct from the stone, existing *per se* thanks to the divine power, represent gravity according to their idea of incorporeal substance. Hence, understanding how the mind can move the body is no more difficult than understanding how gravity can pull down the stone (see AT V: 223).

⁴³ On the expression *sphère d’activité* and the similarity between *gravitas* and magnetic attraction, see Descartes to Mersenne, 13 July 1638 (AT II: 224). Descartes received Atanasio Kircher’s *De Magnete* (AT XI: 635–639) from Huygens (Huygens to Descartes 7 January; AT III: 802). In *Principia* IV.166, Descartes mentions Gilbert as the first to have discovered that the Earth is a magnet.

⁴⁴ Descartes mainly considers the case of iron, which mutates the power of the magnet by becoming magnetic. Descartes’ analysis of the magnet’s sphere of action extends the analogy between *gravitas* and *mens* regarding their presence in heavy bodies to an analogy between mag-

Henry More objects that the view *totamque in toto, & totam in qualibet parte* amounts to “Holenmerism,”⁴⁵ and Leibniz sharply criticizes this model in his third letter to Clarke of 26 February 1716:

Dieu n'est pas présent aux choses par situation, mais par essence; sa présence se manifeste par son opération immédiate. La présence de l'âme est tout d'une autre nature. *Dire qu'elle est diffuse par le corps, c'est la rendre étendue et divisible; dire qu'elle est toute entière en chaque partie de quelque corps, c'est la rendre divisible d'elle-même.* L'attacher à un point, la répandre par plusieurs points, tout cela ne sont qu'expressions abusives, *Idola Tribus.*⁴⁶

We have seen that one need not adopt a form of *non-Cartesian* dualism to conceive of a soul as located *in* the space occupied by its physical body.⁴⁷ Some scholars, however, regard Kant's view in *Dreams*, to the effect that nothing in our experience supports the view that the soul is located at a certain point in the region occupied by the brain (TG, AA 02: 324.35–325.02),⁴⁸ as a significant departure from Descartes, “who regarded spatial extension as a sufficient condition for being physical.”⁴⁹ In my view, this interpretation conflates two distinct notions: external location and spatial extension as space-filling. In the next section I examine the claim that Descartes regarded spatial extension as a sufficient condition for being physical, contrasting his position to that defended by Henry More, who understood the soul or self to be spatially extended.

net and *mens* regarding their power to act on bodies. Similarly, in the *Passions of the Soul*, the figures of those external bodies which strike our sense organs and the images which become composed and unified in the pineal gland *agissant immédiatement contre* or *excite* the soul: on this point see my *L'invenzione di Cartesio*, op. cit., 136–140.

⁴⁵ More, Henry: *Enchiridion Metaphysicum sive de rebus incorporeis. Succinta & luculenta Dissertatio*. London 1671, Chapt. XXVII. 13. Holenmerism or Holenmerianism is the doctrine that the spirit is whole in every part; as to More's label see Rozemond, Marleen: “Holenmerism (Holenmerianism).” In: *The Cambridge Descartes Lexicon*. Ed. Lawrence Nolan. Cambridge 2015, 366–368. She refers Descartes' use to Suárez's *Disputationes Metaphysicae*, according to which a spiritual simple substance can act in compound bodies and be present in physical locations only by being in its entirety in every one of them.

⁴⁶ *Correspondance*, op. cit., 56; my italics.

⁴⁷ For this tenet see Goetz, Stewart and Taliaferro, Charles: *A Brief History of the Soul*. Oxford et al. 2011, 140 ff.

⁴⁸ See Broad, Charlie Dunbar: *Religion, Philosophy and Physical Research*. New York 1953, 130–132.

⁴⁹ Goetz and Taliaferro, op. cit., 142.

§ 4 Descartes and More on Extension

According to the received wisdom in Cartesian historiography, Descartes identified matter with extension⁵⁰ and provided a mechanistic scientific view of bodies which excluded secondary qualities from the physical world.⁵¹ Recall, however, that extension is the principal attribute through which our pure understanding conceives a clear and distinct notion of a created material substance, answering the question of the constitution of any real physical body. Knowing what a material thing (such as a piece of wax) *truly is* is clearly distinct from the facts and states of its physical existence; yet this is not effected *by*, it is only conducted *through*, our sense perception. Descartes' science considers knowledge of matter in terms of what my pure intellect necessarily and sufficiently requires if it is to think of a sensible experienced body.

After examining an actually existing stone in the famous mental experiment of *Principia* II.11, the true idea we have of its nature is that it does not cease to be a body once devoid of secondary as well as ('Galilean') primary qualities. No experienced body can exist without possessing the defining attribute of matter itself, that is, extension in length, breadth and depth; all its other properties – both 'primary' (such as figure, shape, motion, rest, weight and impenetrability) and 'secondary' (such as color, warmth and softness) – are shown to depend upon extension (*Principia* I.53). As Descartes explains with crystal clarity to Henry More, extension is the "true and essential difference," and it is incorrect to "define" the body's essence as *substantia sensibilis* insofar as a body can retain its nature even if it is neither soft nor hard, neither cold nor hot, *nec denique habeat ullam sensibilem qualitatem*.⁵² To say that the nature (essence) of matter or body consists simply in being extended means that – since nothing can be deprived of its essence – *in general* bodies 'can' exist without sensible qualities (such as color or weight), thus implying that a space apparently free of sensible bodies is not "necessarily" empty, in the philosophical or absolute sense of the term: a space with *no substance at all* (*Principia* II.16).⁵³

⁵⁰ On space and extension and on the relation between extension as a principal attribute of matter to extended things see Normore, *op. cit.*; on Descartes' concept of matter see Blackwell, Richard J.: "Descartes' Concept of Matter." In: *The Concept of Matter in Modern Philosophy* [1963]. Ed. Ernan McMullin. Notre Dame/London 1978, 59–75.

⁵¹ See Garber, *Descartes*, *cit.*, Chapt. 3.

⁵² Descartes to More, 5 February 1649; AT V: 268.

⁵³ See Descartes to Mersenne, 15 November 1638 and 9 January 1639. On Descartes's arguments against the *vacuum* and on subtle matter see Nonnoi, Giancarlo: "Against Emptiness: Descartes's Physics and Metaphysics of Plenitude". *Studies in History and Philosophy of Science* 25, 1, 1994: 81–96, 85–87. After 1644, the publication date of the *Principia*, Descartes received Pascal's *Expéri-*

Since according to Descartes's principles all sensible qualities consist only in the different ways in which moving particles, which excite our nerves at a certain velocity, move or are at rest,⁵⁴ "corpus posse existere quamvis nullae ejus particulae moveantur nec quiescant." In this way, Descartes's notion of space depends upon the essential definition of body (*corpus*) as extension: even in the apparent absence of bodies, aether (the *matière subtile*) occupies all spaces, and in this fullness and contiguity of matter, movement (*le mouvement*) can be fully intelligible only when conceived in terms of a *change of state* of matter's immediate neighbors, thanks to which small corpuscles of different size and shape move away (*s'éloigne*), or depart, from other particles.⁵⁵

In the letter to Henry More of 5 February 1649, Descartes is puzzled by More's proto-Berkeleyan claim about the necessity of conceiving of matter as sensible. For Descartes, due to the geometrical divisibility of extended matter, smaller material parts would be unable to move the material parts of our nerves and would produce no sensible sensation. Moreover, against Henry More's argument in favor of ascribing extension to God, in virtue of being omnipresent and so able to fill any empty space, Descartes claims that no space is totally empty and that in all spaces there is some substance, because in space one finds the properties (three dimensionality) of extension (and not *vice versa*); hence, without body, there could be no space at all: "nullum omnino spatium sine corpore esse posse."⁵⁶ If, in a mental experiment, I am to imagine God's creating a *vacuum* in a room, then to avoid contradiction in my thinking I must recognize that the walls of that room would be pulled together; likewise, if I am to conceive of His leveling the Earth's mountains, I cannot also conceive of his preserving its valleys. Descartes repeats to More an earlier argument. In a letter to Descartes (July 1648),

ences nouvelles touchant le vide (1647) and E. Noël's *Gravitas comparata* (1648): see his letters to Mersenne of 13 December 1647 (AT V: 94); 31 January 1648 (AT V: 116); 7 February 1648 (AT V: 118), 4 April 1648 (AT V: 141) and his own documented experiments on the vacuum in AT V: 100–106n.

⁵⁴ As Northrop (op. cit., 428) remarks: "It is to be noted that with respect to the relation between sensuous qualities and material substances the Cartesian science and philosophy and the physics of Galilei and Newton are in agreement. Both theories conceive of the sensuous qualities of the sensed world as the mere subjectively apprehended and projected appearances resulting from the action of the material substances of physics upon the observer."

⁵⁵ As recalled *supra*, in the *Nova Dilucidatio*, Sect. III Prop. XII, Kant claims that "in a world which was free from motion (for motion is the appearance of a changed connection [*motus est nexus permutati phaenomenon*]) nothing at all in the nature of succession would be found even in the inner state of substances" (PND, AA 01: 410; English translation in: The Cambridge Edition of the Works of Immanuel Kant, *Theoretical Philosophy 1755–1770*. Ed. David Walford in coll. with Rolf Meerbote. Cambridge 1992, 37).

⁵⁶ Descartes to More, 5 February 1649; AT V: 272.

Arnauld objected to the idea that the space occupied by a body can still be conceived as a tridimensional extension, that is, as a body, once that body has been annihilated. In reply (29 July 1648), Descartes writes that “the nihil” cannot have any property; therefore, when we speak of an empty space, we do not mean that this space is absolutely empty, a “pure nihil.” The fact that we are still speaking of a space means that we are still conceiving of an extension with dimensional properties.⁵⁷ Descartes further clarifies that he does not deny that God’s omnipotence extends to creating a mountain without a valley; he only affirms that “a me concipi non possit mons sine valle [...] atque talia implicare contradictionem in meo conceptu. Quod idem etiam de spatio, quod sit plane vacuum, sive de nihilo, quod sit extensum” (AT V: 223–224).⁵⁸

In the letter to Descartes of 11 December 1648, More presented a notion of extensionality more ample than the notion of body, as a property common to both corporeal and spiritual substance. Tangibility and impenetrability pertain only to bodies, whereas a penetrable incorporeal extension is inherent in the absolute essence of things subsisting *per se* (such as pure human minds, angels, God). This different notion is advanced regarding the origin and conservation of motion. If an omnipresent God, who has no body or matter, did not “occupy intimately” the whole machine of the universe and its singular parts, how could He have imparted motion to matter and actually conserve it (*per* Descartes’s own principles) without being in proximity to or having touched, at least once, the

57 Note that Euler presents the same example to prove that the Cartesian notions of extension and emptiness do not suffice to explain the nature of bodies. The implicit (Newtonian, i. e. anti-Cartesian) presuppositions are the idea of space as a container, the essentiality of mass for any contained bodies, and the notion of an incorporeal tridimensional extension which coincides with the limits of the container: “Supposons que tous les corps qui se trouvent à présent dans ma chambre, et même l’air qui y est, soient anéantis par la toute puissance Divine; et il y aura encore dans ma chambre la même longueur, largeur, et profondeur, sans qu’il y ait aucun corps. Voilà donc la possibilité du moins, d’une étendue qui ne seroit pas corps. Un tel espace sans corps est nommé un vuide; et un vuide est donc une étendue sans corps.” (Euler, *Lettres*, cit., 150).

58 Following Northrop (op. cit., 427), it is worth recalling that according to Newton space can exist without matter, while a material object cannot exist without space, conceived as a container within which everything is located, for all things are placed in time with regards to an order of succession and in space with regards to an order of situation, and it is due to their essence or nature that they are in place. Since the individuality of Newtonian single bodies is defined by their (arbitrary) location in a homogeneous space (it has similar topological and Euclidean metrical properties everywhere), the particular regions of Newton’s space violate Leibniz’s metaphysical principles of the identity of indiscernibles and the principle of sufficient reason.

matter of the universe?⁵⁹ In the letter to Descartes of 5 March 1649, More claims: “mentisque sive animas nostras atque Angelos, eadem prorsus manente substantia, contrahere se posse, et certos denuo ad limites se expandere” (AT V: 301).

As noted above, in reply to More on 5 February 1649, Descartes rejects the idea that the notion of extension contains more than the notion of body and claims that it would be incorrect to define bodies as sensible substances (AT V: 269). Nevertheless, he is willing to assign extension to human minds, as well as to God and angels, according to an “analogical meaning,” that is, not in a proper and true sense (as ordinarily conceived through imagination, when we distinguish mutually external parts in tridimensional extension). The ‘analogical’ significance of extension ascribed to immaterial substances does not contradict the dualism of the principal attributes of *res cogitans* and *res extensa*, and is compatible with the fundamental Cartesian tenet that no incorporeal substance is properly (*i. e.* tridimensionally) extended. Simple immaterial substances cannot be imagined; we cannot distinguish parts in them, and they are only (metaphysically) intelligible. However, Descartes ascribes to them either outwardly directed virtues or (*aut*) outwardly directed forces. He writes that although these intelligent substances apply themselves to extended things, they are not, for that reason, themselves extended (*quae, quamvis se applicant rebus extensis, non idcirco sunt extensae*; AT V: 270).

Put differently, created immaterial, unextended substances, having received from God the power to act on bodies, may have an external presence and an extensive quantity as spheres of activity, without contradiction. Descartes uses the example of the fire which is “in” the incandescent iron bar without being the iron. Analogously, when our actively embodied thinking mind applies itself to our body, it moves corporeal matter not because of its substance but by virtue of its power or capacity (received from God), and it will be present *in* extension without itself *being* extended. This view is reinforced in that same letter to More (15 April 1649): “nullam intelligo nec in Deo, nec in Angelis vel *mente nostra* extensionem substantiae, sed *potentiae* duntaxat” (AT V: 342, my italics). According to Descartes, *pace* More, there is only one form of “true” extension. It remains defined as the principal attribute of corporeal substance, involving impenetrability, corpuscular structure and, above all, its “essentiality” to bodies. This essentiality does *not* characterize the nature of immaterial substances, which may or may not be ‘analogically’ extended. Also in the letter to Arnauld (29 July 1648), replying

⁵⁹ Descartes, AT V: 238–239: “Atque equidem, quod Deus extenditur suo modo, hinc arbitror patere, nempe quod sit omnipraesens, et universam mundi machinam singulasque ejus particulas intime occupet. Quomodo enim motum imprimeret materiae, quod fecisse aliquando, et etiamnum facere ipse fateris, nisi proxime quasi attingeret materiam universi, aut saltem aliquando attigisset?” (my italics).

to the *vexata quaestio* of how an incorporeal mind can put the body in motion, Descartes had written: “si enim per corporeum intelligamus id quod pertinent ad corpus, *quamvis sit alterius naturae*, mens etiam corporea dici potest” (AT V: 223, my italics). When I conceive of the mind as extended, I think of its nature or essence as distinct from the nature of bodies; I can speak of its ‘corporeality’ *only* if I mean merely its power to act on things which are intrinsically extended, *partes extra partes* (AT V: 343).⁶⁰ Such an *extensio potentiae* means that the human mind can, as one of its modes (not its essence), exhibit its causal agency within a corporeal substance. Moreover, this view implies that once the particular extended body to which the mind is united perishes, this affects only the field and degree of application of the mind’s power, not its essence or pure substance (AT V: 343). As Descartes writes to More: “Nec vero mens mea potest se modo extendere, modo colligere, in ordine ad locum, ratione substantiae suae, *sed tantum ratione potentiae, quam potest ad majora vel minora corpora applicare*” (AT V: 347, my italics).

It is worth noting that in the letter to More of August 1649, Descartes argued that More’s view involves a difficulty in conceiving of a certain force in the body at rest *through which* it resists motion (*vim quandam in corpore quiescente per quam motum resistit*), as if that force were something positive (*scil:* an action), distinct from motionlessness itself (*ab ipsa quiete*); whereas, in Descartes’s view, it is like a modal entity (AT V, 404).⁶¹ Is it then correct to view More’s model of an extended but indivisible entity as the precursor, if not the archetype, of Kant’s notion of space-filling in the *Monadologia physica*?

§ 5 Kant’s *Physical Monadology* and its Alleged Anti-Cartesian Sources

As is well known, the *Physical Monadology* originated from the controversial result of the 1745 essay competition on monadology sponsored by the Philosophy Section of The Prussian Academy of Science, chaired by Maupertuis. Both Formey (permanent secretary of the Academy, known for promoting Wolff’s philosophy in France) and Euler wrote two competing works on the subject, intervening *de*

⁶⁰ On the debate between More and Descartes about the extension of immaterial substances see Pasnau, Robert: *Metaphysical Themes 1274–1671*. Oxford 2013, 356–358.

⁶¹ Note that More had asked Descartes why rest (another mode of bodies like motion in Cartesian terms) does not always pass from one body to another. On More’s changing attitude toward Cartesian philosophy, from acceptance (1648–50) to opposition (after 1660) due to religious concerns, see Gabbey, op. cit.

facto in the Academy's deliberations. In 1746 Euler published his *Gedanken von den Elementen der Körper*, which in 1747 was translated into French and added as an appendix to Formey's *Recherches sur les Eléments de la Matière* (1747).⁶² The prize was awarded to Justi in 1747, who argued against monads as ultimate, unextended, indivisible components of matter, only because the vote was extended to all members of the Academy; indeed the Philosophy Section was unable to decide between the two essays of the short list (one *pro*, the other *contra* monads) and Maupertuis rejected the *ex-aequo*. After almost a decade, Kant's ambition was to settle a debate that had baffled the best philosophical minds of his time by innovatively combining the geometrical (divisible) reality of space with the metaphysical (simple) reality of substances.⁶³

With few exceptions,⁶⁴ this essay has previously been studied with regard to Kant's dynamic conception of matter. According to Friedman, the core of the *Monadologia physica* is seen in Kant's "ingeniously importing the Newtonian doctrine of central forces."⁶⁵ Kant's explicit aim is to deduce two principles: to conceive of both the conjunction of elements (so as to form compound bodies) by positing attractive force and their determinate extension and dispersion in

62 The complete title of Euler's book is: *Gedanken von den Elementen der Körper, in welchen das Lehr-Gebäude von den einfachen Dingen und Monaden geprüft, und das wahre Wesen der Körper entdeckt wird*. For the details of the debate between Formey and Euler and the vicissitudes of the prize, see Rey, Anne-Lise: "Les monades selon Samuel Formey," in *Studia Leibnitiana* 45, 2, 2013, 135–149.

63 Garber notes how little of Leibniz's own work was accessible to the pre-Critical Kant and his contemporaries: the *Monadology*, the *Theodicy* and the correspondence with Clarke, supplemented by some articles published in learned journals between 1684 and 1695, including the *Système nouveau* and the *Specimen dynamicum*. The *Nouveaux essais* were published in 1765 (Garber, Daniel: "What Leibniz Really Said?". In: *Kant and the Early Moderns*, op. cit., 64–78, 65). On this point see Look, Brandon C.: "Simplicity of Substance in Leibniz, Wolff and Baumgarten," in *Studia Leibnitiana* 45, 2, 2013, 191–208, 191–195. On Gottsched's attempt to offer a dynamical picture of monads as simple elements of compound bodies to avoid Zeno's paradox, presenting them as points of moving and repulsive forces filling space, see Gottsched, Johann Christoph: *Erste Gründe der gesammten Weltweisheit* [...]. Leipzig 1739³, §§ 396–397: 196–197. Gottsched writes: "Denn weil sie [scil. the elements with a very obscure *Vorstellungskraft* that compound bodies not as mathematical points] bewegende und widerstehende Kräfte haben, so durchdringet eins das andre nicht: Sondern ein jedes bleibt außer dem andern. Daher erfüllen viele, die neben einander sind, einen Raum, und ihre Zusammensetzung macht einen Körper aus" (§ 397: 197).

64 See e. g. Watkins, "Forces and causes", cit., 23–25, who reconstructs the context of the *Monadologia physica* by referring to Wolff's and Baumgarten's notion of active substance and to Knutzen's view of physical influx. See also Holden, Thomas: *The Architectur of Matter*. Oxford 2004, Chap. 6, who speaks of the "Kant-Boscovich force-shell theory," but who retraces an "indirect influence" of Henry More's model of extended but indivisible entities: the 'indiscerpible' spirits (239).

65 Friedman, op. cit., 9.

space by positing repulsive force. In his “Preliminary considerations” Kant states that his aim is to explain the inner nature of bodies by appealing to the moving force inherent in primitive parts of bodies (monads or elements of matter), and to address the controversy about how they combine and whether compound bodies fill space merely by the co-presence of their primitive parts or by the reciprocal conflict of their forces: “Corpora enim constant partibus; quibus quomodo sint conflata, utrum sola partium primitivarum compraesentia, an virium mutuo conflictu repleant spatium, haud parvi sane interest, ut dilucide exponatur” (MonPh, AA 01: 475.19–22).

Understandably, scholars have sought to establish the possible influence of Boscovich's forces emanating from atomic points,⁶⁶ claiming that Kant held

66 The Cambridge Edition of the Works of Immanuel Kant introduces Kant's *Monadology*, speaking of a dynamic theory of matter “reminiscent of and possibly influenced by that of Boscovich” (Walford, David: “Introduction to the Translations.” In: Kant, *Theoretical Philosophy*, op. cit., liii). See also Tonelli, op. cit., 189–190 and Pecere, *La filosofia della natura*, op. cit., 252, note 112. Sarmiento writes: “This dynamic conception of the monads, its relations, and space, was quite original at that time, and we can only compare it with Boscovich's theory of matter as composed of identical point centres of force of no extent, having no essential properties except inertia and the capacity of exerting forces on one another of magnitudes that depend on their mutual distances” (Sarmiento, Gustavo: “On Kant's Definition of the monad in the *Monadologia physica* of 1756,” in *Kant-Studien*, 96, 2005, 1–19, 18). However, the claim that Boscovich influenced Kant's account presupposes the European diffusion of Boscovich's 1745–1755 writings, and justifying the label “the Kant-Boscovich shell atom theory” requires more than the alleged common assumption of simple unextended parts of compound bodies as centers of attractive and repulsive forces. I have provided detailed evidence and analysis against both claims in my “La teoria della materia nella *Monadologia physica* di Kant e la dinamica di Boscovich: le ragioni per una differenza”. Forthcoming in *Giornale critico della filosofia italiana*. Note that Paolo Pecere recalls that in 1755 Gottsched had introduced repulsive forces in order to explain the impenetrability of monads and that, since the *Gedanken*, Kant's “original idea [...] was to endow monads also with attractive forces” (Pecere, Paolo: “Monadology, Materialism and Newtonian Forces: The Turn in Kant's Theory of Matter.” In: *Quaestio 2016: Another 18th-century German Philosophy? Rethinking German Enlightenment/Un'altra filosofia tedesca del XVIII secolo? Ripensare l'Illuminismo tedesco*. Ed. Enrico Pasini and Paola Rumore. Turnhout/Bari 2016, 167–191, 177, note 50). However, Robert Schofield had already drawn attention to Robert Greene's anti-corpuscular philosophy based on interacting attractive and repulsive forces (in his 1727 *The Principles of the Philosophy of the Expansive and Contractive Forces or An Inquiry into the Principles of the Modern Philosophy*) and on John Michell's theory of matter which, earlier than Boscovich's dynamics, dissolved particles into inertial centers of Newtonian attractive and repulsive forces (with reference to his 1750 *Treatise of Artificial Magnet*: see Schofield, Robert E.: *Mechanism and Materialism. British Natural Philosophy in the Age of Reason*. Princeton/New Jersey 1970, 117–119 and 242). In the *Monadology*, Sec. II, Prop. IX, Kant demonstrates his acquaintance with the Newtonian school. Pecere (“Monadology”, cit., 169, note 6) refers to Roger Cotes and John Keill; Warda (op. cit., 34), reports that Kant had a copy of Keill's 1739 *Introductiones ad veram physicam* in his private library.

a similar view.⁶⁷ In 2004, Thomas Holden framed Kant's *Physical Monadology* within the basic conflict lodged in the new world-view of Enlightenment science: the clash between the two central tenets of the actual parts doctrine and the geometrization of nature.⁶⁸ According to Holden, Kant disarms the antinomy, seeking to preserve both core doctrines by introducing a dynamical model of matter in line with Boscovich, a model providing "a direct ancestor of the field systems of Faraday and Maxwell."⁶⁹ Holden further refers to Henry More's model of extended but metaphysically indivisible spirits as a "formal archetype – or at least a precursor – of the Kant-Boscovich force-shell atom."⁷⁰

Though it is widely assumed that the "concept of monad," a concept "framed to mean and represent true substantial units in nature," is one of Leibniz's major "philosophical inventions,"⁷¹ in his *Enchiridion* (1671) More first uses the terms *Monas* and *physical monads* to designate the extended minimal homogeneous particles or simple elements of which bodies are compounded and into which they can ultimately be divided. More distinguishes between extension and physical magnitude, such that physical monads cannot actually be divided into parts.⁷²

67 See Holden, op. cit., Chap. 4 and Hanna, Robert: *Kant, Science and human Nature*. Oxford 2006, 148, quoted in Smith, Sheldon R.: "Kant's picture of monads in the *Physical Monadology*," in *Studies in History and Philosophy of Science*, 44, 1, 2013, 102–111, 102. See also De Risi, who refers to "the Knutzen–Boscovich–Kant lines of thought" as accepting "deeply Newtonian suggestions on the absoluteness of space and the system of attractive and repulsive forces acting at a distance" (De Risi, Vincenzo: *Geometry and Monadology. Leibniz's Analysis Situs and Philosophy of Space*. Basel et al. 2007, 306) and writes: "The real founder of a dynamically-oriented physical monadology was Boscovich with his *De viribus vivis* (1745)" (308, note 7).

68 Holden, op. cit., 237.

69 Holden, op. cit., 237.

70 Holden, op. cit., 237.

71 See Schönfeld, op. cit., 162, about the title of Kant's 1756 essay: "It was not a coincidence that the title of Kant's work is reminiscent of Leibniz's *Monadologie*." See also Watkins' conclusion regarding Kant's pre-Critical views on causality: "Kant arrives at his position by assuming (with Wolff and his followers) that monads are not necessarily mental, but could be physical instead" (Watkins, *Kant's Metaphysics*, op. cit., 177).

72 See More, *Enchiridion*, cit., Chapt. 9, § 3, 76: "Per *Physicas Monadas* intelligo particulas adeo minutas ut ulterius dividi non possint vel in partes discerni. Corpus autem omne ex his componitur, & in eadem saltem Divina virtute dissolvi potest [...] Nam Extensionem aliquam etiamnum retinent, sed nullam magnitudinem *Physicam* & proprie dictam, ut quae in partes actu potest dividi". Note that in the *Critique of Pure Reason*, Kant explains the significance of the word *Monas*, making clear that he is referring (only) to Leibniz's usage. Moreover, he highlights how according to Leibniz it is a point-center of representation (*perceptio* and *appetitus*), something immediately given (say, to self-consciousness) as a simple substance, but "nicht als Element des Zusammengesetzten, welche man besser Atomus nennen könnte" (KrV, A 442/B 470); see on this point Fichant, op. cit., and Sarmiento, op. cit., 5, who highlights how in 1756 Kant defines the

Kant had a copy of the 1671 *Enchiridion* in his private library.⁷³ However, Holden does not regard More's physical monad as a "formal archetype or at least precursor" of Kant's; this he finds instead in More's notion of indiscernible spirit. Note, however, that in his *Philosophische Abhandlung von der immateriellen Natur der Seele* (1744), Martin Knutzen had objected that Henry More's idea of a spiritual kind of emanative extension, as essentially thick (*i.e.*, constituting a fourth spatial dimension, *spissitude*), raises the specter of materialism.⁷⁴

Rather than the Kant-Boscovich picture, Sheldon Smith argues that "Kant shows significant strands of having a fundamentally non-Boscovichian view," conceiving individual elements (monads) in terms close to Descartes's and sometimes to Euler's picture of matter as a "deformable continuum."⁷⁵ According to

monad or simple entity as that which does not consist of separable parts, thus setting himself apart from other monadists such as Wolff and Baumgarten. However, Sarmiento overlooks reference to More's definition of simple spiritual substances in terms of inseparable parts, which enlarge the *Physical Monadology's* philosophical background and context: "Of the *Indiscernibility* of a Spirit we have already given rational grounds to evince it not impossible, it being an Immediate attribute thereof, as *Impenetrability* is of a *Body*, and as conceivable or imaginable, that one Substance of its own nature may invincibly hold its parts together so that they cannot be disunited nor dissevered, as that another may keep out so stoutly and irresistibly another substance from entering into the same space or place with it self" (More, Henry: *The immortality of the soul, so farre forth as it is demonstrable from the knowledge of nature and the light of reason*. London 1659, Chapt. 5, 25 f.).

⁷³ Warda, *op. cit.*, 52.

⁷⁴ See Knutzen, Martin: *Philosophische Abhandlung von der immateriellen Natur der Seele, darinnen theils überhaupt erwiesen wird, daß die Materie nicht denken könne [...]* Aus dem Lateinischen uebersetzt. Königsberg 1744, § 11, 66–69. Knutzen describes More as "ein Mann von einem scharfsinnigen Witz" (68); he refers to Cudworth's account of the difference between corporeal and spiritual extension, and criticizes More's 'quasi materialistic' approach to spirit in the *Enchiridion*: "[...] da er [Heinrich Morus] denn gar so weit gegangen und diesem ausgedehnten Geist noch die vierte Ausmessung, so er die wesentliche Dicke (*spissitudinem essentialem*) nennet, eingeräumet [...]. In einem engerem Verstande, da man durch das Wort Materie ein zusammengesetztes Ding versteht, so undurchdringlich und mit einer widerstehenden Kraft versehen ist, leugnen sie zwar, dass die Substanz der Seelen eine Materie sey" (*ibidem*). On the theoretical and moral basis of Knutzen's criticism of pre-established harmony (for the former, impenetrability, resistance and law of the conservation of motion; for the latter, freedom of agency and God's wisdom), see Erle, Giorgio: "Aspetti morali della critica di Martin Knutzen all'armonia prestabilita." In: *Alla ricerca di un ethos tra mente e corpo*. Ed. Giorgio Erle. Verona 2016, 47–59, 50–54. In his private library, Kant kept a copy of the 1733 Latin translation (*Systema intellectualis*) of Cudworth's 1678 *True intellectual System of the Universe*; see Warda, *op. cit.*, 47.

⁷⁵ Smith, *op. cit.*, states (103): "Except for the difference in force laws, much of Kant's view certainly sounds Boscovichian, particularly by comparison with viable historical alternatives like Newton's picture of hard, spherical atoms or Descartes' (and sometimes Euler's) picture of mat-

Smith, one non-Boscovichian element of the *Physical Monadology* is Kant's notion of space-filling:

The idea that the elements fill space by their repulsive force is, of course, critical for what Kant is trying to accomplish: He wants to show that a simple monad can still fill an infinitely divisible space. This notion that the monads fill space, or occupy space, that it is not just a point already puts him somewhat aside from Boscovich. For, the idea that monads fill a volume is akin to both a Newtonian “hard” atoms view and a deformable continuum view [...] giving an account of space-filling of the sort that Kant does *ipso facto* drives one away from a Boscovichian view.⁷⁶

In Smith's analysis, this notion of space-filling appears to be original to Kant, since he believes that “in some sense” it “naturally flows” from Kant's notion of contact as the action and reaction of different elements against each other.⁷⁷ Is that the case, or is Henry More the source of Kant's notion in the *Monadologia physica* of a simple unextended substance filling space – or can we provide evidence of a Cartesian legacy?

According to Holden, in the 1653 *Antidote Against Atheism*, as well as in the 1659 *Immortality of the Soul*, More presented an “ingenious,” “original and inventive”⁷⁸ model of an extended but metaphysically indivisible entity, drawing an analogy between the nature of a spirit and a point of light (“one lucid point”) which fills a distance of space with its rays of light; it is diffused and extended and yet indivisible. Holden views this as the precursor to Kant's physical monads. Note that what distinguishes More's solution with respect to the Cartesian *operational* model of the mind's sphere of activity is the circumscribed omnipresence of the point of light, which is discernible in every point of its spherical luminance, due to its emanation and gradual diminution, which fills a space and cannot be divided into parts, just as one cannot cut off the sun's rays. Contrary to Descartes' *extensio potentiae*, More's model for a region wherein the spiritual *punctum* exerts its radiance combines extension with indiscernibility (inseparability) *per essentiam, in ratione substantiae suae*.⁷⁹ In *The Immortality of the Soul*

ter as a deformable continuum. Though I think that comparisons with Boscovich are interesting, one of my main goals in this paper is to argue that Kant shows signs in certain passages of having a deformable continuum view in the *Physical Monadology*.”

⁷⁶ Smith, op. cit., 104.

⁷⁷ Smith, op. cit., 103.

⁷⁸ Holden, op. cit., 242f.

⁷⁹ This is exactly what More (*Enchiridion*, cit., “Ad Lectorem-Praefatio,” § 6) criticizes in the Cartesian picture of the mind's presence within the body: “Mentem Animamve immortalem humano corpori inesse vel adesse; sed per operationes solummodo, non per essentiam.”

(1659, Bk. II Chapt. 5), More distinguishes between four types of created spirits (adding brute souls and seminal forms to Descartes' angelic and human minds), the special virtues of which are indiscerpibility, motion, penetration and 'spissitude' – a fourth dimension, which affords the possibility of contracting shape yet gaining in latitude what is lost in longitude (such as a piece of wax), and the possible coextension of two substances of different kinds in the same place.⁸⁰ According to More, the true notion of a spirit, this vital, active primary substance, is a purely indivisible point, though not a mathematical point without quantity or parts (which would mean, on More's view, something devoid of Being),⁸¹ but rather as an existing point, as in a point of light, which is diffused, extended and yet indivisible,⁸² filling a distance of space with its rays and yet – like the infinitesimal point of contact of a perfect globe on a perfect plane – both physically indivisible in its minuteness and potentially divisible as a geometrical quantity.⁸³ Thus this inmost center of life, according to More, is:

in Magnitude so little that it is *Indiscerpible* but in virtue so great that it can send forth out of itself a Sphere of *Secondary Substance*, as I may call it, that is able to actuate grand proportion of Matter, this whole sphere of life and activity being in the mean time utterly Indiscerpible.⁸⁴

Another distinctive feature of More's 'virtue' is that it therefore blurs the distinction between 'being in space' (location) and 'space-filling', insofar as the extensionless *punctum* that is the center of the spirit (its first and prime essence) emanates *per se* (necessarily) a secondary substance through surrounding space, so that it can actuate matter. Indeed, according to More, the essential "parts indiscerpible" which constitute spiritual atoms (endowed with real extension and perhaps with a round figure) compose and conserve the very Being and exten-

80 By contrast, the characteristic attributes of matter are impenetrability and discernibility (i. e. actual divisibility; see More, *Enchiridion*, cit., Bk. I, Chapt. 3–7). More turns against Descartes, charging him with "Nullibilism," only in his 1671 *Enchiridion Metaphysicum*, to counter the dangerous rise of atheistic Cartesians.

81 More, Henry: *The immortality* [1659], cit. Ed. Alexander Jacob. Dordrecht *et al.* 1987, 7: "[...] it being of the very essence of whatever is, to have *Parts or Extension* in some measure or another. For to take away all extension is to reduce a thing onely to a Mathematical point, which is nothing else but pure Negation or Non-entity [...] it is plain that if a thing be at all, it must be *extended*."

82 More, Henry: *An antidote against atheisme, or, An appeal to the natural faculties of the minde of man, whether there be not a God*. London 1653, Appendix, 186.

83 Ivi, Chapt. 5, §§ 2–3.

84 More, *The immortality* [1659], cit., Chapt. 6, Axiome 15, 32.

sion of matter.⁸⁵ More insists that a spiritual point, unlike a mathematical point, cannot be pure Negation or Non-entity, and it is plain that if a thing is to be at all, it must be extended.⁸⁶

We have already seen that in 1766 Kant defends the possibility of the presence of spirit-substances in matter by distinguishing between how physical elements of the bodies fill space by an active force of repulsion providing resistance and grounding solidity, and how immaterial spiritual simple substances fill space by their sphere of outward activity. In the *Physical Monadology*, Kant appears to be already aware of Descartes' distinction between 'being in a place' and 'filling or occupying a space'. Indeed, in a philosophical context where active simple substances (monads) are elements of matter (that is, they are the fundamental parts of compound bodies), Kant takes care to write in Prop. V. Theorema that the primitive element of bodies, i. e. the monad, "non solum est in spatio"; that is, it is not only located in space and defined by its position relative to neighboring monads but fills or occupies space: "sed et implet spatium" (MonPh, AA 01: 480.02). Although according to Descartes this expression additionally requires conceiving a three-dimensional body of such size and shape that it precisely occupies a specific place, Kant uses the Cartesian expression of "sphere of activity" to convey monadic occupation of a specific space via the exercise of an outward action which determines its position and degree of proximity to neighboring primitive elements of matter.

By contrast, according to More *all* substances, simply as *entia*, include by definition matter or (*vel*) extension (*amplitude*).⁸⁷ Note that in a letter to Moses Mendelssohn of 8 April 1766, Kant expresses his thorough dissatisfaction with Wolff's metaphysical solution to the problem of the presence of the soul in the world, reformulating the issue as a problem of ascertaining the soul's action "in the world of space, time, bodies and matter."⁸⁸ Kant argues that the solution requires a force that inheres in a substance and that has external efficacy and

85 See More, *The immortality* [1659], cit., Chapt. 5, 25: "The Properties of a Spirit, as it is a notion common to all these, I have already enumerated in my Antidote, Lib.I, cap. 4. *Self-motion, Self-penetration, Self-contraction and dilatation, and Indivisibility*, by which I mean *Indiscernibility*: to which I added *Penetrating, Moving and Altering the Matter*".

86 See Jacob, Alexander: "Introduction." In: More, *The immortality*, ed. cit., ivi–lvii.

87 More, *Enchiridion*, cit., Chapt. 2, § 12, 12: "Interea loci observatu dignum est quam bellum Sophisma illi homines committunt qui ex Definitione Substantiae, quippe quae nullam mentionem facit ullius Materia vel Amplitudinis, recte introduci putant Substantias quasdam quae nullam omnino habent Amplitudinem, quaeque nullum ad eam respectum habere possunt; *cum tamen omnis Substantia, ex eo quod Ens sit, Materiam quandam vel Amplitudinem in se includat*" (my emphasis).

88 Nuzzo, op. cit., 330.

receptivity, such that the substance can be affected from without, with the soul's unification with the human body being but one example (Br, AA 10: 71). What is widely regarded as Kant's Critical and transcendental distinction between 'filling' and 'occupying' space (at the end of Chapter Two of his *Metaphysische Anfangsgründe der Dynamik*; 1785) instead capitalizes on his distinction (from 1766) between *einen Raum einnehmen* (the capacity of matter to fill surrounding space by its sphere of attractive activity) and *einen Raum erfüllen* (to occupy space, offering resistance by repulsive force). In Kant's *Foundations*, space is prior to matter, and its emptiness is not conceived as a total lack or inactivity of matter, as if it were a *nihil*; instead, it merely means the absence of the repulsive and expansive forces by which matter in any place "occupies" space, generating solidity:

So wird der Materie Attractionskraft beigelegt, so fern sie einen Raum um sich durch Anziehung *einnimmt*, ohne ihn gleichwohl zu *erfüllen*, der also selbst da, wo Materie wirksam ist, als leer gedacht werden kann, weil sie da nicht durch *Zurückstoßungskräfte* wirksam ist und ihn also nicht erfüllt. (MAN, AA 04: 535.01–04)

The core of Kant's proposal in the *Physical Monadology* (§ 1) is the assumption that each physical monad can exist within the divisibility of space as the simple element of a body because it fills (*implet*) a space through its sphere of force-activity, not through the plurality of its substantial parts. In this way, Kant aims to avoid the pitfall of the preconceived but insufficiently examined opinion: *ac si divisibilitas spatii, quod elementum occupat, elementi etiam ipsius in partes substantiales divisionem argueret* (MonPh, AA 01: 480.16–17) – a prejudice that Kant regards (Prop. V. Theorem, Scholium) as the greater impediment to the marriage (*connubio*) of geometry and metaphysics. The Theorem of Prop. V reads as follows: "Quodlibet corporis elementum simplex, s. monas, *non solum est in spatio, sed et implet spatium*, salva nihilo minus ipsius simplicitate (MonPh, AA 01: 480.01–03; *my italics*).

To understand the provocative tone of this statement, recall § XXVII of Knutzen's *Systema causarum* (1745²): "It is demonstrated that simple elements are in a place and are moved, although they do not fill a space."⁸⁹ Consider further that, as Vincenzo De Risi has pointed out, basically all thinkers in the Eighteenth Century made the "incredible mistake" of viewing Leibniz's monad as a simple unextended substance "existing in space", ignoring "the Leibnizean use of the situation concept in metaphysics"; they commonly represented a monad as a point "in space", thus finding themselves "entangled in the same old problem

⁸⁹ Quoted and translated by Watkins, "The Development of Physical Influx," op. cit., 309, note 39.

de compositione continui that had tormented Leibniz and caused him to turn to phenomenalism.”⁹⁰

In this connection, note also a further, important consequence of Descartes’s model for the coexistence of mind and body within a human being: the division of corporeal substance into parts does not imply a division of the corporeal presence of the immaterial substance into substantial parts. In the *Synopsis* to the *Meditations*, Descartes contends that the eternal and stable essence of the human *mens* informs all the matter of a particular organic body which *per se* would undergo only mechanical changes. What every human being feels within him- or herself is to be *une seule personne, qui a ensemble un corps et une pensée* (AT III: 692). This is why an amputee feels no diminution of his human identity.⁹¹ According to Descartes, the belief that the same whole is conserved although a part of the body is lost holds only in the case of the human body, because of the true and intrinsic way in which *ipsa mens* or the *mesme ame* is united to the body; otherwise, the loss of any single part of the body would mean the loss of a piece of the soul (AT XI: 649).⁹² In sum: Descartes’s model of the *extensio potentiae* which applies to God, angels and to human minds in their true and intrinsic union with the body, allows the subject to have external determinations (presence and agency in space as a *sphere of activity*), yet *not* as part of its essence or internal determination. Therefore, it is not substantially divided by any division of its (contingent) locality.

In my view, this Cartesian model still echoes in Kant’s *Physical Monadology*, in Proposition VI. Theorema and in Proposition VII. Problem. The first passage reads:

Monas spatiolum praesentia suae definit non pluralitate partium suarum substantialium, sed sphaera activitatis, qua externas utrinque sibi praesentes arcet ab ulteriori ad se invicem appropinquatione. (MonPh, AA 01: 480.36–39)

The second passage is Kant’s reply to the anti-metaphysical question, “if one divides the space wherein substance is everywhere present, is not the substance divided?” Kant considers this question in the *Physical Monadology*, Proposition VII, Problem:

⁹⁰ See De Risi, op. cit., 304 f. De Risi refers to Baumgarten’s *Metaphysica*, § 399: “Monades huius & omnis compositi, hinc extensi, mundi, sunt *puncta*, sed neutiquam *mathematica*, in quibus nihil, praeter non extensionem, ponitur, nec iuxta se posita congruunt aut coincidunt” (306, note 6).

⁹¹ See Canziani, Guido: “*Ego cogito, humanum corpus, nostrae mentis natura*: la conoscenza dell’unione mente-corpo nei *Principia*.” In: *Principia Philosophiae (1644–1994)*. Eds. Jean-Robert Armogathe, Giulia Belgioioso. Napoli 1996, 105–152, 135–137.

⁹² See Ferrini, *L’invenzione di Cartesio*, cit., 129–140.

Respondeo: spatium hoc ipsum est ambitus externae huius elementi praesentia. Qui itaque dividit spatium, quantitatem extensivam praesentiae suae dividit. At sunt praeter praesentiam externam, h. e. determinationes substantiae respectivas, aliae internae, quae nisi forent, non haberent illae, cui inhaerent, subiectum. Sed internae non sunt in spatio, propterea quia sunt internae. Neque itaque divisione externarum determinationum ipsae dividuntur, adeoque nec subiectum ipsum s. substantia hoc pacto dividitur. (MonPh, AA 01: 481.25–32)

A similar view recurs in Kant's *Lectures on Metaphysics L1* of mid-1770, where he comments extensively on Baumgarten's assessment of the mind-body *commercium* within the context of empirical psychology. Here Kant refers to the man who amputates a part of his body yet loses nothing of his substantial human identity (*sein denkendes Ich verliert nichts*); he hopes to show that even common sense (*dem gemeinsten Verstand*) agrees that the soul (*Seele*) is distinct from the body (V-Met-L1/Pöhlitz, AA 28: 225). Watkins cites this crucial passage up to this point, to support his elucidation and understanding of the point of Kant's solution against the background of Wolff's and Baumgarten's position on substance.⁹³ To Watkins' reconstruction, we can now add a deeper appreciation of the entire passage. In the following lines, Kant himself clarifies and contextualizes his fundamentally Cartesian tenet (*contra* More's view) that a (simple) substance present in space is not substantially divided by the division of its (contingent) extensive quantity as the sphere of its activity: to say the contrary would be as absurd as saying that to divide the mass of created things is to divide God, because one divides the ambitus of His presence:

Pariter ac si dixeris: Deus omnibus rebus creatis per actum conservationis interne praesto est, qui itaque dividit congeriem rerum creatarum, dividit Deum, quia ambitum praesentiae suae dividit; *quo magis absonum dici quicquam non potest*. Monas itaque, quae est elementum corporis primitivum, quantenus spatium implet, utique quidem quandam habet quantitatem extensivam, mempe ambitum activitatis. (MonPh, AA 01: 481.32–37; my italics)⁹⁴

⁹³ See Watkins, "Forces and causes," 24 f.: "To understand the real point of the objection and what aspect of Kant's position is crucial to addressing it, consider Wolff's and Baumgarten's position on substance. [...] The real disagreement, which Kant does not explicitly acknowledge here as such, concerns whether the activity that is to account for the spatial presence of a monad should be understood in terms of extrinsic relations or internal/intrinsic properties. Wolff and Baumgarten, as proponents of intra-substantial causation, i. e. pre-established harmony, must hold that (causal) activities are intrinsic, whereas Kant, as a proponent of inter-substantial causation, i. e. physical influx, thinks that they must be extrinsic relations."

⁹⁴ The Cambridge Edition of the Works of Immanuel Kant, *Theoretical Philosophy*, cit., translates *ambitus* as "orbit."

This specific reference to God recurs in Section 2, Prop. IX. Definition, regarding the notion of “contact” (*contactus*), usually defined by immediate presence. Kant argues that this definition is incomplete and takes issue with Newtonians who defend attraction at a distance. Kant aims to show that the genuine notion of contact is instead constituted by mutual action and reaction between forces (*viribus mutuo conflictu*). Within this context, Kant remarks in passing, regarding God’s omnipresence, that one should add the adjective „external“ (*externam*), otherwise God, who is immediately but internally present to all things, would have to be thought of as *touching* them: “sine hoc additamento Deus, qui omnibus rebus immediate, sed intime praesens est, ipsas *contingere* putandos foret” (MonPh, AA 01: 483.14–16; my italics).⁹⁵ Kant rejects this opinion. Consider that in his letter to Descartes of 11 December 1648 mentioned above, More had used a synonym of *contingere* (to touch) when he asked Descartes how his unextended God could have imparted motion to the matter of the universe without any contact: “Quomodo enim motum imprimeret materiae, quod fecisse aliquando, et etiamnum facere ipse fateris, nisi proxime quasi attingeret materiam universi, aut saltem aliquando attigisset?” (AT V: 238–239, my italics).

We have seen how Descartes replied to More, introducing an analogical sense of extension and referring to an outwardly directed force able to apply to bodies due to the causal action of intelligent substances. In this way, Descartes developed a model for conceiving of the actual coexistence, diffusion and interaction between a simple and a composed divisible substance, within the ambit of a common space of presence. For this idea of a simple substance’s external presence (in divisible space) in virtue of its (contingent) power to act upon bodies or its sphere of activity – which does not affect its unextended nature or essence, with which he counters both More and the Newtonians – Kant appears to be directly indebted to Descartes.

⁹⁵ See Kant, *Theoretical Philosophy*, cit., 60: “Contact is commonly defined in terms of immediate presence. But even if you insisted on adding *external* (for without this addition, God, who is immediately present to all things, albeit *internally* present, would have to be thought of as touching them), the definition will hardly be thought to be complete in all respects.”

§ 6 Conclusion

The Cartesian idea of the *extensio potentiae* avoids the pitfall of dividing a simple, ensouled substance into substantial parts (if its ambit of active presence in space is divided); it also supports the natural influx solution to explaining mind-body interaction. In Descartes, Kant had access to the idea that, because the soul's *extensio potentiae* is bestowed upon it contingently by God and does not affect its essence, its force of acting outwardly upon others is not primitive or basic to its nature. Moreover, the soul's locality is not a fundamental, necessary condition for its existence *per se*: this is exactly what Kant conveys in the final note to his 1770 *Inaugural Dissertation*, by (transcendentally) denying *absolute and immediate locality* to the soul *as a thing in itself* which cannot be an object of our human external sense: “*Localitas itaque illius [scil. animae] est derivativa et contingenter ipsi conciliata, non primitiva atque existentiae ipsius adhaerens condicio necessaria*” (MSI, AA 02: 419.20–22).

What then is distinctive about Kant's notion of space-filling, and what represents Cartesian tenets rather than the genuinely original contribution of Kant's *Physical Monadology*? Reporting Kant's central claim about simple elements which are not only in a place but fill space,⁹⁶ Smith comments that “obviously, there are obscurities here,”⁹⁷ thus confirming his initial tenet: “In my opinion, what Kant says about matter in the early work is driven by a somewhat jumbled mess of different pictures he is not careful to sort out.”⁹⁸ According to Watkins, the distinctive point is Kant's suggestion, “against Wolff and Baumgarten,” that forces can be relational, and thus need not be exclusively intrinsic to a substance, by allowing forces a “sphere of activity” and thus reconciling the infinite divisibility of space and the unity of monads.⁹⁹ For this understanding, Watkins focuses on Kant's “immediate” philosophical context.

However, drawing upon a larger philosophical context, I have argued that references to Cartesian tenets *contra* More cast significant light upon the apparently “jumbled mess” of Kant's position in the *Physical Monadology*, which continues to puzzle interpreters. To suggest the relevance of neglected sources highlights the hybrid convergence of aspects of many competing and partially overlapping

⁹⁶ A Cartesian influence on Kant's central claim in the *Physical Monadology* gives a distinctive nuance to Kant's endorsement of physical influx with respect to Baumgarten's statement in § 242 of his *Metaphysica*: “*Monas non extensa est, nec spatium replet. At totum monadum est extensum*”.

⁹⁷ Smith, *op. cit.*, 111.

⁹⁸ Smith, *op. cit.*, 103.

⁹⁹ Watkins, *Kant's Metaphysics*, *op. cit.*, 178.

claims within Kant's early conception of force, extension, space, place and matter within the philosophical problem of mind-body interaction, and in line with the mounting dissatisfaction of Kant's contemporaries with the *actualitas* required to solve this problem by appeal to pre-established harmony.¹⁰⁰

100 See Wolff, op. cit., Sect. III, Cap. I, § 541, 463, where he warns the reader not to confuse the actuality of the harmony between mind and body (which is a 'given', something existing and real; see § 540) with the hypothetical status of the theory of pre-established harmony: *harmonia mentis & corporis hypothesis philosophica non est* (264). Nuzzo recalls Wolff's definition of the soul's cognitive activity as self-consciousness and consciousness of other things outside of ourselves in the *Deutsche Metaphysik* (1720, § 192.3) and in the *Psychologia empirica* (1732, § 20) in order to highlight its diplomatic neutrality, crucial to the bipartition of Wolff's psychology into the empirical and the rational. Indeed, the definition of the soul as substance representing the "place" of the organic body in the universe "is compatible not only with the doctrine of the pre-established harmony but also with the two conflicting doctrines of the physical influx and of occasionalism" (Nuzzo, op. cit., 331). See also Knutzen, Martin: *Systema causarum efficientium seu commentatio philosophica de commercio mentis et corporis per influxum physicum explicando ipsius illustris Leibnitii principii superstructa* [...]. Leipzig. 1745², § 13, 60, note: "Falluntur ergo, qui harmoniam preabilitam Philosophia Wolffiana caput esse credunt et fundamentum". Note that Euler, who accepted physical influx in the 1740s, explicitly relies on Knutzen for the metaphysical aspects of mind-body interaction: "Utrum autem extensio et cogitatio in eodem ente inesse queant, hic non inquirō, cum quod istud examen ad metaphysicas speculationes proprie pertineat, tum vero quod Clarissimus Knutzen (*sic*) Professor Regiomontanus hoc argumentum iam uberrime pertractaverit" (Euler, Leohnard: *Enodatio quaestionis utrum materiae facultas cogitandi tribui possit necne ex principiiis mechanicis petita* [1746]. In: *Rechenkunst Accesserunt Commentationes ad Physicam Generalem Pertinentes et Miscellanea*. Ed. Edmund Hoppe et al. Genève 1942, 367–372, 369). On Knutzen's arguments in favor of physical influx, all based on Leibnizian principles, see Watkins, "The Development of Physical Influx," cit., 307–328. See also Gottsched, op. cit., § 1077, 559 where, after examining the *pros* and *cons* of the three famous opinions (*die drey berühmten Meynungen*) of physical influx, occasionalism (Malebranche's system of perpetual assistance) and pre-established harmony, concludes: "Keine derselben ist noch vollkommen erkläret oder demonstret; eine jede davon hat noch ihre Schwierigkeiten: Es kann sich also ein jeder an diejenige halten, die ihm am besten gefällt." However, Gottsched does not confine himself to presenting the negative case of undecidability among competing claims, because the positive implications are that, since no one had yet proved the impossibility of natural influx between mind and body (which we commonly experience), it is not necessary to reject it: "Mir ist es indessen allezeit vorgekommen, dass man nicht eher Ursache habe, die allerälteste und gemeinste Meynung vom natürlichen Einflusse zu verwerfen, bis man sie vollkommen widerleget, und ihre Unmöglichkeit erwiesen haben wird. Dieses aber ist noch zur Zeit von niemand geschehen" (559–560). Watkins calls this attitude an "unofficial acceptance of Physical Influx" (Watkins, "The Development of Physical Influx," op. cit., 305).