Solving the Mind-Body Problem: A Comparison between the Solutions of Joseph Priestley and Ruđer Josip Bošković

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Summary

The mind-body problem has been a major concern of philosophers. Since the time of the Renaissance, scientists dealing with the problems of the natural world also joined in the discussion. This article looks at the contributions of two important figures of 18th–century natural philosophy, namely Joseph Priestley and Ruđer Josip Bošković. It is a well-known fact that Priestley's solution to this problem antagonized his colleague from Dubrovnik. Less known, however, are the religious or spiritual reasons why he used Bošković's notion of unextended points of matter as the basis of his solution. After presenting these reasons and establishing their connections with a specific set of presuppositions underlying monist systems of thought, the present article looks at Bošković's own solution that assumes a dualistic view of human nature, a solution relying on his notions of forces relative to the distances between unextended points, center of gravity and compenetration as discussed in his *Theoria philosophiae naturalis redacta ad unicam legem virium in natura existentium* (1763).

Keywords: Ruđer Josip Bošković, Joseph Priestley, mind-body problem, monism, dualism, notion of the soul, structure of the material world.

The mind-body problem has been a major concern of philosophers. For many of them, this concern was not just about the pleasure to speculate on human nature or exercising their ability to debate, but rather it was about de-

fending their very way of life. For instance, the Cārvākas[1] were of the opinion that the mind was just an epiphenomenon emerging from the interplay of four basic material components, namely, earth, water, fire and air, in a way similar to the production of red saliva when chewing a betel leaf, areca nuts and lime.[2] This view allowed them to deny the reality of ideas like the reincarnation of the soul and to negate the efficacy of rituals, of good actions or anything that presupposes the existence of a life after death, a life that we can earn if we sacrifice our life in this world. In other words, they would say that any belief or view that can be used as a pretext to limit the autonomy of people wishing to honestly enjoy their material existence should be refuted.

Considering the development of Western philosophy since the Renaissance, this concern took a different turn in light of our increasing knowledge about the principles regulating the material world. By assuming more and more that the evolution of this world is determined by specific laws, that our universe is inanimate and purposeless, philosophers started to seriously investigate the nature of what we call the mind and, more particularly, how such an entity is connected with the material body.

In the early period of this development, we have the groundbreaking contribution of the French philosopher René Descartes, who proposed a model in which the mind and body are two fundamentally different types of entity. Despite their irreconcilable nature, Descartes nevertheless assumed that these two entities must be somehow connected. His assumption was based on an observation of a man who, after he had lost his limb, claimed that he could feel it after having his nerves stimulated. On account of this, Descartes thought that the center of the interaction between the mind and the body must be in the brain, more specifically, in the pineal gland.

Descartes's assertion gives us the possibility to test a theory by doing what would qualify as scientific experiments. We should note that, by negating the existence of such a physical space as the locus of the interaction between the mind and the body, we are somehow compelled to limit our exploration of this problem to metaphysical speculations only. Or, as will be discussed later, we could circumvent the problem by negating the reality of one of the two entities by saying that one entity is the product of the other. On the basis of such a monist or reductionist model, we can investigate, as it is now done by using sophisticated instruments like brain scanners or such techniques as

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[1] The members of an ancient school of Indian materialism.

[2] *Sarvasiddhāntasamgraha*. Cited in Sarvepalli Radhakrishnan, *A Sourcebook in Indian Philosophy* (Princeton: Princeton University Press, 1973), p. 235.

Hereafter in notes: Radhakrishnan, *A Sourcebook in Indian Philosophy* (1973).

neuroimaging, the behavior of the brain in order to determine how it affects faculties usually attributed to the mind, for instance, emotions, motivation, thinking processes, etc.

However, if we decide to keep a dualistic view of the mind and body in which these two entities are inherently different realities, one possible model of explanation is to say that the behavior of the body is coordinated with that of the mind without having a real contact between the two. As examples of such models, we have Nicolas Malebranche's theory called *Occasionalism*, Leibnitz's *Pre-established Harmony*, or Spinoza's *Parallelism*. Contrary, but somewhat similar to the monist models which negate the existence of one of the two entities, these models are bypassing the problem of the connection between the mind and the body by negating the possibility of any connection. Needless to say, such models leave no room for scientific experimentation as they are not based on any observation whatsoever and consequently cannot be contradicted.

This brief discussion on the problem of the connection between the mind and the body finally brings us to the topic of this article. Ruđer Josip Bošković was very much concerned by this problem as he clearly stated in the "Appendix ad metaphysicam pertinens de anima et Deo" to his major work entitled *Theoria philosophiae naturalis* published for the first time in 1758 and later in 1763:

> "Here I will first of all consider more fully this distinction [i.e. distinction between the mind and matter]; & I will add something with regard to the mind itself, the force of its actions, & its nature; these are closely connected with the very theme of this work."[3]

As will be seen, Bošković, while maintaining the dualistic view of man, tried to identify, on the basis of some of the ideas developed in his *Theoria*, the ways a mind might be able to influence the activity of a body and vice versa. Like

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[3] "Appendix ad metaphysicam pertinens de anima, et Deo," in Rogerius Joseph Boscovich, *Theoria philosophiae naturalis redacta ad unicam legem virium in natura existentium*, editio Veneta prima (Venetiis: Ex Typographia Remondiniana, 1763), nn. 525–558 on pp. 248–263, in n. 525 on p. 248:

"Hic primum, et id ipsum discrimen [= discrimen animæ a materia] evolvam magis, et addam de ipsius animæ, et ejus actuum vi, ac natura, nonnulla, quæ cum eodem operis argumento arctissime connectuntur: <…>."

Hereafter in notes: Boscovich, *Theoria* (1763).

Cf. "Appendix Relating to Metaphysics: The Mind and God," in *A Theory of Natural Philosophy put forward and explained by Roger Joseph Boscovich, S.J.*, English edition from the text of the first Venetian edition (1763), translation by J. M. Child (Cambridge, Massachussets, and London, England: The M.I.T. Press, 1966), p. 187.

Hereafter in notes: Boscovich, *A Theory of Natural Philosophy* (1966).

Descartes and contrary to the other philosophers mentioned above, Bošković wanted to go beyond metaphysical speculations by giving an explanation that still tries to identify a physical connection or an acting force between the mind and the body.

There is another important philosopher of the eighteenth century worth mentioning in this regard. He is even more interesting to refer to as he used one of Bošković's ideas as a key element of his solution to the mind-body problem. However, the solution he suggested was entirely different than that of Bošković, not to mention that it was motivated by quite a different purpose. That philosopher is Joseph Priestley (1733–1804), better-known today for his discovery of the oxygen than for his philosophical investigations on the mind-body problem. Nonetheless, this Englishman could be considered as the precursor of the materialist view of human nature that shapes modern research on the brain and mind.[4] Ironically, we may say that it was possible for Priestley to formulate such a view by using an idea from someone who wore many hats but that of a materialist.

Priestley vs. Bošković: The End of a Friendship

Almost twenty years after the first publication of Bošković's *Theoria philosophiae naturalis*, Joseph Priestley published his *Disquisitions relating to Matter and the Spirit* (first edition in 1777, the second in 1782), in which he outlined his materialistic view of the world. In order to disprove the dualistic explanation of the nature of man, he made use of Bošković's points of matter. He argued that these points account for the properties we usually attribute to the spirit or the soul. Indeed, in the Preface of his *Disquisitions* he says:

> "Father Boscovich and Mr. Michell's new theory concerning matter, of which I gave an account in my *The History of Discoveries Relating to Vision* &c. was

[4] Three of Priestley's works particularly deal with the questions related to the nature of the soul. These are: *An examination of Dr. Reid's Inquiry into the human mind on the principles of common sense; Dr. Beattie's Essay on the nature and immutability of truth, and Dr. Oswald's Appeal to common sense in behalf of religion* (London: [s. e.], 1775), *Hartley's Theory of the Human Mind: On the Principle of the Association of Ideas; with Essays Relating to the Subject of it* (London: Printed for J. Johnson, 1777), and *Disquisitions relating to matter and spirit: to which is added, The history of the philosophical doctrine concerning the origin of the soul, and the nature of matter; with its influence on Christianity, especially with respect to the doctrine of the pre-existence of Christ* (London: Printed for J. Johnson, 1777).

Hereafter in notes: Priestley, *An examination of Dr. Reid's Inquiry into the human mind on the principles of common sense* (1775); Priestley, *Hartley's Theory of the Human Mind* (1775); Priestley, *Disquisitions relating to matter and spirit* (1777).

> calculated, as will be seen, to throw the greatest light on the constituent principles of human nature."[5]

Bošković was highly dissatisfied with Priestley's recuperation by qualifying it as a "terrible calumny."[6] He felt that he was being dragged into the camp of the materialists who hold views that he later decried in French translation of his epic *Les Éclipses*:

> "In the first book [i.e. first part of the *Theoria*], I show the essential difference between my points and the spirits. I discussed even in more detail, in *Appendix de anima et Deo*, something that reveals how far I am from the view of materialism, a view that I abhor and consider without substance and ungodly."[7]

Without naming it explicitly, Bošković seemed to have been already aware of the spread of materialism among his colleagues at the time of publishing his *Theoria*, as he wrote in 1758 in his dedication to Christopher Count de Migazzi, the archbishop of Vienna:

> "This is what we have seen for a long time taking place, by some unhappy decree of adverse fate, all over Europe; and, as the canker spreads at an ever-increasing rate, young men, who have been made to imbibe principles that counterfeit the truth but are actually most pernicious doctrines, do not think that they have attained to wisdom until they have banished from their minds all thoughts of religion and of God, the All-wise Founder and Supreme Head of the Universe."[8]

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[5] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xii.

Cf. Željko Marković, *Ruđe Bošković*, Prvi dio (Zagreb: Jugoslavenska akademija znanosti i umjetnosti, 1968), p. 461.

On first mention of Boscovich and Michell in Priestley's *The History and Present State of Discoveries Relating to Vision, Light, and Colours* (1772) see Ivica Martinović, *Ruđer Bošković and the Royal Society* (London: Royal Society, 2011), in the chapter "Joseph Priestley and three Presidents of Royal Society," pp. 68–75, on p. 68.

[6] "Une calomnie atroce." This expression was used in the letter Bošković wrote to Priestley on 17 October 1778. Cf. Vladimir Varićak, "Drugi ulomak Boškovićeve korespondencije," *Rad JAZU* 193 (1912), pp. 163–338, on p. 209.

Hereafter in notes: Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912).

[7] Roger Joseph Boscovich, *Les Éclipses*, poême en six chants dédié à sa Majesté, traduit en François par M. l'Abbé de Barruel (Paris: Chez Valade et Laporte, 1779), note 7 on p. 534:

> "Dans le premier livre, je démontre la différence essentielle qu'il y a entre mes points & les esprits; mais j'y mis un *Appendix de anima & Deo*, qui l'exprime encore plus, & et qui fait voir combien je suis éloigné de l'opinion du Matérialisme que je déteste & que je regarde comme insubsistante & impie."

[8] My translation to English.

Cf. Boscovich, *Theoria* (1763), on the difference between matter and spirit in nn. 153–165 on pp. 69–76.

Through their mutual contact, Lord Shelburne, who was Priestley's patron, Bošković requested that Priestley withdraw his affirmations. If he failed to do so, Bošković felt that he was obligated to publish in newspapers what he believed to be an affront to his reputation as well as an insult to his faith. In a letter dated 19 August 1778, Priestley regretted that Bošković did not write directly to him and most importantly, he reproached him his "very inconsiderate and violent step which, without any provocation" he has undertaken against him.[9] Priestley ended his letter by saying:

> "I am, not without respect, but with much less than formerly."[10]

Bošković replied to Priestley:

> "He should be excused for the tone of his language in his letter and that to Lord Shelburne, but, when it comes to defending my honour and my faith, there are never expressions that are too strong."[11]

He finished his own letter with the Latin sentence: "*Amicus usque ad aras.*"[12]

This fallout between Priestley and Bošković could have been avoided and, perhaps the ideological and social circumstances having been different, may have resulted in a less passionate and more constructive exchange between these two great thinkers since the scientific speculations of the former were not that far from the insights of the latter. Let's first look at Priestley's ideas so that we could see where he took a "wrong turn"—in the eyes of Bošković,

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Boscovich, *Theoria* (1763), in "Epistola auctoris dedicatoria primae editionis Viennensis," pp. VI–XII, on pp. IX–X:

> "quod quidem jam dudum tristi quodam Europæ fato passim evenire cernimus, gliscente in dies malo, ut fucatis quibusdam, profecto perniciosissimis, imbuti principiis juvenes, tum demum sibi sapere videantur, cum et omnem animo religionem, et Deum ipsum sapientissimum Mundi Fabricatorem, atque Moderatorem sibi mente excusserint."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 6.

[9] Priestley to Bošković, 19 August 1778, in Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912), p. 207.

[10] Priestley to Bošković, 19 August 1778, in Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912), p. 207.

[11] Bošković to Priestley, 17 October 1778, in Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912), p. 210:

> "Je vous demande pardon des expressions, que j'ai employées dans cette lettre, et dans la précédente à Milord: il n'y en a pas d'assés fortes, quand il s'agit de mettre à l'abri ma religion et mon honneur."

[12] Bošković to Priestley, 17 October 1778, in Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912), p. 210, with the meaning 'Friend up to the altar' or 'Friend, except in what is contrary to one's religion.'

of course—before we present the latter's own solution to the problem of the connection between the mind and the body.

Priestley's Monist View of the Soul and Body

In the Preface of his *Disquisitions relating to Matter and Spirit*, Priestley confessed that, just until a few years before writing this work, he had not given any thoughts about the question regarding the connection between the spirit and the body. Like many Christians of his time, he took for granted that man had a soul distinct from his body and added:

> "Though with many modern divines, I supposed it to be incapable of exerting any of its faculties, independently upon the body; and I believed this soul to be a substance so intirely distinct from matter, as to have no property in common with it."[13]

But at some point, doubts arose in his mind regarding the possibility of an intimate union of two substances that are defined as completely heterogeneous. He struggled with this problem and came to postulate that the distinction between material and immaterial as part of a model of explanation is superfluous. Not being able to progress in his metaphysical investigations, Priestley "relapsed into the general hypothesis of *two intirely different and independent principles in man*, connected in some unknown and incomprehensible manner."[14] And, as he added, not with some resignation, "I acquiesced in it as well as I could."[15]

Although Priestley did not find a solution to the problem of the union between a soul/spirit/mind and a body, he nevertheless was able to identify its nature, namely, the tendency to resolve it without questioning its underlying dualist assumption. If we reject that assumption, one line of reasoning presents itself. One of the two horns of the dilemma has to be reduced to the other to end up with a monist view of the world. This means that one reality has to be interpreted in terms of the other reality.

If we maintain the dualistic assumption, however, we have to introduce a new principle that encompasses these two realities. This second line of reasoning usually consists in the contextualization of a dualism where each conflicting interpretation is true relative to its own field of application. This is done with an understanding that the parts that are contextualized and the whole that contextualizes are realities that have their own characteristics and properties. As

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[13] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xi.

[14] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xii. Italics are Priestley's.

[15] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xii.

will be shown, this second line of reasoning corresponds to Bošković's view of the world as presented in his *Theoria philosophiae naturalis* (1763).

This is, however, not the path Priestley is following here. Indeed, even before publishing his *Disquisitions*, he was already convinced that this dualism had to be resolved by assuming only one uniform substance to explain the nature of man. More precisely, he said in a paragraph quoted from his early works:[16]

> "I am rather inclined to think, though the subject is beyond our comprehension at present, that man does not consist of *two principles* so essentially different from one another as *matter and spirit*, which are always described as having no one common property, by means of which they can affect, or act upon each other; the one occupying space, and the other not only not occupying the least imaginable portion of space, but incapable of bearing any relation to it; insomuch that, properly speaking, my mind is no more in my body, than it is in the moon. I rather think that the whole man is of some *uniform composition*; and that the property of *perception*, as well the other powers that are termed *mental* is the result (whether necessary, or not) of such an organical structure as that of the brain: consequently, that the whole man becomes extinct at death, and that we have no hope of surviving the grave, but what is derived from the scheme of revelation."[17]

The above quotation confirms that somehow Priestley *a priori* decided what he was looking for as a solution. It is therefore in this context that Bošković's notion of unextended points was introduced in England. Thus, with this notion, Priestley's original doubts "were instantly converted into a full *persuasion*."[18] It somehow gave him the confidence to face the charges of atheism and unbeliever that were raised against him as a result of the publication of the passage just quoted. Priestley was now ready, with a firmer intention, to show that "we shall find ourselves intirely unauthorized to admit any thing in man besides that body which is the object of our senses."[19] What was then Priestley's motivation in challenging a view of man so central to Christianity? An answer to this question should further highlight the reasons why Bošković did not quite appreciate having his theory on matter associated to Priestley's promotion of what amounts, according to the opinion of one of the members of the Royal Academy of Sciences in Paris, to pure materialism, a doctrine that he detests.[20]

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[16] Priestley, *An Examination of Dr. Reid's Inquiry Into the Human Mind on the Principles of Common Sense* (1775); Priestley, *Dr. Hartley's theory of the Human Mind* (1775).

[17] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xiii. Italics are Priestley's.

[18] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xiv. Italics are Priestley's.

[19] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xv.

[20] Bošković to Priestley, 17 October 1778, in Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912), p. 208:

"J'en ai eu la relation d'un des principaux membres de l'Accad-e Royale des Sciences,

More generally, it may also help us better understand the intellectual environment of the time in which the scholar from Dubrovnik evolved.

Priestley's Spirituality

First of all, the entire exercise could be viewed as an affirmation of one's freedom of inquiry and use of reason. Indeed, in the dedication of his *Disquisitions* to Rev. William Graham, Priestley says:

> "I rejoice with you, on account of such a prevalence of free inquiry, and good sense in matters of religion, in the present age, as cannot fail, in the end, to overturn the antichristian systems that have been permitted by divine providence to prevail so long in the christian world, and consequently (though probably in a remote period) the antichristian tyrannies that have supported them."[21]

However, Priestley did not consider himself as an absolute atheist like Hobbes may have been perceived at the time the *Disquisitions* were published. On the contrary, he wished to defend Christianity, but in a way that he saw fit. In this regard he said:

> "Be this as it may; I feel a great *present ease* in the idea of publishing my thoughts with the most unreserved freedom on this important subject."[22]

As such, Priestley was following a trend within Protestantism—probably a militant and most radical one—that directly implicates Bošković and his theory on matter in the worst possible manner.[23]

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qui l'ented bien, et qui l'avoit lu. Celui-là m'a assuré, et il me l'a confirmé dans plusieurs conversations, que nous avons eu sur cet objet, qu'a son grand étonnement, vous enseignies dans votre ouvrage le matérialisme tout pur, et sens le moindre menagement, tout à decouvert: que vous pretendies le tirer de ma theorie sur la matiere, en me faissant de cette maniere complice d'une doctrine, que je deteste, et que j'abhorre comme impie du coté de la Religion, et sotte du coté de la saine philosophie."

[21] Priestley, *Disquisitions relating to matter and spirit* (1777), p. ix.

[22] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xvi. Italics are Priestley's.

[23] Bošković to Priestley, 17 October 1778, in Varićak, "Drugi ulomak Boškovićeve korespondencije" (1912), p. 209:

> "Vous y dites, que vous aves adopté ma theorie sur la matiere, et que vous en avois tiré des consequences, quoique sans dire, que ces consequences son à moi, par les quelles vous accusés d'erreur toutes les differentes branches de la Chretienté suivies aujours'hui, et sourtout l'Eglise Romaine, de la quelle je suis membre selon vos expressions mêmes, en resuscitant les vieilles appellations injurieuses, que vous donnes à son chef d'Antichriste. Est ce que vous croyés, que ce n'est pas une injure très grave, que vous me faites, de publier, que ces, que je dois regarder et que je regarde comme impietés, et sottises, sont des consequences necessaires de ma theorie, qui en est si eloignée comme le ciel de la terre?"

However, despite this fundamental difference between the Protestant Priestley and the Jesuit Bošković, their intentions, as men of science, in exploring objective realities may have something in common. Bošković was worried that the obstinacy of some of his colleagues, especially those in change of the curriculum at the Jesuit colleges in Rome and Paris, was not only detrimental to science, but to religion as well. More precisely, in a letter to his elder brother Baro, he said:

> "I preach that the greatest damage one can do to religion is to associate it with such things in physics that a great part of the Catholics also believe to be wrong. Because then, young people, convinced of the opposite, do not say: 'religion is true, therefore such and such thing in physics is true,' they instead say: 'such and such a thing is wrong, therefore religion is wrong.' And I believe that really in these parts [Italy and France] great damage has been done and is being done to religion by continuing in this way."[24]

To some extent, what Priestley's *Disquisitions* intended to do was, a little bit like Galileo himself did, to suggest that one's experiences of the observable world should be taken into consideration in any exegesis of the Christian scriptures. Although the extent to which that suggestion was made would have been, in many respects, quite reprehensible for Bošković, it was nevertheless necessary for getting rid of the 'dead wood' that obstructed the development of a convergent vision of the phenomenal world acceptable to both the Church and the emerging scientific community of the eighteenth century. Thus, Priestley hoped, assuming that the dualism of the spirit and body was an example of that 'dead wood,' that Christians, even those who are dismissing him as an unbeliever, will realize, as he says in the Preface of his *Disquisitions*, that:

> "the true system of revelation to be quite another thing than they had imagined it to be, and infinitely more *consonant to the real appearances of nature*, [they] may think it worth their while to consider it in various *other lights*, and attend to the evidence that myself and others have produced in favour of it, and so, from

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[24] Ruđer Bošković to Baro Bošković, Paris, 6 April 1760, in Željko Marković, "Boškovićev put u Francusku g. 1759./60.," in Željko Marković (ed.), *Građa za život i rad Rudžera Boškovića*, Knjiga II (Zagreb: Jugoslavenska akademija znanosti i umjetnosti, 1957), pp. 5–242, on p. 129:

> "Io predico, che il maggior danno, che si possa fare alla Religione è il volerla legare a cose fisiche tali, che da una gran parte anche di Cattolici sieno stimate false; perche allora la gioventù persuasa dell'opposto non dice, la Religione è vera; dunque la tal cosa in Fisica è vera; ma dice, la tal cosa è falsa, dunque religione è falsa; e credo, che realmente in queste parti si sia fatto, e si vada facendo per questa via del gran danno alla Religione."
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> My translation to English.

> being infidels, in consequence of not understanding what christianity really is, and not sufficiently examining the evidence of it, which is generally the case, they may become rational christians."[25]

However, by privileging reason over revelations and indirectly, by transforming science into an instrument of man's emancipation, Priestley is also pushing his enlightenment project over a line that Bošković, and the Catholic Church for that matter, were not ready to cross. For them, science will always remain a means to make the Christian revelation more accessible and explicit. In other words, the role of science is to provide reasons to believe in the Christian economy of salvation, an economy that includes—one should not forget this—an acceptance of the dogmas of the Church. Thus, Priestley's use of the idea of unextended points rests on a complete inversion of the presuppositions underlying Bošković's religious view and even his spirituality. Bošković would say regarding the purpose of the study of science:

> "It is marvellous how exceedingly prone the mind becomes to pass from a contemplation of Nature herself to the contemplation of celestial things, and to give honour to the Divine Founder of such a mighty structure, lost in astonishment at His infinite Power and Wisdom and Providence, which break forth and disclose themselves in all directions and in all things."[26]

That we actually are dealing with a form of spirituality in Priestley's case can be seen in the second aspect of his motivation for embarking in his enlightenment project. When it comes to systems aiming at the transformation of the subject, the West has known two models. The first and dominant one has been produced and nourished by the various mystical orders of Christianity. The second, less in amplitude but nevertheless a serious contestant, comprised the gnostic traditions that emerged in the Mediterranean world.[27] All these

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[25] Priestley, *Disquisitions relating to matter and spirit* (1777), p. xvi. Italics are Priestley's.

[26] Boscovich, *Theoria* (1763), in "Epistola auctoris dedicatoria primae edizioni Viennensis," p. IX:

> "Mirum enim, quam belle ab ipsa consideratione Naturae ad caelestium rerum contemplationem disponitur animus, et ad ipsum Divinum tantae molis Conditorem assurgit, infinitam ejus Potentiam, Sapientiam, Providentiam admiratus, quae erumpunt undique, et ubique se produnt."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 9.

[27] To these two types of models, we could certainly add the Kabbalah traditions of Judaism and that of Sufi Islam which may, in certain areas of Europe, have exerted some influence on Western mysticism.

traditions assume a division between a spiritual reality and a material one. However, one major difference between the Christian mystical traditions and the gnostic ones is that, while the former consider that a relation between the two realities is possible, the latter traditions categorically deny it. This denial of any connections between the soul and the body usually translates itself in most gnostic systems by overrating the value of the spiritual dimension of man, while disparaging if not negating the very existence of his material one and everything related to it. It is exactly this negative prejudice against matter that is bothering Priestley. Indeed, he continues in the Preface of his *Disquisitions*:

> "The considerations suggested above tend to remove the odium which has hitherto lain upon matter, from its supposed necessary property of *solidity*, *inertness*, or *sluggishness*; as from this circumstance only the baseness and *imperfection*, which have been ascribed to it are derived. Since matter has, in fact, no properties but those of *attraction* and *repulsion*, it ought to rise in our esteem, as making a nearer approach to the nature of spiritual and immaterial beings, as we have been taught to call those which are opposed to gross matter."[28]

What Priestley is therefore aiming at is an inversion of the gnostic prejudice, namely, the attempt at giving back to the material world a sense of nobility. But, even though that move could be acceptable to a Catholic Church which had to vehemently protect its economy of salvation from any type of gnostic influence, by somehow "spiritualizing" matter, Priestley makes the spiritual reality, no matter how it is defined, superfluous. That means that, as alluded before, the distinction between the material and the immaterial is also unnecessary.

If Priestley's understanding of human nature is a swing of the pendulum from a worldview that disparages the material world on account of a mystical view of reality that assumes that only the spiritual aspect of man is real and worthy of attention, it appears to have gone too far in the opposite direction. Priestley's criticism of the dualism of the spirit and the body may help foster a more positive attitude toward God's creation, an attitude that allows one to enjoy without a feeling of guilt its order and beauty, it nevertheless had to rely on a reductionist or monist vision of reality and thereby negated an intuition, like that of free will, that tells us that, when dealing with oneself, others and the world, two distinct and autonomous principles are at work.

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[28] Priestley, *Disquisitions relating to matter and spirit* (1777), p. 17. Italics are Priestley's.

To some extent, Priestley's solution appears to be a shortcut that many contemporary thinkers like Steven Pinker, who negates the reality of human consciousness,[29] are adopting when confronted with problems concerning the nature of such non-material realities as our thoughts and intentions. Bošković will not be tempted, in order to resolve this problem, by resorting to such a reductionist shortcut. However, before we come to Bošković's solution to this problem regarding the structure of what defines us as sentient beings capable of thinking and willing, I have to present as a necessary detour what constitutes some of the major pillars of his theory about the observable world.

Bošković's Distinction Between Matter and Spirit

One of the basic intuitions we have about the universe in which we live is the idea that it is constituted of impenetrable objects, that is, objects that have such a property that they allow us to sense their presence. Without this property, it would be impossible to interact with the world. The experience of impenetrability of matter led one to assume that the universe is a construction whose fundamental building blocks are indivisible particles of matter or atoms in the ancient sense of the word. Bošković showed that we do not have to resort to this atomistic model, as many scientists of his time including the great Newton did, to account for our experience of impenetrability. Instead, he concluded that our realities are emerging from unextended points of matter that are always separated by a distance,[30] to which corresponds a force that is either attractive or repulsive. At very short distances, this force is very strong and repulsive. It is such a force that accounts for the impenetrability of objects. Analogically speaking, we can say that a universe in which the building blocks of matter lack solidity and where impenetrability is explained by the action of the repulsive

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[29] More precisely, he would rhetorically ask whether consciousness is not some kind of epiphenomenon, "an impotent side effect covering over the symbols, like the lights flashing on a computer or the thunder that accompanies lightning?"

Cf. Steven Pinker, *How the Mind Works* (London – New York – Toronto: Pinguin Books, 1997), p. 132.

[30] Boscovich, *Theoria* (1763), n. 7 on p. 4:

"Prima elementa materiae mihi sunt puncta prorsus indivisibilia, et inextensa, quae in immenso vacuo ita dispersa sunt, ut bina quaevis a se invicem distent per aliquod intervallum, <…>."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 20.

force at the exiguous distances,[31] is what we would call today a force field.[32] As seen earlier, this is an explanation that pleased Priestley as it allowed him to get rid of the fundamental distinction between matter and the spirit.[33]

How could we then account for the activity of the mind that feels so different from that of the material world? Priestley, echoing some of his predecessors and anticipating an answer that is today more and more imposing itself, added to a previously cited assumption that "the power of thinking belongs to the brain of a man, as that of walking to his feet, or that of speaking to his tongue."[34]

The lack of a fundamental distinction between matter and the spirit, or the brain and the mind to use a more modern formulation of the question, not only does it collapse the principle of being an instrument and that of the purpose into one single reality or "stuff," but also assumes that what is intuitively felt

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[31] On Bošković's first concept of *materiae punctum* in his early treatises *De viribus vivis* (1745) and *Dissertationis de lumine pars secunda* (1748) see Ivica Martinović, "The Fundamental Deductive Chain of Bošković's Natural Philosophy," in Valentin Pozaić (ed.), *The Philosophy of Science of Ruđer Bošković*, Proceeding of the symposium of the Institute of Philosophy and Theology, S. J. (Zagreb: Institute of Philosophy and Theology, 1987), p. 65–99, on pp. 82, 88–89.

Hereafter in notes: Martinović, "The Fundamental Deductive Chain of Bošković's Natural Philosophy" (1987).

Boscovich, *Theoria* (1763), n. 360 on p. 164:

"si enim in minimis distantiis agunt vires repulsivae, quae iis in infinitum imminutis crescent in infinitum ita, ut pares sint extinguendae cuilibet velocitati utcunque magnae, <...>."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 134.

On Bošković's concept of impenetrability of bodies in his early treatise *De viribus vivis* (1745) see Martinović, "The Fundamental Deductive Chain of Bošković's Natural Philosophy" (1987), pp. 74–76.

[32] The notion of field—which is a metaphor—used in modern physics is, of course, an anachronism as far as the terminology employed by Bošković in his theory is concerned. However, if the term is applied in its general sense to mean a region in which a particular condition prevails, then, that condition being a force determined by a distance between two points of matter—or, most likely, a network of such forces—that notion is adequate.

[33] It is very much likely that Priestley got this explanation from John Michell (1724–1793). Although Priestley referred to Bošković in his *Disquisitions*, it is really Michell's theory of matter that converted him to a monist model of human nature. For some reason, Priestley just assumed that Bošković's view of matter was identical to Michell's.

On the meeting of Boscovich with Michell in Cambridge in November 1760 cf. Marković, *Ruđe Bošković* I (1968), p. 573.

Cf. John Schondelmayer Parry, *John Michell's theory of matter and Joseph Priestley's use of it* (London: University of London, Imperial College of Science and Technology, Department of History of Science and Technology, 1977), p. 9.

Hereafter in notes: Parry, *John Michell's theory of matter and Joseph Priestley's use of it* (1977).

[34] Priestley, *Disquisitions relating to matter and spirit* (1777), p. 277.

as qualitatively different is in fact just a process of that stuff.[35] To some extent, Priestley is here reiterating another of the arguments of the materialist Cārvākas that says that intelligence is also produced from only four elements, "just as the inebriating power is developed from the mixing of certain ingredients."[36] It is an argument that survived until today as we saw earlier in Pinker's explanation of the phenomena of consciousness.

However, the idea of force field suggested by Bošković's points of matter endowded by forces, does not necessarily imply a monist and reductionist model of reality and, by extension, of human nature. Most of the time, when Bošković refers to his points of matter, he does so by considering them as pairs.

A simple connection involving two points of matter could be called a relation. According to Bošković, such a relation is defined by a mutual force by which the two points of matter, placed at the limits of cohaesion (*limites cohaesionis*), have a propensity to attract or to repulse each other or to maintain the relative distance that separates them. When two of these pairs of Bošković's points of matter are combined, they could form a two-dimensional shape or a tridimensional structure like a regular tetrahedron.[37] If the latter construction is solid enough, it forms a particle of the first order. We could then combine these particles of the first order to form a particle of the second order and so on to have the objects that can be perceived by our senses and with which we interact.[38]

What is important to note at this point is that each of these particles or structures have their properties defined only by the distribution of their points of matter placed at their limits of cohaesion.[39] This means that the qualitative difference between objects is exclusively due to the internal distribution of the pairs of points of matter or the relations that constitute them:

> "Two local modes of existence can constitute an infinite number of relations, some of one sort & some of another."[40]

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[35] Karis Muller, "Physics and the Deity: the ideas of R Boscovich and J Priestley," *Enlightenment and Dissent* 12 (1993), pp. 49–62, on p. 59.

[36] *Sarvasiddhāntasamgraha*. Cited in Radhakrishnan, *A Sourcebook in Indian Philosophy* (1973), p. 229.

[37] Boscovich, *Theoria* (1763), n. 239 na p. 111; n. 364 na p. 166. Cf. Boscovich, *A Theory of Natural Philosophy* (1966), pp. 95, 135.

[38] Boscovich, *Theoria* (1763), n. 239 na p. 111. Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 95.

[39] Boscovich, *Theoria* (1763), n. 213 on p. 98. Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 83.

[40] Boscovich, *Theoria* (1763), n. 60 on p. 27:
"Bini locales existendi modi infinitas numero relationes possunt constituere, alii alias."
Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 36.

We no longer need an essentialist model in which the "elements" of nature are endowed with qualities or even with forces, as Priestley was compelled to admit,[41] since a force is a characteristic of the distances between points of matter or relations and not of the points of matter taken individually. Moreover, Bošković's notion of order or level of organization implies that an object may consist of many of these levels, each with their own properties and operating principles. Thus, we have a model that reintroduces a dualism. However this time, it is not based on the notion of substance or stuff, but rather on the concept of distribution of matter points, which could be interpreted as the mode of organization of matter or information.

The use of this term to describe Bošković's theory may be too radical considering the atomistic and materialistic views prevailing in the 18th century, a period when many scientists were still struggling with the idea of having a movement without physical contact. It would put the Jesuit scholar from Ragusa too much ahead of his time. However, since Bošković will say that our experiences of reality exclusively depends on the distribution of the points of matter in space and time,[42] I believe that I am justified in using a word that would appear to be a neologism at the time of Bošković, but would have been nevertheless acceptable in so far as it could be derived from the Latin verb *informo* which means, among other things, "to shape in the mind" as in Cicero's sentence: "notions of the gods are formed in the minds of men."[43]

This distinction is crucial as it confirms what Michael Polanyi believed to be "at the heart of the fallacies flowing from science today"[44] and to which Priestley has been contributing through his description of human nature. What Polanyi means by fallacy is the tendency to reduce the multiplicity of modes of organization found in any given structure to only one of these modes. For example, to say that the forces that regulate the functioning of the mind are the same as those that organize its support, namely, the brain. Using an analogy,

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[41] Cf. Parry, *John Michell's theory of matter and Joseph Priestley's use of it* (1977), p. 107: "Priestley's view of points surrounded by spheres of attraction and repulsion was a simplification and distortion of Boscovich's concept of forces."

[42] "De spacio, ac tempore, ut a nobis cognoscuntur," in: Boscovich, *Theoria* (1763), nn 18–24 on pp. 273–276.

Cf. "Of Space and Time, as we know them," in Boscovich, *A Theory of Natural Philosophy* (1966), pp. 203–205.

[43] Cf Cicero, *De natura deorum* 2.13:

"in animis hominum deorum notiones informatæ sunt."

[44] Michael Polanyi and Harry Prosch, *Meaning* (Chicago and London: The University of Chicago Press, 1975), p. 29.

Hereafter in notes: Polanyi and Prosch, *Meaning* (1975).

Polanyi would make this fallacy even more explicit:

> "Take any question to which you want to know the answer. For example, having planted some primroses today, you would like to know whether they will bear blossoms next spring. This question is not answered by a list of atomic positions and velocities at some future moment on May 1 of next year. Primroses, as such, are lost in the topography of all the atoms. Your question can be answered only in terms of primroses."[45]

Polanyi is here referring to Pierre-Simon Laplace's ideal of universal knowledge or Laplace's Demon which consists of a Being endowed with an intellect that is capable of predicting from moment to moment the evolution of a universe that consists of only particles in movement. It is to be noted that this idea is in fact Bošković's, as he wrote in his *Theoria*:

> "If the law of forces were known, the position, velocity and direction of all the points at any given instant, it would be possible for such a mind to foresee all the necessary subsequent motions and states and to predict all the phenomena that necessarily followed from them."[46]

This is true, but again one is to be reminded that Bošković's assertion applies to a level of organization isolated from its context, a context that reduces it to the status of an instrument. As will be seen, one level organization can be informed by a second level of organization which has here the status of purpose with regard to the first one, thus giving us a theoretical basis for understanding the connection between a body as an instrument and a mind as that which has the ability to accept and impose a purpose. Before getting to the heart of Bošković's formulation of this theoretical basis, one more element of his system needs to be presented, namely, his notion of a center of gravity.

Even if thinking about the objects of this world in terms of force fields or information may be baffling, it does not inhibit our ability to manipulate them. That ability has been cultivated on account of having had, from the time we have used objects as tools, an intuitive knowledge of another universal property

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[45] Polanyi and Prosch, *Meaning* (1975), p. 29.

[46] Boscovich, *Theoria* (1763), n. 385 on p. 177:

"Cognita autem lege virium, et positione, ac velocitate, et directione punctorum omnium dato tempore, posset ejusmodi mens prævidere omnes futuros necessarios motus, ac status, et omnia Naturæ phænomena necessaria, ab iis utique pendentia, atque prædicere."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 141.

The idea that one is be able to predict the evolution of a system if we were to know its initial conditions is also known as the 'Laplacian determinism.' According to John Barrow, this idea should have been attributed to Bošković. Cf. John Barrow, *New Theories of Everything: The Quest for Ultimate Explanation* (Oxford: Oxford University Press, 2007), p. 63.

in addition to that of impenetrability, namely, that all objects have a center of gravity and only one, a fact that, according to Bošković, many people often omit.[47] It is the awareness of such a center that makes it possible to maximize the instrumental value of these objects because all the mass of an object behaves as though it is concentrated at that center. Thus, by controlling the center of gravity of an object, one controls the entire object no matter how its mass is distributed or organized. This is a well-known fact as it emerges from very common experiences.

However, not so well-known is the idea that a center of gravity presents an ontological oddity, at least from the point of view of a reductionist and positivist epistemology. We have the knowledge of its existence since, as just alluded to, without such knowledge no successful interaction with the world would be possible. However, it can never be directly observed. Like the distance between two points of matter, it is always tacitly known. Moreover, when we are seizing it, we never make direct contact with it, but rather with the part of the object that approximately embodies it.

Thus, the part of the object that embodies a center of gravity has a double status: it is a connector with the elements belonging to its own level of organization as well as with the level that instrumentalizes it. In other words—this is what Laplace's model did not consider—one element of a system may be the embodiment of a force whose origin is located outside that system as it is related to an element that belongs to another system. Because of this external connection, the uncertainty with regard to the evolution of a given system is considerably increased, at least from the point of view of elements of this system. In fact, one has to consider the organization of the external system, a system that can only be manipulated by other external systems. It is this idea of double status for a center of gravity that finally brings us to Bošković's original solution to the problem of the connection between the mind and the body.

Bošković's Solution to the Mind-Body Problem

Bošković's answer to the mind-body problem is to be found in an appendix to his *Theoria* entitled "De anima et Deo" ("On the Soul and God").[48] He also

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[47] Boscovich, *Theoria* (1763), n. 240 on p. 112:

"tum demonstrabo accuratissime, in quavis massa haberi aliquod gravitatis centrum, idque unicum, quod quidem passim omittere solent, et perperam; <…>."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 96.

[48] "Appendix ad Metaphysicam pertinens de anima, et Deo," in Boscovich, *Theoria* (1763), nn. 525–558 on pp. 248–263.

Cf. "Appendix relating to Metaphysics: the Mind and God," in Boscovich, *A Theory of Natural Philosophy* (1966), pp. 187–196.

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provided the basis of such an answer at the end of the first part of his *Theoria* which deals with the presentation and proofs of his law of forces where, anticipating Priestley's reductionist move, he refuted the idea that his points of matter are to be equated with spirits.

In short, Bošković argued that the forces that regulate our mental processes and which are consequently responsible for the connection between the mind and the body, are not the same as the ones that are responsible for the movements of the material world, namely the propensities for attraction and repulsion, and inertia. In fact, if there were substances endowed with these forces and capable of thinking and willing, which are the properties of the spirits, they would be neither material nor spiritual.[49] Thus, according to Bošković, the connection between the mind and the body is realized following three distinct laws or modes of action. The first two are completely different from the law that regulates the matter points (*materiae puncta*) that constitute the body as well as the mind, whereas the third one agrees to some extent with it.[50]

The first two modes of action correspond respectively to the local motions of our organic body or part of it and to the non-local movements of our mind responsible for exciting our ideas and acts of will. Here, we find reciprocity between the mind and the body in which the former may excite the latter and vice versa. However, this reciprocal action is only possible when there is an alignment (*mutua positio partium*) between the mind and the parts of the body so that, when there is a lesion in the brain, it ceases to operate. Bošković also believed that the first two modes of action are of two types, namely, one when the connection is necessary and a second when it is free.[51] It is in this context that he addressed the mechanism of free will and the determinism of our nervous system as well as our inclinations. In this regard, he said that it is possible that,

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Hereafter in notes: Boscovich, "Appendix de anima et Deo" (1763); Boscovich, "Appendix on the Mind and God" (1966).

[49] Boscovich, *Theoria* (1763), n. 155 on p. 70:

"Si possibile sit illud substantiæ genus, quod et hujusmodi vires activas habeat cum inertia conjunctas, et simul cogitare possit, ac velle; id quidem nec corpus erit, nec spiritus, <…>."

Cf. Boscovich, *A Theory of Natural Philosophy* (1966), p. 64.

[50] Boscovich, "Appendix de anima et Deo" (1763), n. 531 on p. 250:

"Porro commercium illud inter animam, et corpus, quod unionem appellamus, tria habet inter se diversa legum genera, quarum bina sunt prorsus diversa ab ea etiam, quæ habetur inter materiæ puncta, tertium in aliquo genere convenit cum ipsa, sed ita longe in aliis plurimis ab ea distat, ut a materiali mechanismo penitus remotum sit."

Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 188.

[51] Boscovich, "Appendix de anima et Deo" (1763), n. 532 on p. 251:

"Sunt autem ejusmodi legum duo genera: alterum genus est illud, cujus nexus est necessarius, alterum, cujus nexus est liber:"

Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 188.

on account of a certain law, there is an inclination that renders some actions easier to do than others. It nevertheless remains that we dispose of a faculty called volition which allows us to counteract this inclination by giving something which by itself would not be able to overcome the force of that inclination.[52]

Moving on to the third mode of action, Bošković tried to make more explicit this notion of alignment between a mental structure and the body. This third mode of operation shares an important characteristic of the law regulating the movements of the material and inert world, which is the fact that the mind must occupy a certain position with regard to the body and its organs to maintain an organism alive.[53] However, it greatly differs from the law of forces that regulates matter as its range does not extend to infinity and that it does not alternate from a propensity to attract to a propensity to repulse and vice versa, propensities that change according to distances and occur at points serving as limits. It is to be noted that Bošković made these claims only on the basis of having no indices to the contrary.[54] He added that, again based on an absence of observed indices, perhaps there is no propensity to repulsion with regard to a point of matter at very short distances so that it is possible to assume that a spiritual substance is capable of compenetration with matter. This means that it has the ability to occupy with point of matter the same point of space at the same time.[55]

Finally, Bošković reiterated the idea that the forces enabling this connection are not eternal and immutable as there are dependent on a specific organization of the body. And to cover all possibilities, he added that these forces do

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[52] Boscovich, "Appendix de anima et Deo" (1763), n. 532 on p. 251:
"licet fieri possit, ut certa lege ad id inclinent, et actus alios aliis faciliores reddant, manente tamen semper in animo, in ipsa illa ejus facultate, quam dicimus voluntatem, potestate liberrima eligendi illud etiam, contra quod inclinatur, et efficiendi, ut ex mera sua determinatione præponderet etiam illud, quod independenter ab ea minorem habet vim."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

[53] Boscovich, "Appendix de anima et Deo" (1763), n. 533 on p. 251:
"Tertium legum genus convenit cum lege mutua punctorum in hoc genere, quod ad motum localem pertinet animæ ipsius, ac certam ejus positionem ad corpus, & ad certam organorum dispositionem."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

[54] Boscovich, "Appendix de anima et Deo" (1763), n. 533 on p. 252: "vel saltem nullum earum rerum habemus indicium."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

[55] Boscovich, "Appendix de anima et Deo" (1763), n. 533 on p. 252:
"cum potius ipsa [= anima] compenetrari cum materia posse videatur; nam ex phaenomenis nec illud certo colligi posse arbitror, an cum ullo materiae puncto compenetretur."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

not interact with other minds so that there is, following the law of cohesion by which the sensitivity of matter is generated, no impenetrability between these minds. Thus, Bošković concluded that, based on such differences, the law concerning the union between the mind and the body greatly differs from a material mechanism.[56]

By assuming that the nature of the connection between a material structure and a spiritual one is likely to be that of compenetration,[57] Bošković is fulfilling the two conditions necessary for an organism to function properly. These are: 1. these two types of structure have to be close to each other, and 2. they have to be somehow aligned. What remains to be discussed is their spacial organization or to answer the following question: where would an inorganic mind be situated with regard to a bodily structure? If recent discoveries in neuroscience allow us to pinpoint locations in the brain where certain cognitive activities are taking place, it is still an open question as to account for the plasticity and adaptability of the brain to compensate or relocate the centers of these activities when the original locations have been damaged. Thus, what is yet to be determined is whether the mind is spread all over the brain or even the body, whether it is localized in specific parts of the brain or are we dealing with a combination of both possibilities? The last alternative may also include the time factor where certain cognitive activities pass from a local position to a wider spread within the brain thus favoring adaptability in the case of a lesion.

As mentioned at the outset of this article, the question of spacial organization regarding the mind and the body preoccupied many thinkers preceding and contemporary to Bošković. One prevalent answer was the one suggested by Descartes who situated the mind in a small part of the body called the pineal gland. Other thinkers, also on the basis of the fact that some people claimed to feel pain in their fingers even when they had their hand cut, argued that the mind must be diffused over the entire body. Bošković rejected these interpretations on the ground that the evidence is not convincing. In fact, he was of the

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[56] Boscovich, "Appendix de anima et Deo" (1763), n. 533 on p. 252:

"satis luculenter patet, quam longe hæc etiam lex pertinens ad unionem animæ cum corpore a materiali mechanismo distet, et penitus remota sit."

Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

[57] However, as a word of caution, Bošković says that it is impossible to know just "from the phenomena" whether there is such a compenetration. Cf. Boscovich, "Appendix de anima et Deo" (1763), n. 533 on p. 252:

"nam ex phaenomenis nec illud certo colligi posse arbitror, an [anima] cum ullo materiae puncto compenetretur."

Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

opinion that the simple observation of the phenomena will never by sufficient to answer with certainty the present question.[58]

For him, the heart of the problem lies in having to translate the general laws effecting the connection between the various types of mental and brain activity, on the one hand, and all physical structures involved in our actions on the other, into very precise causal events affecting the points of matter. In other words, Bošković is looking for a solution which is, although impossible to confirm by observation, naturalistic, that is, one that is based on a theory that can explain the behavior of the phenomenal world. And even if we were able to identify these causal events, we would still need a very deep understanding of the geometry involved and a tremendous power of computation at a time when we are still struggling "to determine all the motions of three little masses, which act upon one another with forces that are known."[59]

Despite this methodological limitation, Bošković ventures a few hypotheses that are in agreement with his vision of reality as exposed in his *Theoria*, more particularly, the notions of the center of gravity and that of levels of organization as presented earlier. He asked whether the mind is present simultaneously in a certain number of points following the principle of virtual extension. According to that principle, which is one way of describing the double status of a center of gravity, it is possible to have one single point serving as a limit of a reality encompassing a space or a structure that is defined by a given number of elements. Using the analogy of time and space, we could say that one moment of time, as one limit of an interval of time, affects simultaneously a group of points of matter forming a given space.

Consequently, the rational mind, about which it has not been demonstrated that it does not exist as merely a single, simple and non-extended point of the body, maintains the same position from which it puts forth some kind of force via a center of gravity into the remaining points of the body encompassed by that center.[60] We can here think of a kite which has, as a material structure a center that is connected to a thread that allows an external user to control its behavior.

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[58] Boscovich, "Appendix de anima et Deo" (1763), n. 534 on p. 252:
"Ubi sit animæ sedes, ex *puris phænomenis certo nosse* omnino non possumus."
Italics are Bošković's.
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 189.

[59] Boscovich, "Appendix de anima et Deo" (1763), n. 535 on p. 253:
"At illa omnia nobis incognita sunt, nec ad illud adeo sublime Geometriæ genus adspirare nobis licet, qui nondum penitus determinare potuimus motus omnes trium etiam massularum, quæ certis viribus in se invicem agant."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 190.

[60] In fact, the body is controlled by a hierarchy of levels of organization starting from the neural network, the nerves, the muscles and probably many other levels the biologist, chemist and physicist know about, each level being directed by its encompassing level via a center of gravity.

According to Bošković, the communication between the mind and the body would consist of these forces, some of which, as mentioned before, are voluntary and others are involuntary.[61] Again, that communication is possible only if we have a compenetration at a center of gravity, a compenetration that can only occur between two entities of a different kind or two levels of organization. As such, the relation between the mind and the body is analogically similar to that we have with objects we manipulate to perform actions. It is, according to Bošković, the model that also represents the relation between God and His creation.[62] But these are considerations, as Bošković himself said, that "exceed the scope of natural philosophy."[63]

Conclusion: Beyond the Points of the Body and Mind

We started the present discussion by analyzing Priestley's model of reality, a model that reduces the world to one single substance by collapsing the dualism between the mind and body. Using the model of levels of organization, we tried to rescue that dualism. However, and to play the devil's advocate, we may argue that Priestley's monism reflects an intuition that says that there should be a common denominator or a continuity between the various types of reality with and by which we interact, that is, between an observer and the observed world. Such continuity is necessary at least to account for our ability to interact with the world and to reshape it, an ability that can certainly by extended to all living organisms, albeit to a degree somewhat proportional to their complexity. The question thus remains to define the nature of this 'discontinuous continuity' or to see how we could have 'unity in diversity.'

This paradox may be solved by supposing that the very "stuff" of our universe is, as alluded before, information or that by which we are able to experience meaning and which can be added to an existing structure so that it acquires a higher degree of complexity, like building a computer by using common raw materials. This means that the ability to understand and to transform the world is already present in the very worlds we understand and transform. Bošković's

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[61] Boscovich, *Theoria* (1763), n. 85 on p. 39:
"exerendo inde vires quasdam in reliqua corporis puncta rite disposita, in quibus viribus partim necessariis, et partim liberis, stet ipsum animæ commercium cum corpore."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 44.

[62] Boscovich, "Appendix de anima et Deo" (1763), n. 537 on p. 254:
"ut et Deus per infinitam Immensitatem suam præsens est punctis infinitis spatii (et ille quidem omnibus omnino), sive in iis materia sit, sive sint vacua."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 190.

[63] Boscovich, "Appendix de anima et Deo" (1763), n. 558 on p. 263:
"Sed ea jam Philosophiæ Naturalis fines excedunt, <…>."
Cf. Boscovich, "Appendix on the Mind and God" (1966), p. 196.

Theoria, with its notions of points of matter, center of gravity, compenetration and level of organization would easily lend itself to such an explanation of what ultimately constitutes our reality. To some extent, his vision of reality anticipates the law of consciousness and complexity suggested by Pierre Teilhard de Chardin.[64] From this perspective, the assertion that information, and perhaps consciousness, is the basic "stuff" of our universe would give us a middle way between a monist and a dualist view of human nature. If it is so, the next question would be: what makes information to "fossilize" itself into what we call matter? To answer that question, we would need more than Bošković's *Theoria*. But again, it may not be that far in suggesting a direction in which we could start our exploration.

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[64] Teilhard de Chardin, *Le phénomène humain* (Paris : Éditions du Seuil, 1955), p. 47:
"Réfracté en arrière dans l'Evolution, la Conscience s'étale qualitativement en un spectre de nuances variables dont les termes inférieurs se perdent dans la nuit."
My translation to English:
"Refracted back along the paths of evolution, consciousness spreads itself qualitatively into a spectrum of shifting shades, whose lower terms are lost in the night."

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Pred problemom odnosa duše i tijela: usporedba između rješenjā Josepha Priestleya i Ruđera Josipa Boškovića

Sažetak

Problem odnosa duše i tijela oduvijek je bio velika tema filozofā. Nakon renesanse raspri o ovom problemu pridružili su se i prirodoznanstvenici. Ovaj se članak usmjerava na prinose dvojice protagonista prirodne filozofije 18. stoljeća: Josepha Priestleya i Ruđera Josipa Boškovića. Dobro je poznata činjenica da se Bošković suprotstavio Priestleyevu rješenju ovoga problema. Manje su poznati religiozni ili duhovni razlozi zašto se Priestley poslužio Boškovićevim pojmom neprotežnih točaka tvari kao osnovom za svoje rješenje.

Nakon izlaganja tih razloga i utvrđivanja njihove povezanosti sa specifičnim skupom pretpostavaka na kojima počivaju monizmi, ovaj članak promatra Boškovićevo vlastito rješenje koje počiva na dualističkom pogledu na ljudsku narav, rješenje koje se oslanja na tri pojma: silu koja se pojavljuje između međusobno udaljenih neprotežnih točaka tvari, težište i pronicanje, kako su ti pojmovi raspravljeni u njegovu djelu *Theoria philosophiae naturalis redacta ad unicam legem virium in natura existentium* i napose u njegovu dodatku »Appendix pertinens ad metaphysicam de anima et Deo«.

Ključne riječi: Ruđer Josip Bošković, Joseph Priestley, problem odnosa duše i tijela, monizam, dualizam, pojam duše, ustroj tvarnoga svijeta.