



University of Zurich  
Zurich Open Repository and Archive

Winterthurerstr. 190  
CH-8057 Zurich  
<http://www.zora.uzh.ch>

---

*Year: 2010*

---

## Zeno's metrical paradox of extension and Descartes' mind-body problem

Ferber, R

Ferber, R (2010). Zeno's metrical paradox of extension and Descartes' mind-body problem. In: Giombini, S; Marcacci, F. Il quinto secolo. Studi di filosofia antica in onore di Livio Rossetti. Passignano s.T. (Pg), 295-310.  
Postprint available at:  
<http://www.zora.uzh.ch>

Posted at the Zurich Open Repository and Archive, University of Zurich.  
<http://www.zora.uzh.ch>

Originally published at:  
Ferber, R (2010). Zeno's metrical paradox of extension and Descartes' mind-body problem. In: Giombini, S; Marcacci, F. Il quinto secolo. Studi di filosofia antica in onore di Livio Rossetti. Passignano s.T. (Pg), 295-310.

# Zeno's metrical paradox of extension and Descartes' mind-body problem

## Abstract

The article uses Zeno's metrical paradox of extension, or Zeno's fundamental paradox, as a thought-model for the mind-body problem. With the help of this model, the distinction contained between mental and physical phenomena can be formulated as sharply as possible. I formulate (I) Zeno's fundamental paradox and give a sketch of four different solutions to it. Then (II) I construct a mind-body paradox corresponding to the fundamental paradox. Through that, it becomes possible (III) to copy the solutions to the fundamental paradox on the mind-body paradox. Three of them fail. But (IV) one of them — the Aristotelian one — gives us an interesting hint. Finally, (V) this hint is pursued somewhat further and (VI) through comparison with Zeno's fundamental paradox, the impossibility of a solution to the mind-body problem is shown again. The main new point of this article is the comparison of the mind-body problem with Zeno's fundamental paradox. The article is a revised version of an article published in: *Méthexis, Revista Internacional de Filosofía Antigua/International Journal for Ancient Philosophy*, 13, 2000, 139-151.

Rafael Ferber

Zeno's Metrical Paradox of Extension  
and Descartes' Mind-Body Problem





Rafael Ferber, *Zeno's Metrical Paradox of Extension and Descartes' Mind-Body Problem*

Estratto da/Excerpt from:

**Il quinto secolo. Studi di filosofia antica in onore di Livio Rossetti**

a c. di Stefania Giombini e Flavia Marcacci. Aguaplano—Officina del libro, Passignano s.T. 2010, pp. 295-310

[ISBN/EAN: 978-88-904213-4-1]

Rafael Ferber

# Zeno's Metrical Paradox of Extension and Descartes' Mind-Body Problem

Aguaplano

Rafael Ferber, *Zeno's Metrical Paradox of Extension and Descartes' Mind-Body Problem*

Estratto da/Excerpt from:

**Il quinto secolo. Studi di filosofia antica in onore di Livio Rossetti**

a c. di Stefania Giombini e Flavia Marcacci. Aguaplano—Officina del libro, Passignano s.T. 2010, pp. 295-310

[ISBN/EAN: 978-88-904213-4-1]

Videoimpaginazione/graphic layout by: Raffaele Marciano.

Proprietà letteraria riservata/All right reserved.

copyright © 2010 by Aguaplano—Officina del libro. [www.aguaplano.eu](http://www.aguaplano.eu) / [info@aguaplano.eu](mailto:info@aguaplano.eu)

In copertina/Cover: *Greece, Athens (Ancient). Erechthion, Caryatide Porch* (1860-1890), National Library of Congress, Prints and Photographs Division, Washington, D.C.

Videoimpaginazione/graphic layout by: Raffaele Marciano.

**L**ivio Rossetti, whose friendship I have had the pleasure and privilege to share since my first encounter with him in Perugia in the Piazza Ermini on the occasion of the Second Symposium Platonicum in September 1989, has for a long time had an interest in Zeno.<sup>1</sup> His main interest is, so it seems to me, mainly the rhetoric of these paradoxes, especially the rhetoric of the four paradoxes on motion. I am more interested in the logical aspects, which I want to pursue here. Now these paradoxes have a kind of wit, but nevertheless they have a wit that has its own profundity. This is especially the case when we regard these four paradoxes as a witty expression of a more profound paradox that underlies them. I have called this “Zeno’s fundamental paradox”, namely, that an extended line consists of unextended points. But we can apply this paradox to another problem, namely, the mind-body problem. In the following article, I try to reformulate this problem with the help of Zeno.

The mind-body problem as it arose with Descartes may be formulated with the following three propositions:<sup>2</sup>

- (a) Mental phenomena are non-physical phenomena.
- (b) Mental phenomena interact with physical ones.
- (c) The physical world is causally closed.

---

1. Cf. ROSSETTI 1988, 1992, 1993, 1994.

2. I am following here, with small modifications, the helpful exposition of P. BIERI, *Analytische Philosophie des Geistes*, Königstein <sup>2</sup>1993, pp. 5-7.

These three propositions form together a trilemma, because they all seem *prima facie* evident, although we cannot accept them all together. Two of them imply the falsehood of a third: If (a) mental phenomena are non-physical phenomena and (b) nevertheless interact with physical ones then (c) the physical world is not causally closed. But if (c) the physical world is causally closed and (a) mental phenomena are non-physical, then (b) interaction between physical and mental phenomena is not possible. But if despite the (c) causal closure of the physical world, we have (b) interaction between physical and non-physical phenomena, then (a) mental phenomena are no longer non-physical.

I use now Zeno's metrical paradox of extension, or Zeno's fundamental paradox, as a thought model for the mind-body problem. With the help of this paradox, the distinction contained in thesis (a) between mental and physical phenomena can be formulated as sharply as possible.<sup>3</sup> I formulate (I) the above-mentioned paradox and give a sketch of four different answers to it. Then (II) I construe a mind-body paradox corresponding to the fundamental paradox. Through that, it becomes possible (III) to copy the solutions to the fundamental paradox onto the mind-body paradox. Three of them fail. But (IV) one of them — the Aristotelian one — gives us an interesting hint. Finally, (V) this hint should be pursued somewhat further, and (VI) through the comparison with Zeno's fundamental paradox, the logical impossibility of a solution to the mind-body problem shall be shown again.

## I

What I call Zeno's metrical paradox of extension, or Zeno's fundamental paradox, is the conjunction of two propositions: (a) A point in space or time is indivisible and without extension. (b) A line in space or time is continuous and extended.

Since, however, an extended line in space or time is supposed to consist of infinitely many unextended points in space or time, the two propositions exclude each other: If (a) is true, then (b) is false. If (b) is true, then (a) is false. This paradox is fundamental because it underlies, in my opinion, *all* the other four paradoxes of motion: the Runner,

---

3. I am indebted for this idea to K. Bächli.

Achilles and the Tortoise, the Arrow and the Stadium (cf. FERBER 1995, esp. pp. 50-52).<sup>4</sup>

But the two propositions exclude each other only *prima facie*. In fact, there are at least four answers to this fundamental paradox, which I will outline now in a brief survey (cf. FERBER 1995, pp. 102-103).

(1) Aristotle solves the paradox by his theory of the continuum, whose nucleus may be sketched for our purpose in the following way: If the presupposed set of points is dense, there is a sense in which the predicate "divisible everywhere" applies to quantities and a sense in which it does not. It does not belong to them insofar as the set of points is not divisible everywhere simultaneously. It belongs to them insofar as it is divisible at any point, but not simultaneously. Only simultaneous divisibility at all points leads to the fact that a magnitude may be divided into nothing. Divisibility at any point leads only to a division into smaller and smaller parts (cf. *De gen. et. corr.* A2. 317 a 2-17). When we presuppose the second sense, we do not arrive at a paradox. A line does not actually consist of points because points are only potential cuts in the line (cf. *Phys.* Δ13. 222 a 14).

(2) Infinitesimal calculus solves the paradox by the method of approaching a limit. In differential calculus, the transition from an extended line to an unextended point is made possible by postulating the limit of a line that becomes infinitely small. In integral calculus, a line is described as the sum of an infinite number of infinitely small summands. This sum may be described, in turn, as a limit that can take the value of a positive number.

(3) Cantor's theory of the continuum solves the paradox insofar as a *non*-denumerable infinite set of extensionless points may be described as a non-denumerable infinite set of degenerate subintervals. Since a finite interval (a, b) is the union of a continuum of degenerate subintervals, "*we cannot meaningfully determine its length in our theory by 'adding' the individual zero lengths of the degenerate*

---

4. Unfortunately, the article of DAVEY 2007, p. 127, does not take into account my interpretation of the Stadium. Thus, it lags behind the current state of research as does the article of HUGGETT 2004.

*subintervals*” (GRÜNBAUM 1968, p. 136). We are here confronted with an instance in which “set-theoretic addition (i.e., forming the union of degenerate subintervals) is meaningful”, “while arithmetic addition (of their lengths) is not” (GRÜNBAUM 1968, p. 136). Cantor’s theory does *not* assign any meaning to ‘forming the arithmetic sum’, when we are attempting to ‘sum’ a *super-denumerable* infinity of individual numbers (lengths)! (GRÜNBAUM, 1968, p. 135).

(4) A dissolution of the paradox goes back to the theory of “indivisible lines” assigned to Plato by Aristotle (*cf. Metaph. A9. 992 a 20-22*). Whereas, however, attempts (1) to (3) still try to *solve* Zeno’s fundamental paradox, the problem does not even appear anymore within the theory of the “indivisible lines”: it *dissolves* “like a piece of sugar in water”, to use an expression of L. Wittgenstein made in another context (WITTGENSTEIN 1989, p. 192). For, unlike the propositions (a) “A point in space or time is indivisible and without extension” and (b) “A line in space or time is continuous and extended”, the propositions (a’) “A point in space or time is an atomic, finite unity of space and time” and (b’) “A line in space or time is an extended discontinuum of space or time” don’t exclude each other, but form a biconditional. Instead of “If (a) is true, then (b) is false. If (b) is true, then (a) is false”, we get If (a’) is true, then (b’) is true. If (b’) is true, then (a’) is true (*cf. FERBER, 1995, 50-74*).

## II

For Descartes, according to the above-mentioned trilemma, (a) the mind or the *res cogitans* is in contrast to the body as *res extensa* unextended, but nevertheless (b) interacts with the body, despite the fact (c) that for Descartes nature is causally closed. In fact, the laws of push are confined to the corporeal world (*Principles of Philosophy*, part 2, § 40). Now if we apply Zeno’s fundamental paradox to proposition (a) of the above-mentioned trilemma, we obtain the following:

- (a) An idea, a unit or “point of consciousness”, is unextended [in space].
- (b) A body is extended [in space].

But, contrary to Zeno's fundamental paradox, the unity of brain and consciousness does not consist in the paradoxical unity of the addition of unextended points to an extended line, but in the paradoxical unity of interaction between unextended points of consciousness and an extended body. Whereas the addition of unextended points to an extended line appears to be conceptually impossible, the interaction between unextended points and an extended body is impossible in reality. The apparent conceptual impossibility of the addition can be mastered by the infinitesimal calculus and Cantor's continuum theory, but the real impossibility cannot be resolved in a similar way. For, according to the laws of conservation of matter and energy, the physical world is causally closed. Hence, no non-physical cause such as an unextended point of consciousness can interact with a body. Therefore, the human being that in Descartes' conception is a substantial unity of body and mind, or brain and consciousness, embraces a relation of interaction between two entities that cannot enter into such a relation. In analogy to Zeno's fundamental paradox, the two propositions (a) and (b) exclude each other. If (a) is true, then (b) is false. If (b) is true, then (a) is false.

Hereafter, I will borrow an expression from J.C. Eccles and name these points of consciousness psychons and the parts of the brain that are linked to them dendrons. I further assume with J.C. Eccles "that each of these psychons is reciprocally linked in some unique manner to its dendron" (ECCLES 1994, p. 87; *cf.* also ECCLES 1994, figure 6.10). Now, just as an extended line cannot be summed up from unextended points, likewise the human brain cannot form a unity of unextended psychons and extended dendrons. Regardless of how many dendrons we may discover, they cannot produce a single psychon. Regardless of how many psychons we may find, they are not able to bring about a single change in a single dendron. Of course, as is well known, indefinitely small causes may have indefinitely big effects. The beatings of the wings of a jackdaw may start an avalanche and those of a butterfly in China may produce a hurricane in Mexico. But according to the above-mentioned presupposition, no psychon can cause a transmitter to pour a chemical substance into a dendron, since a psychon is not only infinitely small, but unextended. Therefore, the interaction between brain and consciousness is paradoxical. In analogy to Zeno's fundamental paradox, I am calling this paradox the mind-body paradox. More than Zeno's paradox, this second paradox seems to be unsolvable for logical

reasons, so that long before Colin McGinn's thesis of the cognitive closure of the human mind (MCGINN 1991, pp. 2-3),<sup>5</sup> we can read in Pascal: "The way in which minds are linked to bodies cannot be understood by human beings, nevertheless this is the human being" (Thoughts, § 72-199).<sup>6</sup>

### III

Now Zeno's paradoxes are taking place in our thoughts, not in reality. We all suppose that in reality Achilles overtakes the tortoise. Likewise, we assume that the body and consciousness interact with each other. But how this is possible is just the philosophical problem. Let us therefore copy the four above-mentioned answers on the mind-body paradox.

We begin with the fourth one (4) (*cf.* p. 4) and assume in the sense of a logical possibility that these "points of consciousness" or psychons may be analysed in a future state of neurophysiologic research. These points themselves would be measurable by the elementary space and time units. Then we obtain the following propositions:

- (a') A psychon has an extension.
- (b') A dendron has an extension.

Herewith the mind-body paradox would disappear. For if the human being forms a unity of brain and consciousness, the two propositions (a') and (b') do not exclude each other. Rather, they explain how the interaction between psychons and dendrons is possible. For these two

---

5. For MCGINN 1991, pp. 2-3, we have a mind-body problem, "because we are cut off by our very cognitive constitution from achieving a conception of that natural property of the brain (or of consciousness) that accounts for the psychophysical link".

6. "*Modus quo corporibus adhaerent spiritus comprehendere ab hominibus non potest, et hoc tamen homo est.*" Pascal borrows this statement from Augustine: "*quia et iste alius modus, quo corporibus adhaerent spiritus et animalia fiunt, omnino mirus est nec comprehendere ab hominibus potest, et hoc ipse homo est*" (*City of God*, book 21, section 10). *Cf.* also Hume's *Enquiry*, Sect. VII, Part II, 74: "The same difficulty occurs in contemplating the operations of mind on body—where we observe the motion of the latter to follow upon the volition of the former, but are not able to observe or conceive the tie which binds together the motion and volition, or the energy by which the mind produces this effect".

entities — the psychon and the dendron — are both of a physicalistic nature. Between them an interaction, on the one hand, is conceptually possible, and on the other hand does not violate the laws of conservation.

But it is evident that, in contrast to Zeno's fundamental paradox, such a solution does not make the mind-body paradox disappear, but only contests what it should explain. For in contrast to such elementary physical points, psychons are not measurable and qualitative. Hence, it makes no sense to say that a psychon or a point of consciousness is so and so small. On the other hand, we may with Th. Nagel's well-known question *What Is it Like to Be a Bat?* (NAGEL 1974, pp. 435-450) inquire what it is like for me to have psychons, but not what it is like for me to have dendrons. But as long as we do not take these qualia into consideration, "we cannot even pose the mind-body problem without sidestepping it" (NAGEL 1974, p. 450). It is a merit of Colin McGinn to have again made clear that qualia don't have any spatial dimensionality and to have restored this Cartesian intuition (*cf.* MCGINN 1995, pp. 220-230).<sup>7</sup>

However, a solution that (2) is based on the differential or integral calculus would save the unextendedness of the psychons. It may be logically possible to calculate psychons in such a way that they are limiting cases of dendrons and as such unextended. Then we obtain the following propositions:

- (a'') A psychon is the limiting case of the extension of a dendron.
- (b'') A dendron is extended.

These two propositions, too, do not contradict each other. But the particular character of the psychons, namely, the fact that they are given to us from an inner perspective, would disappear. Nobody so far ever saw an unextended point with his bodily eyes or felt it in his inner perception. Rather, it is the (Fregean) sense of the expression "unextended point" that becomes the reference. In this (ordinary) sense, unextended points have no real existence, but only a theoretical or, more exactly, a

---

7. "E [e.g. the visual experience of lightning] seems not to have any of these spatial characteristics: it is not located at any specific place; it takes up no particular volume of space; it has no shape; it is not made up of spatially distributed parts; it has no spatial dimensionality; it is not solid", p. 220.

nominal or semantic one (*cf.* FERBER <sup>8</sup>2008, pp. 136-142; 2009, pp. 114-121). But if psychons have only a semantic existence, then they lose their real character, namely, that it is for me in some way to have such psychons. In addition to this, the interaction between psychons and dendrons could no longer be explained, since limiting cases with zero extension also have zero causality.

Something similar is true (3) for Cantor's theory of continuum. According to this, we obtain again, in the sense of a logical possibility, the following propositions:

- (a'') A psychon is the "degenerated subinterval" of the extension of a dendron.  
 (b'') A dendron is extended.

But even if neurophysiologists would be able to copy unextended psychons on a mathematical continuum in Cantor's sense, the problem would nevertheless not yet be solved. We can feel psychons, but not Cantor's sets. Moreover, it is impossible that "degenerated subintervals" can interact with dendrons. Therefore, Cantor's solution also does not do justice to the phenomenon of psychons. For contrary to Zeno's fundamental paradox, which is based upon an apparent contradiction between the zero dimensionality of points that can only be posited theoretically and the extension of a line that can be experienced empirically, the mind-body paradox rests on a contradiction between the extension of dendrons and the zero dimensionality of psychons, which are both perceptible, the one through our outer perception, the others through our inner one.

Thus the physicalistic (4) and the nominalistic [(2) and (3)] solutions—nominalistic in the sense of a psychological nominalism—do not lead to a viable solution of the mind-body paradox. Both positions, the physicalistic and the nominalistic ones, are reductionist in an unsuitable sense, since they deny a part of the problem: For the physicalistic position, there are no (spatially) unextended qualitative "points of consciousness"; for the nominalistic positions, it is true that there are unextended points, but they would not have real, but only semantic existence.

#### IV

Hence, of the four answers to Zeno's fundamental paradox, only (1) the Aristotelian one remains. To prevent a misunderstanding, let us mention here that Aristotle's solution of Zeno's fundamental paradox is not intended by him to also be the solution of the mind-body problem. I don't want to discuss here Aristotle's solution of this problem and its credibility in the framework of functionalism (*cf.* GRANGER 1990, pp. 27-49; BURNYEAT 1992, pp. 15-26; PATZIG 2009, pp. 249-266). Since Aristotle did not yet know the laws of conservation of matter (and energy), the mind-body problem did not arise for him with the sharpness with which the problem has been raised since Descartes. Here I only want to ask the question of whether Aristotle's solution of Zeno's fundamental paradox can be transferred in an illuminating way to the mind-body paradox as exposed.

In transferring this solution, there exist in reality only dendrons, i.e., extended bodies. In thoughts, however, we can understand unextended psychons as limits of dendrons that confer a potential existence to the psychons. Thus, the unextended psychons exist no more actually or independently in dendrons than the unextended spatial points in a line exist actually or independently. Psychons exist only potentially in dendrons, just as unextended points exist only potentially in a line. The ontological status of the psychons can be described in the same way in which Aristotle characterised the potentiality of the infinite. The specialness of the potential existence of the infinite consists in the fact that it does not presuppose actuality, neither conceptually nor according to time nor according to essence (*cf. Metaph.* Q8. 1049 b 4-1051 a 3). For the infinite "does not exist potentially in the sense that it will ever actually have separate existence; its separateness is only in knowledge" (*Metaph.* Q6. 1048 b 14-15, tr. Ross-Barnes). Thus unextended points in a line, too, do not exist independently in the line and do not presuppose real points. Rather, they exist only in thought. In order to distinguish between the potentiality that presupposes actuality from the one that does not, we will put the second one into quotation marks.

In an analogous way, psychons do not exist actually and independently in dendrons, but only "potentially" (or in thoughts). Thus the indivisibility or unextendedness of the psychons is not a product of reality, but of cognition. Now, just as the unextended psychons exist only in

cognition, likewise also their qualitative character. We will characterise this potential existence and the “unique way in which each psychon is linked to a dendron” (ECCLES, 1994, 87) in such a way that psychons are the way in which dendrons are given to us in immediate awareness. According to this, we obtain the following propositions:

- (a'') A psychon is the way in which a dendron  
is given to us in immediate awareness.  
(b'') A dendron is extended.

These two propositions do not contradict each other. For a dendron may very well be extended, but nevertheless be given to us in our cognition in an unextended and qualitative way. Such a hypothesis recognizes (a'') the psychic and (b'') the physical side of the mind-body problem and conforms to proposition (a) “Mental phenomena are non-physical phenomena”. Likewise, we also obtain an answer to the question about how the causal role of psychons can be explained. On the one hand, as entities that exist only in thoughts, they cannot interact with dendrons. This is impossible for the above-mentioned conceptual and factual reasons. We thus not only, to quote from K. Popper’s dialogue with J.C. Eccles, have to assume that “the first law of thermodynamics can no longer be checked; and there is thus no real reason to say that it has been violated” (POPPER 1977, p. 563—Part 3, dialogue 12, September 30). We have also to assume that a point of zero dimensions has zero causality. If we may, with D. Hume, characterise the relation of causality between A and B by contiguity, succession and the impression of necessary connection, it is even impossible to understand how an unextended psychon can enter into a relation of contiguity.<sup>8</sup> On the other hand, the physical activity of dendrons is nevertheless, in our direct cognition, phenomenally given to us in such a way that, probably because of long accustomization, we *experience* it as causal effectiveness. As we may suppose since D. Hume’s analysis of causality, the causal relation between two events is not given *in rerum natura*, but is a connection merely in our cognition: “When we say therefore that one object is connected with another, we mean only that they have acquired a con-

---

8. Cf. LUCRETIUS, *De rerum natura*, 1, 304: “*tangere enim et tangi, nisi corpus, nulla potest res*”.

nexion in our thought and give rise to this inference" (HUME, *Enquiry*, Section 7, Part 2, 76). Likewise, the relation of causality between psychons and dendrons is a connection merely in our thought. But only the dendrons can do the job of "selecting by means of the quantal probability field, a vesicle for exocytosis" (*cf.* the hypothetical model of ECCLES, 1994, chapt. 5). But the relation of causality does not lie in the dendrons themselves, but is given phenomenally in the form of psychons, even if, without dendrons, psychons cannot become effective. Thus in the mind-body paradox, we maintain the propositions (a) "Mental phenomena are non-physical phenomena" and (c) "The physical world is "causally closed", but we must give up (b) "Mental phenomena interact with physical ones". This interaction is possible neither physically nor logically, but is an inevitable illusion.

## V

Let us now go back to Zeno's paradoxes. It is evident that Achilles overtakes the tortoise. But when we start to philosophise, the question arises as to how this is possible. Yet, it is only in thought that the tortoise has a lead. Likewise, only in our thoughts is the mind a step in advance of our conception. In practical life, there is no problem concerning the interaction of psychons and dendrons, mind and body. As long as we are not paralysed, we can move an arm in accordance with our will. Only when we start to philosophise does the question arise as to how such an interaction is possible despite the conservation laws.

But it is a product of our thought that there is an interaction between psychons and dendrons. By conceiving psychons as the way in which dendrons are given in immediate cognition, we see how an interaction is possible without violating the laws of conservation. For it is not psychons that are producing some effect in some mysterious way; it is dendrons that are unmysteriously producing it. But dendrons are given to us in direct cognition only under the aspect of psychons. Hence the *real* causality of dendrons is given to us as the *spurious* causality of psychons. In an analogous way, a line is extended in reality and cannot be made up of unextended parts. Based on the results of our analysis, we can reconstruct the line in such a manner that it is made up of unex-

tended points, and with this we end up creating the problem of how an extended line can be composed of unextended points.

This theory is an aspect dualism. Instead of conceiving mind and body as things whose reciprocal relation then becomes problematic, mind and body are only two different aspects of the same thing, as Spinoza formulated it: “Mind and body is one and the same individual, which now is conceived under the attribute of thought, now under the one of extension” (*Ethics*, Part 2, and theorem 21, Annotation).<sup>9</sup> By means of G. Frege’s distinction between sense and reference, aspect dualism may be formulated in such a way that the expressions dendron and psychon have different “senses” or “modes of presentation”, but the same reference. According to this, psychons are dendrons, but our mentalist language describes them in a way that cannot be copied isomorphically in a physiological and physicalistic terminology. Only in this sense are mental phenomena, according to the thesis (a) of the mind-body paradox, non-physical phenomena.

## VI

Nevertheless, this must be made more precise. A line does not have the double “mode of presentation” of being on the one hand extended and on the other hand composed of an infinite number of points without extension. An unextended line would no longer be a line. It only has the double aspect of being extended on the one hand and on the other of possessing in thought as many “potential” cuts or “limits” as you like. Likewise, the dendron does not have the double aspect of being extended and of being an unextended psychon. A dendron has only the double aspect of being given as an extended entity in indirect cognition and as an unextended psychon in immediate awareness. Now, just as a line is indeed extended on the one hand, but unextended only in a “potential” sense, so the dendron is indeed extended on the one hand, but an unextended psychon in the “potential” sense. In direct outer perception, sound waves appear to us as sounds and electromagnetic waves as colours, just as in the inner perception, dendrons appear to us

---

9. “[...] *Mentem et corpus unum, et idem esse individuum, quod jam sub Cogitationis, jam sub Extensionis attributo concipitur*”.

as unextended psychons, e.g., as some elementary sensations. Insofar as aspect dualism is no more mysterious than that, an extended line has in the "potential" sense unextended parts.

But it is also true to say with T. Nagel: "To talk about a dual aspect theory is largely hand waving. It is only to say roughly where the truth might be located, not what it is" (NAGEL 1986, p. 31). Nevertheless, it is a misunderstanding of T. Nagel to say "that the brain has nonphysical properties" (*ibid.*), just as it is a misunderstanding of J.R. Searle's "biological materialism" to assert that "consciousness" is "itself a feature of the brain" in the sense of an "emergent property", like the liquidity of water is an emergent property of a system of molecules (SEARLE 1997, pp. 17-18). The brain as a physical organ cannot possess non-physical or mental features, just as an extended line cannot have unextended points, except "potentially". But the *comparison* with the line illustrates a formulation of the mind-body problem in which the problem becomes unsolvable, as has been asserted in various ways from Augustine through Pascal up to Th. Nagel and C. McGinn. Indeed, it is impossible for us to understand "how minds cling to bodies" (Pascal) or to achieve "a conception of that natural property of the brain (or of consciousness) that accounts for the psychophysical link" (MCGINN 1991, p. 2). But if "non-physical features of the brain" are only the immediate "modes of representation" or the "senses" of dendrons, then they are like points in the line thoughts. They "cling to bodies" or become "nonphysical features of the brain" only when we make sense of the reference, i.e., if we reify their "mode of representation" to "nonphysical features of the brain". Similarly, unextended points in a line are only mental "cuts" that are reified. As soon as we forget this reification, the apparently unsolvable problem arises as to how an extended line can consist of unextended points. But as soon as we disregard this reification of psychons, the really unsolvable problem arises as to how an extended brain can produce such unextended mental points and how such unextended mental points can exert an effect on the extended brain.

T. Nagel is therefore right when he continues "[that] one must be careful to recognise that it [to talk about a dual aspect theory] doesn't by itself increase our understanding any more than the postulation of a non-physical substance does. The main question, how anything in the world can have a subjective point of view remains unanswered" (NAGEL 1986, p. 57). But probably this question is also asked in a misleading

way. Nothing in the material world can have *per se* a subjective point of view, just as the star Venus by herself doesn't have the property to be the morning or the evening star, to use Frege's well-known example. Likewise, a dendron by itself doesn't have the property of being a psychon. A subjective point of view is only characteristic of the way in which dendrons are experienced by us in immediate awareness and reified to psychons.

But unfortunately this is not the end of the story. The proposition, "A subjective point of view is the way in which the brain is given to us in immediate awareness" also has a circular structure. For in principle it means nothing other than, A subjective point of view is the way in which a brain is given to us from a subjective point of view. Yet here we come, on a higher level of reflection, to a point where one can only state circular propositions, since, to remain in the image of the line, we are ourselves the points in the line that we produce. But from where do these "points of consciousness" that we produce come from?

They, too, are facts of our immediate awareness that we have reified. But from where do these new facts come? The question may be repeated *ad indefinitum*. Here, at this indefinite *autopoiesis* of "points of consciousness" or indefinite capacity of reflection, consciousness is again and again somewhat in advance of our conceptual grasp. Just as an unextended "point of consciousness" cannot be naturalized, so, too, its indefinite intramental autopoiesis cannot. Rather, it appears that because of our biologically conditioned limits of cognition (*cf.* MCGINN 1993, esp. chapt. 2), we must simply accept this double aspect of reality as the primitive psychophysical phenomenon and a mystery. Every attempt to dig further here would make us meet not with "hard rock", but with psychons where "the spade of our thinking is turning back on itself", to modify an image of L. Wittgenstein (*Philosophical Investigations*, § 217) in the context of the mind-body problem or paradox. In this sense reflection can really never overtake consciousness—as Achilles apparently could never overtake the tortoise.<sup>10</sup>

---

10. This is the revised and slightly shortened version of an article I published in «Méthexis, Revista internacional de filosofía Antigua/International Journal for Ancient Philosophy», 13, 2000, pp. 139-151.

Literature

- BIERI 1993: PETER BIERI, *Generelle Einführung*, in *Analytische Philosophie des Geistes*, Hain, pp. 1-28 [2nd ed.].
- BLOCK 1995: NED BLOCK, *Qualia*, in *The Cambridge Companion to the Mind*, Cambridge, pp. 514-519.
- DAVEY 2007: KEVIN DAVEY, *Aristotle, Zeno, and the Stadium Paradox*, «History of Philosophy Quarterly», 24, 2007, pp. 127-146.
- BURNYEAT 1992: MYLES F. BURNYEAT, *Is an Aristotelian Philosophy of Mind Still Credible?*, in MARTHA C. NUSSBAUM-AMÉLIE OKSENBERG RORTY (eds.), *Essays on Aristotle's de Anima*, Oxford, pp. 15-26.
- FERBER 1988: RAFAEL FERBER, *Das normative 'ist' [das Sein Gottes und die Leibniz-Schellingsche Frage]*, «Zeitschrift für Philosophische Forschung», 42, pp. 371-396.
- FERBER 1995: RAFAEL FERBER, *Zenons Paradoxien der Bewegung und die Struktur von Raum und Zeit*, Wiesbaden [2nd ed.].
- FERBER 2008: RAFAEL FERBER, *Philosophische Grundbegriffe 1. Philosophie, Sprache, Erkenntnis, Wahrheit, Sein, Gut*, München [8th ed.].
- FERBER 2009: RAFAEL FERBER, *Concetti fondamentali della filosofia I. Filosofia, Linguaggio, Conoscenza, Verità, Essere, Bene*, tr. it. di Luigi Garzone, Torino.
- ECCLES 1994: JOHN C. ECCLES, *How the Self Controls Its Brain*, Berlin et al.
- GRANGER 1990: HERBERT GRANGER, *Aristotle and the Functionalist Debate*, «Apeiron», 23, pp. 27-49.
- GRÜNBAUM 1968: ADOLF GRÜNBAUM, *Modern Science and Zeno's Paradoxes*, London.
- HUGGETT 2004: NICK HUGGETT, *Zeno's Paradoxes*, in *The Stanford Encyclopedia of Philosophy*, ed. by Edward N. Zalta, <http://plato.stanford.edu/entries/paradox-zeno> [Winter 2004 Edition].
- MCGINN 1991: COLIN MCGINN, *The Problem of Consciousness: Essays Towards a Resolution*, Oxford.
- MCGINN 1993: COLIN MCGINN, *Problems in Philosophy. The Limits of Inquiry*, Oxford.
- MCGINN 1995: COLIN MCGINN, *Consciousness and Space*, «Journal of Consciousness Studies», pp. 220-230.
- METZINGER 1995: THOMAS METZINGER, *Bewusstsein. Beiträge aus der Gegenwartsphilosophie*, Paderborn.
- NAGEL 1974: THOMAS NAGEL, *What Is it Like to Be a Bat?*, «Philosophical Review», 83, pp. 435-450.
- NAGEL 1986: THOMAS NAGEL, *The View from Nowhere*, New York-Oxford.
- NAGEL 1998: THOMAS NAGEL, *Conceiving the Impossible and the Mind-body-Problem*, «Philosophy», 285, 1998, pp. 337-352.

- JACKSON 1982: FRANK JACKSON, *Epiphenomenal Qualia*, «Philosophical Quarterly», 32, pp. 127-136.
- PATZIG 2009: GÜNTHER PATZIG, *Körper und Geist bei Aristoteles – Zum Problem des Funktionalismus*, in DOROTHEA FREDE-BURKHARD REIS (Hg.), *Body and Soul in Ancient Philosophy*, Berlin, pp. 249-266.
- POPPER-ECCLES 1977: KARL R. POPPER-JOHN C. ECCLES, *The Self and Its Brain*, Berlin *et al.*
- ROSSETTI 1988: LIVIO ROSSETTI, *The Rhetoric of Zeno's Paradoxes*, «Philosophy and Rhetoric», 21, pp. 145-152.
- ROSSETTI 1992: LIVIO ROSSETTI, *Sull'intreccio di logica e retorica in alcuni paradossi di Zenone di Elea*, «Archiv für Geschichte der Philosophie», 74, pp. 1-25.
- ROSSETTI 1993: LIVIO ROSSETTI, *Where Philosophy and Literature Merge in the Platonic Dialogues*, «Argumentation», 6, pp. 433-443.
- ROSSETTI 1994: LIVIO ROSSETTI, *I Paradossi di Zenone nell'interpretazione di A. Koyré*, in CARLO VINTI (a cura di), *Koyré, Alexandre: L'avventura intellettuale*, Napoli, pp. 423-435.
- SEARLE 1997: JOHN R. SEARLE, *The Mystery of Consciousness*, London.
- WITTGENSTEIN 1989: LUDWIG WITTGENSTEIN, *Philosophie, §§ 86-93 (pp. 405-435)*, ed. by H. Nyman, «Revue Internationale de Philosophie», 43, pp. 175-203.

## *Il quinto secolo. Studi di filosofia antica in onore di Livio Rossetti*

<i>Introduzione</i> di Stefania Giombini e Flavia Marcacci	11
<i>Bibliografia degli scritti di Livio Rossetti</i>	29

### PHYSIS

---

BEATRIZ BOSSI, *Parménides, DK 28 B 16: ¿el eslabón perdido?*, p. 45; OMAR D. ÁLVAREZ SALAS, *Intelletto e pensiero nel naturalismo presocratico*, p. 63; MIRIAM CAMPOLINA DINIZ PEIXOTO, *Physis et didachê chez Démocrite*, p. 83; ANTONIETTA D'ALESSANDRO, *Democrito: visione e formazione dei colori nel De sensu et sensibilibus*, p. 101; CARLO SANTINI, *Democrito, Lucrezio e la poesia delle cose impercettibili* (De r.n. 3,370-395), p. 113; DANIELA DE CECCO, *Anassagora B4 DK (B4a; B4b): esame delle fonti*, p. 123; SERGE MOURAVIEV, *L'Exorde du livre d'Héraclite. Reconstruction et Commentaire*, p. 135; DARIO ZUCHELLO, *Parmenide e la tradizione del pensiero greco arcaico (ovvero, della sua eccentricità)*, p. 165; M. LAURA GEMELLI MARCIANO, *Il ruolo della "meteorologia" e dei "discorsi sulla natura" negli scritti ippocratici. Alla ricerca di un "canone" per lo scritto medico?*, p. 179; DANIEL W. GRAHAM, *Theory, Observation, and Discovery in Early Greek Philosophy*, p. 199.

### LOGOS

---

DMITRI PANCHENKO, *The Cultural Florescence of Fifth-Century Athens in Comparative Perspective*, p. 215; GIANFRANCO MADDOLI, *L'immagine dell'Umbria nel V secolo a.C.*, p. 229; EMIDIO SPINELLI, *Presocratici scettici? Assunti genealogici nel Varro di Cicerone*, p. 235; MARIA MICHELA SASSI, *Senofane critico dell'antropomorfismo*, p. 247; GIUSEPPE MAZZARA, *Aspetti gorgiani e pitagorici nel socratico Antistene*, p. 257; KSENJIA MARICKI GADJANSKI, *ΔΙΣΣΟΙ ΛΟΓΟΙ and Modern Linguistics*, p. 269; STEFANIA GIOMBINI, FLAVIA MARCACCI, *Dell'antilogia*, p. 277; RAFAEL FERBER, *Zeno's Metrical Paradox of Extension and Descartes' Mind-Body Problem*, p. 295; MARCELLA G. LORENZI, MAURO FRANCAVIGLIA, *Continuo o discreto? Dai paradossi di Zenone alla meccanica quantistica*, p. 311; DISKIN CLAY, *The Art of Platonic Quotation*, p. 327; TOMÁS CALVO-MARTÍNEZ, *Las hipótesis del Fedón y la dialéctica como arte del diálogo*, p. 339; FRANCO FERRARI, *Equiparazionismo ontologico e deduttivismo: l'eredità di Parmenide nella gymnasia del Parmenide*, p. 357; MICHEL NARCY, *Calliclès est-il un bon interprète du Gorgias?*, p. 369; GRACIELA E. MARCOS DE PINOTTI, *Ser y aparecer en Protágoras*, p. 379; THOMAS M. ROBINSON, *Socrates on Soul and Immortality*, p. 389.

## ETHOS

---

DELFIN F. LEÃO, *The Seven Sages and Plato*, p. 403; GABRIELE CORNELLI, *Sulla vita filosofica in comune: koinonía e philía pitagoriche*, p. 415; MARIO VEGETTI, *Il medico antico fra nomadismo e stanzialità (dal V secolo a.C. al II secolo d.C.)*, p. 437; FRANCESCO DE MARTINO, *Aspasia e la scuola delle mogli*, p. 449; FRANCISCO BRAVO, *Entre la euthymía de Demócrito a la eudaimonía de Aristóteles*, p. 467; CHIARA ROBBIANO, *L'immutabilità come valore morale: da Parmenide (B8, 26-33) a Platone (Rep. 380d1-383a5)*, p. 483; RENZO VITALI, *Stasis come rivoluzione*, p. 493; WALTER O. KOHAN, *Sócrates en el último curso de Foucault*, p. 503; GIOVANNI CERRI, *Tesi di Platone sulla ragion politica del processo a Socrate e sulla natura della sua attività propagandistica*, p. 519; CHRISTOPHER ROWE, *Boys, Kingship, and Board-games: A Note on Plato*, *Politicus 292E-293A*, p. 529; GERARDO RAMÍREZ VIDAL, *Los sofistas maestros de política en el siglo V*, p. 535; RACHEL GAZOLLA, *Intorno alla Paideia di Socrate e dei Cinici*, p. 547; GILBERT ROMÉYER DHERBEY, *Socrate educateur*, p. 563; GIOVANNI CASERTANO, *La regina, l'anello e la necessità*, p. 587.

## PATHOS

---

MARIA DE FÁTIMA SILVA, *Euripides and the Profile of an Ideal City*, p. 603; PATRIZIA LIVIABELLA FURIANI, *Il V secolo, tra fiction e realtà, nel romanzo di Caritone*, p. 617; MARIA DO CÉU FIALHO, *The Rhetoric of Suffering in Sophocles' Philoctetes and Coloneus: A Comparative Approach*, p. 645; NOBURU NOTOMI, *Prodicus in Aristophanes*, p. 655; ENRIQUE HÜLSZ PICCONE, *Huellas de Heráclito en tres fragmentos 'filosóficos' de Epicarmo*, p. 665; ALESSANDRO STAVRU, *Il potere dell'apparenza: nota a Gorgia, Hel. 8-14*, p. 677; LIDIA PALUMBO, *Scenografie verbali di V secolo. Appunti sulla natura visiva del linguaggio tragico*, p. 689; NESTOR L. CORDERO, *Les fondements philosophiques de la 'thérapie' d'Antiphon. Les vertus thérapeutiques du logos sophistique*, p. 701.

\* \* \*

## PER L'AMICO LIVIO

---

MASSIMO CAPPONI, *L'originalità e il valore dell'ipertesto dialogico-interattivo tra creatività e simulazione*, p. 715; CHIARA CHIAPPERINI, *L'incontro con Livio Rossetti, la nascita di Amica Sofia... e alcune osservazioni sull'arte della "maieutica"*, p. 725; NESTOR L. CORDERO, *D'un citoyen d'Élée à l'autre*, p. 735; GERARDO RAMÍREZ VIDAL, OMAR D. ÁLVAREZ SALAS, *Livio Rossetti y la UNAM, 25 años de cooperación y amistad*, p. 737; THOMAS M. ROBINSON, *Livio Rossetti and the International Plato Society*, p. 743; MARIAN WESOLY, *I Owe so much to Professor and my Friend Livio Rossetti...*, p. 745.

\* \* \*



