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CONTENTS

RICHARD OWEN ON THE MIND/BODY PROBLEM

Sergio Balari[1] · Guillermo Lorenzo[2]

1. *Universitat Autònoma de Barcelona, Facultat de Lletres, Edifici B, 08193 Bellaterra (Barcelona), Spain*
E-mail: Sergi.Balari@uab.cat
2. *Universidad de Oviedo, Facultad de Filosofia y Letras, 33011 Oviedo, Spain*
E-mail: glorenzo@uniovi.es

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Abstract: *Contrary to the received view of Richard Owen as a Platonic and conservative naturalist, we document that he held a radically physicalist worldview that extended to so tough a matter as the Mind/Body Problem. We argue that if viewed from the perspective of his overall comparative project, Owen's reflections on the nature of mind at the end of volume III of* On the anatomy of vertebrates *can be read as an anticipation of some of the main tenets of the Brain State Theory of mind developed since the mid 20th century.*

> A physicalist theory of mind is a mere prolegomenon to a physicalist metaphysics.
> Such metaphysics, like the theory of mind, will no doubt be
> the joint product of scientific investigation and philosophical reflection.
>
> D. M. Armstrong, *A materialist theory of mind*, p. 366.

1. Introduction

The Darwinian partisans, first, and Darwinian historiography, in more recent times, constructed an image of Richard Owen (1804-1892) as an old-fashioned and conservative thinker, who held idealistic stances and defended the idea of special creation in the evolutionary debate. In spite of some recent efforts to clarify his actual ideas and commitments [1, 2, 3, 4, 5, 6, 7, 8], Owen continues to be portrayed as the personification of the establishment's reaction against the modern worldview brought about by Darwin and his followers. But Owen and Darwin's real differences were concerned, from root to branch, with biological technicalities, not metaphysical ones. Owen, to no lesser degree than Darwin, thought that natural laws applied with no single exception, including those governing the evolution of species, even if he, as a growing number of current biologists, believed that natural

selection was not a mechanism capable of explaining why organisms are the way they are [9, 10, 11].

This paper's main focus is not however on the ideas of Richard Owen as an evolutionist but on another, less known aspect of Owen's radical naturalistic worldview: Namely the idea that mental properties, even if not directly observable and certainly poorly understood are not mysterious or supernatural forces somehow added to the physical constitution of organisms. Owen specifically contended that mental properties were (1) natural forces of nervous systems, and (2) impossible to tell apart from the activity of such systems. Both contentions are clearly expounded in the closing pages of Volume III of *On the anatomy of vertebrates* [11], where he defended that the mental experience of organisms (including humans) is exhausted by the activity of their brains and that no mental experience could exist were it not mediated by brain activity. This set of assumptions makes Owen a clear advocate of a physicalistic conception of the Mind/Body Problem reminiscent of what we refer to today as the Brain State or Identity Theory of mind [12, 13, 14, 15; for some recent reappraisals of the theory and relevant sources: 16, 17, 18]. While venerable antecedents have been ascribed to this materialist tradition – Leucippus, Hobbes, La Mettrie, d'Holbach, Karl Vogt [17], Richard Owen seems never to have been included on this list.[1]

We want to clarify from the onset that this is not a historiographic contribution on the development of psychological and neuroscientific concepts in the 19th century [20]. Owen himself did not write the passages on which we will focus with any such intent. As we understand it, this is rather a contribution to the historiography of Richard Owen's ideas, stressing an aspect of his scientific ideology or philosophy hitherto unnoticed, as well as a contribution to the historical background of Brain State Theory. So this paper complements other recent efforts to tracing different contemporary views on the Mind/Body question back to 19th century antecedents, in the same way that connections have been previously established between Alexander Bain (1818-1903) and «psychophysical parallelism», Shadworth Holloway Hodson (1832-1912) and «epiphenomenalism», William Benjamin Carpenter (1813-1885) and «interactionism», and so on [21, 22].

The article is organized into two main sections. Section 2 is devoted to clarifying what to be a physicalist amounted to in Owen's time and how he personally fitted within that worldview. We particularly aim in this section at explaining why it was not an easy matter to decide whether one was or was not a 'materialist' in the 19th century, a nice illustration of which was Owen's wavering reflections about the word when declaring himself to be what we would not hesitate to call a materialist today. Section 3 documents Owen's identification of mental properties and brain states,

[1] To our knowledge, only two scholars have addressed the topic of Owen's ideas concerning the Mind/Body Problem. On the one hand, Phillip Sloan [19], based on purely circumstantial evidence, classifies Owen as a dualist; Rupke [2, 3], on the other hand, acknowledges Owen's materialism, but does not develop his ideas with detail.

thus adhering himself to a quintessential physicalist theory of mind [15]. In this section we first explain the context of Owen's brief statement about the question of mind, which was framed within a more general reflection concerning how other metaphysically challenging concepts related to states of matter; then we argue that considering his overall comparative project, Owen's physicalist convictions did not simply boil down to a refusal of dualism, but also to the belief that mental properties cannot exist but associated to brains. So we conjecture that he would be prompt to rebut current functionalist claims to the contrary, had he lived at the right time. This part of the paper may be seen as controversial, as we derive from different parts of Owen's works conclusions that he did not personally sustain, and we use such deductions to anachronically involve him in a debate that only started a century later. But we believe that we are justified in doing this: First, because we think that it is a relevant conclusion that the sum of Owen's homological program and his materialist ideas on mind equals a «proto-Brain State» theory of mind, no matter whether he was aware of the fact; second, because we think that this is a demonstration that Owen's ideas still matter, and can be a useful guide in so tough questions as current debates on the nature of mind. Some concluding remarks close the paper.

2. Materialism and Physicalism in Victorian Science

Most scientists and philosophers now use the words 'material' and 'physical' (and 'materialism' and 'physicalism') interchangeably [23]. Things were somehow different by the mid 19th century, after the physical sciences arrived at the conclusion that matter was not exactly like it was thought to be in the pre-Newtonian era [24]. A nice illustration of this critical juncture can be found in the words and works of Richard Owen, who refused to introduce himself as a materialist while unhesitantly embracing one of the most radically physicalist viewpoints on such a sensitive matter as the Mind/Body Problem at his time.

To some extent Owen's discomfort was purely terminological, due to the vagueness of the conceptual contrast 'material' vs. 'immaterial', actually not a very meaningful one as he explained at the end of Volume III of *On the anatomy of vertebrates* [11]. He specifically argued there that, in the many uses of the word, «immaterial» ranged from the idea of «not directly perceptible» to «poorly understood», in which case there existed nothing wrong with saying, misleadingly, that a certain force was «natural» and «immaterial» at the same time. So a different and more meaningful distinction for Owen was that between «natural» *vs.* «supernatural» forces, the latter to be completely excluded from acting in the normal course of events from the very beginning of the existence of life forms.

The fact that Owen always tried to make compatible his faith in science with his faith in God, as witnessed by the following quotation, probably added a further note of confusion to his views on the issue:

> [T]he idea of a forecasting, designing Power is not incompatible with the conception of the constitution of an organized species by the operation of forces and influences which are part of the ordained system of things; and if the nature of such operation be not comprehended, it, at least, may be a legitimate subject of an endeavour at comprehension. [10, p. 60]

But Owen always rejected to allow the appeal to divine action in scientifically tractable problems, even the most obscure ones, as it was the case of the evolution of species and the origin of life, which, in Owen's opinion, Darwin had explained away precisely resorting to a strategy of this kind:[1]

[the hypothesis of 'natural selection'] differs from Lamarck's in invoking a supernatural commencement of organisms which are held to have been 'descended from some one primordial form, into which life was first breathed. [10, p. 65][2]

Note how Owen in the first of these two quotations uses the word «force» to denote a natural phenomenon, possibly a poorly understood one, but not one out of the reach of scientific inquiry; see section 3.1 for an elaboration of this point.

The textual evidences of Owen's commitment to a radically naturalistic worldview are incontestable [11, pp. 821-825]. The following passage convincingly shows that this commitment extended to such a delicate arena as the nature of mind, while at the same time illustrates the reasons why he nevertheless felt some distrust of the materialist jargon:

I know of nothing outside myself of which I can have any clearer knowledge by calling it 'material,' than I have of that which originates force from within myself, by calling it an 'immaterial' entity, mental principle, or soul.

But, so it is; in the endeavour to clearly comprehend and explain the functions of the combination of forces called 'brain,' the physiologist is hindered and troubled by the views of the nature of those cerebral forces which the needs of dogmatic theology have imposed on mankind.

How long physiologists would have entertained the notion of 'life,' or 'vital principle,' as a distinct entity, if freed from this baneful influence, may be questioned; but it can be truly affirmed that physiology has now established, and does accept, the truth of that statement of Locke – 'the life, whether of a material or immaterial substance, is not the substance itself, but an affection of it'. [11, p. 823][3]

So in a nutshell, Owen's contention regarding this side of the question was that mental properties were but forces consisting in the activity (or affections) of brains,

[1] Owen was a firm believer in the spontaneous generation of unicellular organisms as the only rational explanation for the origin of life, hence the interest with which he followed the debate between Pasteur and Pouchet [25] on this matter and of which he offers a detailed account in *On the anatomy of vertebrates* [11, ch. XL, §428]. This was, however, just a small part of a grander scheme where the posterior action of natural forces would account for the origin of multicellularity and of complex organisms through what Owen called the «Derivative Law» – in essence an evolutionary interpretation of von Baer's laws [10, ch. 13, 11, ch. XL, § 426-427]. Owen's view was therefore a synthesis of Lorenz Oken's generative theory [26, 27, § 883ff; for a summary: 28, pp. 491ff] with von Baer's observations, plus the conviction that life could be the result of the action of natural forces, what he called «formifaction», similar to those which, like crystallization, are responsible to inform inorganic matter, *contra* Oken, who closed his *Die Zeugung* with the words: «Nullum Vivum ex Ovo! Omne Vivum e Vivo!».

[2] The quotation is from page 484 of the first edition of Darwin's *Origin* [29]. Somehow reaffirming Owen's point, the phrase «by the creator» was added in the second edition (1860) of the book. The whole paragraph was rewritten in the third edition (1861), where every signal of the original comment vanished. According to Ospovat [30], Darwin's was actually committed to some form of theism until as far as 1859.

[3] The quotation is from Locke's reply to the Bishop of Worcester [31, p. 478].

where «force» was to be literally understood in the sense of contemporary physical sciences. No gain seemed to obtain by calling them «material», as it happened to be the case with every other aspect of the physical realm, let alone by maintaining such obscure terms like «soul» or similarly connoted words.

Owen's was also in part the angst of most of his contemporaries, practicing what Feigl called «Victorian science» [13]. In Owen's days, hardly 200 years had passed since the publication of Newton's *Principia*, and the collapse of the Cartesian-Leibnizian mechanistic worldview in which everything was to be explained as the interaction of bodies was even closer [32, 33, 34]. Physics in the 19th century was reconstructing its notion of 'matter', immersed in controversies generated by Dalton's theory of rigid atoms and the incipient development of field theory by Faraday, whose experiments in electromagnetism pointed to a different conception of atom from Dalton's, closer to Boščović's model, which suggested that matter was much less solid than Dalton's model predicted. Thus, Faraday, in a brief note commenting on his experiments on conduction wrote:

> If we must assume at all, as indeed in a branch of knowledge like the present we can hardly help it, then the safest course appears to be to assume as little as possible, and in that respect the atoms of Boscovich appear to me to have a great advantage over the more usual notion. His atoms, if I understand aright, are mere centres of forces or powers, not particles of matter, in which the powers themselves reside. [35, p. 140]

Faraday's interpretation was indeed correct, as Boščović had defined matter thus:

> The primary elements of matter are in my opinion perfectly indivisible & non-extended points; they are so scattered in an immense vacuum that every two of them are separated from one another by a definite interval; this interval can indefinitely increased or diminished, but can never vanish altogether without compenetration of the points themselves; for I do not admit as possible any immediate contact between them. On the contrary I consider that it is a certainty that, if the distance between two points of matter should become absolutely nothing, then the very same indivisible point of space, according to the usual idea of it, must be occupied by both together, & we have true compenetration in every way. Therefore indeed I do not admit the idea of vacuum interspersed among matter, but I consider that matter is interspersed in vacuum & floats in it. [36, Part I, §7][1]

These points, Boščović later argues [36, Part I, § 9ff], would in fact be the centers of a series of attraction/repulsion forces obeying Newton's Inverse-square Law.

It seems therefore that the physical world was turning out to be much less material than traditionally assumed, the actual building blocks of matter were forces and not bodies; and Owen was well aware of that. In 1868 he refers to Faraday's paper cited above on the nature of matter and to another one on the lines of magnetic force [38] to support his physicalistic stance, which is not necessarily to be identified with a «materialist» one, given the connotations of the word «matter» at that time. Owen didn't know how the issue was to be resolved and resigned himself «to rest at a point beyond which Faraday did not see his way» [11, p. 822]; but

[1] Translated from Latin by J. M. Child for the London/Chicago 1922 bilingual edition [37].

he was not ready to abjure his physicalism, and vindicated the methods of science as the only reasonable (or should we say rational?) way of bringing some light to these issues.[1]

There is no exaggeration in Jacob's statement [40] that from this collapse resulted an image of the world in which immaterial and spiritual forces fitted comfortably [41]. In this context, it is not surprising the drift of some prominent evolutionary thinkers towards idealistic and even spiritualistic stances. Thomas Huxley, for example, embraced a monistic but non-materialist worldview [42].[2] More surprisingly perhaps, Alfred Wallace became a dualist, accepting the supernatural character of the superior mental capacities of man as fully compatible with his radical views on natural selection [44].[3]

Richard Owen remained among those whose confidence in science as the proper vehicle of reason in comprehending the world and in the unitary worldview favored by scientific practice was completely comparable and not less – perhaps even more – consistent than that of Charles Darwin.[4] He was a tough-minded naturalist convinced that only science would some day provide answers to the many questions nature posed; or, resorting to Feigl's distinction between the «physical$_1$» and the «physical$_2$» [13],[5] Owen remained pretty convinced that a «physical$_1$» answer to these questions was possible (and desirable), even though our picture of the «physical$_2$» was not yet clear. One could even read Owen as contending that the Mind/Body Problem is not a problem at all and that its persistence is a side effect

[1] Even in one of his most controversial and ambiguous texts [39], he maintained a strong position for the primacy of science over theology, as the following excerpt demonstrates: «Beware, therefore, of logically precise and definite theologies, accounting, from their point of view, for all things and cases natural and preternatural, claiming to be final and sufficient. 'Systems of Doctrine,' 'Schemes of Christianity,' 'Dogmatic Formularies,' are of human fabrication, the works of man's brain, of which he is as proud and jealous as of the works of his hands. They, forsooth, must not be meddled with; any ray of light exposing a hole or a bad joint in them must be shut out, – the light-bringer, perhaps, anathematized: they must be the exception to the common lot awaiting all mortal constructions! Beware, also, of theological terms ending in 'ist' and 'ism:' for the most part, they indicate a lack of Christian charity in the more ignorant of two insufficiently informed disputants, who, under a disability to meet an argument, explain away a fact, or reconcile opposite propositions, flings at his opponent some hard word so terminated». [39, p. 34]

[2] Smith actually portraits Huxley as a Cartesian, so radical as to proclaim the superiority of mind over matter and to conclude that the latter could not conceivably exist in the absence of the former [42, p. 112]. According to Huxley [43], «matter» and «force» were but names or certain forms of consciousness, in clear contrast with Owen's own interpretation of the word «force».

[3] Wallace justified his belief in such a spiritual realm on the basis of natural selection, as certain abilities, like the musical, linguistic or mathematical talents that he was capable of witnessing among the most primitive of people, could not be explained as adaptations to any practical need and thus could not be the result of natural evolution [45]. Those who, like Owen, were skeptical about the role of natural selection as the only force acting on the shaping of organic forms, were thus more willing to accept the naturalness of said abilities.

[4] Richards shows that in thinking about the mind/brain question, Darwin also found inspiration in the physical sciences' concept of «force». However, as Richards also explains, Darwin's notion of «mind» is obscured by the fact that he attributed mind-like properties to Nature itself [46].

[5] According to Feigl, physical$_2$ refers to «those concepts and laws which suffice in principle for the explanation of inorganic as well as biological phenomena», while physical$_1$ «is practically synonymous with 'scientific'» [13, p. 377].

of our poor understanding of the physical (i.e. «physical$_2$») world since the collapse of Cartesian physics.[1]

3. On the Nature of Mind: Owen as a Proto-Brain State Theorist

Textual evidence for the main thesis of this paper is nonetheless to be found in the closing pages of the general conclusions, chapter XL, of volume III, Mammals, of *On the anatomy of vertebrates* [11], perhaps too hidden in the depths of this dense treatise to be easily located. In these pages Owen explicitly rejects the hypothesis «that an abstract entity produces psychological phenomena by playing upon the brain as a musician upon his instrument, producing bad music when the fibers or cords are of out of tune»,[2] and he endorses instead the belief of «these phenomena […] to be the result of cerebral actions» [11, p. 821]. He also claims there that:

> Thought relates to the 'brain' of man as does electricity to the nervous 'battery' of the torpedo: Both are forms of force, and the results of action of their respective organs. [11, p. 820]

From these excerpts some preliminary conclusions can be drawn: Firstly, Owen's rejection of dualism, even extending it to what Daniel Dennett referred to as the «Cartesian theater» [56], as he clearly contended that «thought» and other «psychological phenomena» were due to the actions of their respective organs, instead of a privileged «entity» (abstract or physical) somehow governing these actions; secondly, his conviction that psychological phenomena, including thought, were not more mysterious than other functions of nervous systems (or other organic systems, for that matter); and thirdly, his belief that models to advance in the understanding of these phenomena were to be found in the emergent worldview brought about by modern physics, of which the study of electricity offered a suitable paradigm. This set of assumptions is far from making Owen a Brain State theorist, but it makes clear that for him a science of mind could be envisaged thoroughly framed within what we call today «biological naturalism» [54], an obvious necessary condition for deserving the former adscription. An argument can be unraveled that leads to the conclusion that Owen's ideas also fulfill a sufficient condition for him to be dubbed (at least) a «proto-Brain State» theorist. The next subsection contains some important premises for the completion of the argument in the following one.

3.1. *The Rebuttal of Dualism*

Owen's basic premise in order to turn the Mind/Body Problem into a tractable question was to think about psychological phenomena in terms parallel to those of

[1] In this sense, Owen could be seen as a precursor of a rather minority position in contemporary philosophy of mind, held by a single person: Noam Chomsky. Chomsky's attitudes towards these issues are often hard to pin down, as they are scattered, often in occasional and ancillary comments, within his many works [47, 48, 49, 50, 51, 52]. Indeed, we believe that Chomsky may arguably be characterized as a crypto-Brain State theorist. To be fair, perhaps also Richard Rorty and John Searle would fit into this category, although each of them for slightly different reasons [53, 54].

[2] Richard Saumarez (1764-1835) is a possible source of this image [55].

the new physics when talking about magnetism, electricity or light as «forces» or «powers» compounding «lines» or «fields» that connected fragments of matter («mere centres of forces or powers»), ranging from atoms to bodies. According to such a view, reality ultimately lay in the lines themselves, in which forces and their centers are inextricably linked. Speaking in terms identical to these about the Mind/Body question, Owen thus invited his cultivated audience to think about «thought» and other «psychological phenomena» as «forces» inextricably compounding «lines» with nervous systems (or specific organs thereof) as their «centers», using the expression «cerebral forces» in a way that it could be freely interchangeable with that of «mental centers», maybe for different expository purposes. No ontological divide or causal distinction emerged as a consequence. Thought was to be identified with the actions and affections (internal activity or external perturbations) of brains, in a way no more mysterious than that leading from the corresponding perturbations to electromagnetic induction, light transmission, and so on. Altered states of mind both under endogenous or exogenous influences were for Owen the best of proof of the adequacy of extending the Faradian model to the study of mind:

> Sleep, stimulants, drugs, disease, concur by their effects in testifying that the kinds and degrees of mental manifestations are the results of corresponding affections and changes of structure of the brain. [11, p. 824]

It seems reasonable to conjecture that Owen's willingness to accept this view was favored by the fact that such paradigmatic force as electricity could have centers located in nervous organs in some species, as in the case of the «nervous battery» of torpedo or electric rays (*Torpediniformes*, an order of cartilaginous fishes) that he knew well from his own anatomical investigations [57, §68], paving the way to the idea that forces other than electricity could have neighboring locations and thus to the speculation that thought and other psychological phenomena could be given identical scientific treatment.[1] Be it as may, by 1868 Owen seemed to have concluded that «mind» was not a problematic category to any further extent than those referring to other physical forces whose connections with the corresponding centers were still unclear to scientists (save for the influence of «dogmatic theology», of which these scientists had not to worry about). As a matter of fact, Owen's musings on the nature of mind were framed within a more general reflection on the «life» concept, which he also conceived of as another particular kind of «force», i.e., the dynamic quality of certain states of organized matter, thus belonging to a level of analysis not different from that of the gravitational force, the magnetic force, the mental force, and so on [11, 820ff].[2]

[1] The importance of electrophysiology among the topics of 19th century neurophysiology is a well-known fact [58].

[2] As previously noted [fn1, p. 134], this was a critical question to Owen, who rejected the idea that 'life' was introduced as a special act of creation and somehow superadded to the natural composition of organic beings («thaumatogeny», in his own words), a position to which, in his opinion, Natural Selection irremediably led. Concerning this question, he claimed that an intermediate condition between the inorganic and the organic existed, in which particular physical and chemical interactions bring about or-

Space reasons prevent us from providing a detailed historiographic account of Owen's sources and influences on life and mind, but they, like other important aspects of his thought, have their roots in Germany, specifically in what Timothy Lenoir [59] has termed «vital materialism» and «teleomechanism», a research program including such leading figures as Johann Friedrich Blumenbach and Johannes Müller. Owen came into contact with their ideas both directly and indirectly, through, in the latter case, the work of other British German-influenced physicians and physiologists like William Lawrence (1783-1867), himself the first translator of Blumenbach into English and one of Owen's predecessors as a Hunterian lecturer. Owen's first-hand knowledge of Müller's work is incontestable, as he relied heavily on Müller's *Handbuch der Physiologie* to prepare the first round of Hunterian lectures he delivered in 1837 [60]. As for Blumenbach, it is quite likely that Owen's first notice of him came from John Barclay, his professor at Edinburgh, whose *Inquiry* [61], which Owen knew well [19], contained a direct attack against Blumenbach's and Lawrence's materialist stances. Moreover, as pointed out by Rupke [2, 3], Owen's ideas on life and matter in [11] have a striking similarity with those presented by Lawrence some forty years earlier in [62], a book Lawrence dedicated to Blumenbach.

In a way, then, Owen's enterprise runs parallel to that of Joseph Priestley, for example, who also found in the ruins of the Cartesian notion of matter the opportunity of integrating «thought» or «sensation» within a renewed view of the physical almost a century before:

> If I be asked how, upon this hypothesis, *matter* differs from *spirit*, if there be nothing in matter that is properly solid or impenetrable; I answer, that it no way concerns me, or true philosophy, to maintain that there is any such difference between them as has hitherto been supposed. […] Since the only reason why the principle of thought, or sensation, has been imagined to be incompatible with matter, goes upon the supposition of impenetrability being the essential property of it, and consequently that *solid extent* is the foundation of all properties that it can possibly sustain, the whole argument for an immaterial thinking principle in man, on this new supposition, falls to the ground; matter, destitute of what has hitherto been called *solidity*, being no more incompatible with sensation and thought, than that substance, which, without knowing any thing farther about it, we have been used to call *immaterial*. [63, pp. 16-18]

Theirs were however rather different projects, as Priestley seems to have been mostly interested in demonstrating that such a view was not in conflict with the truth revealed in the Scriptures while Owen, even if also sympathetic with such an aim [39, 64], clearly oriented his efforts to argue that it put the mind under the reach of scientific practice. Actually, it was to this purpose that he directed his research on the higher cognitive powers of man, a question that deserves to be clarified, because Owen's tenets were the target of an adulteration campaign by Huxley and other

ganic aggregates by means of a process («formifaction») not different from that which originates «crystalline aggregation[s] of mineral matter in solution» [11, p. 816]. The 'living' condition of such aggregates did not ask for miraculous or special intervention of any kind. Recognition of Owen's position within 19th British immanentist thought [55] is still lacking.

contemporary Darwinians [2, 3, 65, 66] that continues to impregnate Owen's image nowadays. Owen's main interest in this respect was to show that the exceptional mental capacities of the human species must exist in association with a correspondingly exceptional brain organization, so he directed his efforts at pinpointing the most peculiar features of the human brain (the forward and backward projections of cerebral hemispheres, the posterior horn of the lateral ventricle and the hippocampus minor, and the exceptional number and depth of the convolutions) as the putative centers of these capacities. In his own words: «Peculiar mental powers are associated with this highest form of brain» [64, p. 26]. So he clearly directed his research in this area in fulfillment of his overall comparative program, as for him this was a scientifically tractable question, alien to religious or metaphysical considerations. The obvious failure of his neuroanatomical observations does not refute in any sense that his guiding principle clearly derived from his unwavering biological naturalism.

3.2. *Beyond the Rebuttal of Dualism*

Owen's lifetime comparative project that entered the scene in the previous paragraph is a frame within which his views concerning the mental cannot be simply read as a rebuttal of dualism, as is maybe in the case of Priestley's, but as a positive proposal that points to a specific position within the space of possibilities of biological naturalism. It is our main contention in this paper that this position is closer, if not fully coincident, to that of current Brain State or Identity theory of mind, our reservations having only to do with the fact that Owen did not elaborate his stance with sufficient detail himself. Our argument is thus a reconstruction of what we think to be Owen's proto-Brain State theory, based on putting the ideas reviewed in the previous paragraphs under the perspective of some of the principles of his comparative method.

To put it in the words of Owen and his contemporaries, the Brain State Theory of mind contends that mental powers of any kind are identical, in the strongest possible sense, to the states of the corresponding nervous organs, a stance that logically follows from the conjecture that they are but the same lines or fields seen under the alternative perspectives of «force» or «center».[1] So one cannot tell them apart when the discovery is made that a certain mental property correlates with the activity of a certain brain site. As a consequence, two corollaries follow from this position: (1) The impossibility of disembodied (or loosely embodied) mental powers, and (2) the impossibility of mental powers embodied in stuff other than their natural centers.

As for the first corollary, Owen's statement on the absurdity of the image of «an abstract entity» that «produces psychological phenomena by playing upon the brain as a musician» convincingly speaks of how far away he was from any form of dual-

[1] A form of «dual-aspect monism» was proposed by George Henry Leaves (1817-1878), whose main contention was that the «physical» and the «mental» were but different perspectives from which a single kind of stuff could be apprehended. «Neutrality» regarding the stuff in question makes Leaves' position different from bona fide physicalism [21].

ism. It is our claim that the adherence to something akin to current Brain State Theory represented to him a safe harbor for preventing any such unscientific slip. In this regard, Owen seems to us to have been in a better position for fighting against the «ghost in the machine» than many contemporary cognitive scientists and philosophers of mind who, under purportedly empirically guided stances, continue to coexist with its shadows. To put just a face to this criticism, we invite readers to think about the still influential Functional State hypothesis of Hilary Putman, which contends that abstract descriptions suffice to capture the nature of mental states. As a consequence, they may be multiply realizable in different kinds of stuff, from carbon-based brains to silicon-based computers, but also in «a system consisting in a body and a soul», as the Functional State hypothesis, in Putnam's own words, «is *not* incompatible with dualism!» [67, p. 436].

As for the second corollary, rebutting multiple realizabity arguments [68] seems not to have been among Owen's worries at his time. Curiously enough, the conceptual framework that he adopted and developed in order to carry out his comparative project contained the argumentative pieces that he could have needed to answer his critics, should he have had such worries. Multiple realizability arguments come in two main different flavors. The first appeals to the machine perspective and contends that, contrary to the Brain State hypothesis, machines can be organized according to descriptions that make them artificial counterparts, and not just replicas, of natural minds. According to this point of view, which is basically that of Putnam's Functional State hypothesis [69, 70], to be a mind thus amounts to be describable as implicitly containing a certain pattern of organization, which can readily be shared with artificial devices.

Owen was aware that functional adscription was entirely in the eye of the beholder, so we conjecture that he would be prompt to answer that multiple realizabity arguments support a scientifically useless concept of mind. We derive this conclusion from Owen's meticulous differentiation between «homology» and «analogy» [71, 72, 73], the latter concept comprising organs serving to similar purposes irrespective of their belonging to the same natural kind. The opening pages of *On the nature of limbs* [73, pp. 9-10] demonstrate that he thought that including a particular organ in a class of analogues depended only upon the ingenuity of the observer and that the corresponding categories were completely artifactual. One, for example, could either say that the mole «scraps and throws back the soil» or that it «swims through the earth», as Owen himself wrote [73, p. 7], and correspondingly its forelimbs could belong to different functional classes. No explanatory advantage obtains from one or another *façon de parler*, which are just reflexes of the observer's familiarity with similar enterprises.[1] He also explained in these pages that analogical classes could be extended as to comprise artificial devices. For example, nothing in the analogy concept prevented it from being applied to both the forelimbs of a mole and a domestic shovel, but Owen saw this as a proof that natural philosophers were not indebted to grant these classes any certificate of naturalization. The moral

[1] This line of reasoning has more recently been developed by Kalke [74] and Searle [55, pp. 237-240].

was clear: Analogical classes were for him completely irrelevant to the task of scientific explanation.

Owen's use of electricity as a simile of the association between thought and the brain of man may look somehow misleading in this context. But it is in no way a defining feature of Brain State Theory that organic and inorganic stuffs cannot share properties, say, electricity; quite the opposite: To the extent that they share the relevant physico-chemical conditions, they cannot but share germane properties [75]. Electricity is not typically seen as a mental property because its association with inorganic stuff and artificial devices is, from the start, fully compatible with everyone's expectations [76, pp. 461-462]. In the identity debate, the key is whether properties said to be «mental», because brains are seen as their natural seat (pain, thought, and so on), can also exist in association with very different kinds of physical stuff, in which case Brain State Theory would be irremediably false. So Owen's simile was a good reference point for the debate, in the way that electricity as associated with lightning has served as a recurrent simile to many modern identity theorists [12, pp. 45, 14, p. 145, and so on].

An alternative version of the argument from multiple realizability is not so dependant on the machine perspective. It is the case, for example, of Fodor's psychofunctionalism [77, 78], which underscores the fact that the same mental states may be multiply realized in different brain locations at different times and in non-identical brains in different persons or organisms, to conclude that mental categories belong to a special science devoted to the study of abstract representations instead of brain states. This variety of functionalism presupposes that there exists not a viable theory of «type identity» framed on bare biological grounds. Curiously enough, one of the main conclusions of Owen's comparative project was that the contrary is true and that natural kinds, or 'homologues', exist that can be settled on strictly biological, ultimately developmental,[1] criteria. This means that the underlying identity of different brain components in different organisms, individuals or moments («under every variety of form», as Owen would word it) can be established on pure biological grounds, without any appeal to abstract representations seen as special in relation to their putative anatomical or physiological basis.

We conclude that there exist enough reasons to claim that, to say the least, Owen was a proto-Brain State theorist, a conclusion that we think inescapable once his physicalist convictions regarding the idea of mind are put in contact with his overall comparative project.

4. Conclusion

For too long, Richard Owen was the incarnation of idealism and immobilism in Darwin's days. A new historiographic wave has recently started to correct such an image, documenting both that Owen did not personally embrace these stances [2, 3] and that biology was not so endemically platonic and conservative at that time

[1] Current, and rather consensual, «biological concept of homology» [79] actually boils down to this. Balari and Lorenzo argue that such a concept is prefigured in Owen's writings [8].

after all [6]. Our aim in this paper has been to contribute to this enterprise, adding a detail that clearly contradicts the image of Owen constructed by the Darwinian historiography in the mid 20th century: Namely, his radical physicalism concerning so tough an issue as the Mind/Body question. It has been our contention that his ideas prefigure the theses of the Brain State or Identity Theory of mind. This means that his naturalism regarding this issue was even some steps ahead of many current philosophers of mind and cognitive scientists, whose theories still coexist with softened versions of dualism.

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References

1. Minelli A, Schram FR. Owen revisited: a reappraisal of morphology in evolutionary biology. Bijdragen tot de Dierkunde. 1994; 64: 65-74.
2. Rupke NA. Richard Owen: Victorian naturalist. New Haven, CT: Yale University Press; 1994.
3. Rupke NA. Richard Owen. Biology without Darwin, a revised edition. Chicago: The University of Chicago Press; 2009.
4. Minelli A. Some thoughts on homology 150 years after Owen's definition. Systematic biology as an historical science. Memorie della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano. 1996; XXVII (I): 71-79.
5. Camardi G. Richard Owen, morphology and evolution. Journal of the History of Biology. 2001; 34: 481-515.
6. Amundson R. The changing role of the embryo in evolutionary thought. Roots of Evo-Devo. Cambridge: Cambridge University Press; 2005.
7. Amundson R. Richard Owen and animal form. In: Owen R. On the nature of limbs. A discourse (Amundson R, editor). Chicago: The University of Chicago Press; 2007. pp. xv-li.
8. Balari S, Lorenzo G. Apología del villano. Richard Owen y el origen de Evo Devo. In: Owen R. Discurso sobre la naturaleza de las extremidades (Balari S, Lorenzo G, editors). Oviedo: KRK; 2012. pp. 11-66.
9. Owen R. Darwin on the Origin of species. Edinburgh Review. 1860; 3: 487-532.
10. Owen R. Monograph on the aye-aye. London: Taylor and Francis; 1863.
11. Owen R. On the anatomy of vertebrates. III. Mammals. London: Longmans, Green, and Co; 1868.
12. Place UT. Is consciousness a brain process? British Journal of Psychology. 1956; 47: 44-50.
13. Feigl H. The "mental" and the "physical". In: Feigl H, Scriven M, Maxwell G, editors. Concepts, theories and the mind-body problem. Minnesota Studies in the Philosophy of Science. Volume 2. Minneapolis: University of Minnesota Press; 1958. pp. 370-497.
14. Smart JJC. Sensations and brain processes. Philosophical Review. 1959; 68: 141-156.
15. Armstrong DM. A materialist theory of mind. London: Routledge & Kegan Paul; 1968.

16. Polger TW. Natural minds. Cambridge, MA: The MIT Press; 2004.
17. Smart JJC. The mind/brain identity theory. In: Zalta EN, editor. The Stanford Encyclopedia of Philosophy. Fall 2011 ed. http://plato.stanford.edu/archives/fall2011/entries/mind-identity/; 2012. (Accessed 16 December 2012)
18. Gozzano S, Hill CS, editors. New perspectives on type identity. The mental and the physical. Cambridge: Cambridge University Press; 2012.
19. Sloan PR. On the edge of evolution. In: Owen R. The Hunterian lectures in comparative anatomy. May and June 1837 (Sloan PR, editor). London: Natural History Museum Publications; 1992. pp. 3-72.
20. Clarke E, Jacyna LS. Nineteenth-century origins of neuroscientific concepts. Berkeley and Los Angeles: University of California Press; 1987.
21. Wozniak RH. Mind and body. From Descartes to William James. Bethesda, MD and Washington, DC: National Library of Medicine and the American Psychological Association; 1992.
22. Heidelberger M. The mind-body problem in the origin of logical empiricism. In: Parrini P, Salmon WC, Salmon MH, editors. Logical empiricism: Historical and contemporary perspectives. Pittsburgh, PA: University of Pittsburgh Press; 2003. pp. 233-262.
23. Moser PK, Trout JD. General introduction: Contemporary materialism. In: Moser PK, Trout JD, editors. Contemporary materialism. A reader. London: Routledge; 1995. pp. 1-33.
24. Chomsky N. Language and nature. Mind. 1995; 104: 1-61.
25. Roll-Hansen N. Experimental method and spontaneous generation: The controversy between Pasteur and Pouchet, 1859-64. Journal of the History of Medicine. 1979; 34: 273-292.
26. Oken L. Die Zeugung. Bamberg: Joseph Anton Goebhardt; 1805.
27. Oken L. Lehrbuch der Naturphilosophie. 3rd edition. Zürich: Friedrich Schulteß; 1843.
28. Richards RJ. The Romantic conception of life. Science and philosophy in the age of Goethe. Chicago: The University of Chicago Press; 2002.
29. Darwin C. On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. London: John Murray; 1859.
30. Ospovat D. God and Natural Selection: The Darwinian idea of design. Journal of the History of Biology. 1980; 13: 169-194.
31. Locke J. The works of John Locke in nine volumes. 12th edition. Volume 3. Letters to Bishop of Worcester. London: Rivington; 1824.
32. Garber D. Descartes' physics. In: Cottingham J, editor. The Cambridge companion to Descartes. Cambridge: Cambridge University Press; 1992. pp. 286-334.
33. Garber D. Leibniz: physics and philosophy. In: Jolley N, editor. The Cambridge companion to Leibniz. Cambridge: Cambridge University Press; 1995. pp. 270-352.
34. Bennett J. Learning from six philosophers. Volume 1: Descartes, Spinoza, Leibniz. Oxford: Oxford University Press; 2001.
35. Faraday M. A speculation touching electric conduction and the nature of matter. The London, Edinburgh, and Dublin Philosophical Magazine. 1844; XXIV: 136-144.
36. Boščović RJ. Theoria philosophiae naturalis redacta ad unica legem virium in natura existentium. Venice: Typographia Remondiniana; 1763.
37. Boščović RJ. A theory of natural philosophy. London and Chicago: Open Court Publishing Company; 1922.
38. Faraday M. Experimental researches in electricity. Twenty-eighth series. On lines of magnetic force; their definite character; and their distribution within a magnet and

through space. Philosophical Transactions of the Royal Society of London. 1852; 142: 25-56.
39. Owen R. On some instances of the power of God as manifested in His animal creation. In: Lectures delivered before the Young Men's Christian Association, in Exeter Hall, from November, 1863, to February, 1864. London: James Nisbet and Co; 1864. pp. 1-35.
40. Jacob M. The cultural meaning of the scientific revolution. Philadelphia: Temple University Press; 1988.
41. Oppenheim J. The other world. Spiritualism and psychical research in England, 1850-1914. Cambridge: Cambridge University Press; 1985.
42. Smith CUM. Owen and Huxley: Unfinished business. Endeavour. 1998; 22: 110-113.
43. Huxley TH. On Descartes' "Discourse touching on the method of using one's reason rightly and of seeking scientific truth". The Eclectic. 1870; 2: 21-28.
44. Shermer M. In Darwin's shadow. The life and science of Alfred Russel Wallace. A biographical study on the psychology of history. Oxford: Oxford University Press; 2002.
45. Wallace AR. The limits of natural selection as applied to man. Contributions to the Theory of Natural Selection. 1870; April: 332-371.
46. Richards RJ. Darwin's metaphysics of mind. In: Hösle V, Illies C, editors. Darwinism and philosophy. Notre Dame, IN: University of Notre Dame Press; 2005. pp. 166-180.
47. Chomsky N. Rules and representations. New York: Columbia University Press; 1980.
48. Chomsky N. Language and problems of knowlegde. The Managua lectures. Cambridge, MA: The MIT Press; 1988.
49. Chomsky N. Naturalism and dualism in the study of language and mind. In: New horizons in the study of language and mind. Cambridge: Cambridge University Press; 2000. pp. 75-105.
50. Chomsky N. Reply to Lycan. In: Antony LM, Hornstein N, editors. Chomsky and his critics. Malden, MA: Blackwell; 2003. pp. 255-263.
51. McGilvray J. Chomsky. Language, mind, and politics. Cambridge: Polity Press; 1999.
52. Lycan WG. Chomsky on the mind-body problem. In: Antony LM, Hornstein H, editors. Chomsky and his critics. Malden, MA: Blackwell; 2003. pp. 11-28.
53. Rorty R. Philosophy and the mirror of nature. Princeton, NJ: Princeton University Press; 1979.
54. Searle JR. The rediscovery of the mind. Cambridge, MA: The MIT Press; 1992.
55. Jacyna LS. Immanence and transcendence: Theories of life and organization in Britain, 1790-1835. Isis. 1983; 74: 310-329.
56. Dennett DC. Consciousness explained. Boston: Little, Brown & Co; 1991.
57. Owen R. On the anatomy of vertebrates. I. Fishes and reptiles. London: Longmans, Green, and Co; 1866.
58. Brazier MAB. A history of neurophysiology in the nineteenth century. New York: Raven Press; 1987.
59. Lenoir T. The strategy of life. Teleology and mechanics in nineteenth-century German biology. 2nd edition. Chicago: The University of Chicago Press; 1989.
60. Owen R. The Hunterian lectures in comparative anatomy. May and June 1837 (Sloan PR, editor). London: Natural History Museum Publications; 1992.
61. Barclay J. An inquiry into the opinions, ancient and modern, concerning life and organization. Edinburgh: Bell & Bradfute and Waugh & Innes; 1822.
62. Lawrence W. Lectures on physiology, zoology, and the natural history of man, delivered at the Royal College of Surgeons. 3rd edition. London: James Smith; 1823.
63. Priestley J. Disquisitions relating matter to spirit. London: J. Johnson; 1777.

64. Owen R. On the classification and geographical distribution of the mammalia. London: John W. Parker and Son; 1859.
65. Gross CG. Hippocampus minor and man's place in nature: A case study in the social construction of neuroanatomy. Hippocampus. 1993; 3: 403-416.
66. Cosans CE. Owen's ape and Darwin's bulldog. Beyond Darwinism and Creationism. Bloomington, IN: Indiana University Press; 2009.
67. Putnam H. Psychological predicates. In: W. Capitan W, Merril D, editors. Art, mind, and religion. Pittsburgh, PA: University of Pittsburgh Press; 1967. pp. 37-48 (reprinted as Putnam H. The nature of mental states. In: Mind, language and reality. Philosophical papers. Volume 2. Cambridge: Cambridge University Press; 1975. pp. 429-440).
68. Bickle J. Multiple realizability. In: Zalta EN, editor. The Stanford Encyclopedia of Philosophy. First published Nov 23; 1998. Substantive revision Jul 27; 2006. http://plato.stanford.edu/entries/multiple-realizability/. (Accessed 19 December 2012).
69. Putnam H. Minds and machines. In: Hook S, editor. Dimensions of mind: A symposium. New York: New York University Press; 1960. pp. 138-164 (reprinted in Putnam H. Mind, language and reality. Philosophical papers. Volume 2. Cambridge: Cambridge University Press; 1975. pp. 362-385).
70. Putnam H. Robots: Machines or artificially created life? The Journal of Philosophy. 1964; 61: 668-691.
71. Owen R. Lectures on the comparative anatomy and physiology of the invertebrate animals. London: Longman, Brown, Green and Longmans; 1843.
72. Owen R. On the archetype and homologies of the vertebrate skeleton. London: John van Voorst; 1848.
73. Owen R. On the nature of limbs. A discourse. London: John van Voorst; 1849.
74. Kalke W. What is wrong with Fodor and Putnam's functionalism. Noûs. 1969; 3: 83-93.
75. Adams FR. Properties, functionalism, and the identity theory. Eidos. 1979; 1: 153-179.
76. Keely BL. Shocking lessons from the electric fish: The theory and practice of multiple realization. Noûs. 2000; 3: 83-93.
77. Fodor JA. Special Sciences: Or the disunity of science as a working hypothesis. Synthese. 1974; 28: 97-115.
78. Fodor JA. The language of thought. Cambridge, MA: Harvard University Press; 1975.
79. Wagner GP. The biological homology concept. Annual Review of Ecology and Systematics. 1989; 20: 51-69.

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