

WHITEHEAD, IDEALISM, AND RELATIVITY

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Abstract. 1922 is an important year in the context of a conference on Whitehead and idealism. It is the year that Whitehead published his book on relativity, *The Principle of Relativity*, in which, on philosophical grounds, he outlined an alternative to Einstein's general theory of relativity. But more importantly in this context: 1922 is also the year that Whitehead delivered the following two lectures at the Aristotelian Society: "The Idealistic Interpretation of Einstein's Theory" on February 20th, and "The Philosophical Aspects of the Principle of Relativity" on July 16th. Chairing the Society's meeting on February 20th was Whitehead's friend and idealist philosopher Lord Haldane, and on July 16th, his friend and idealist philosopher Wildon Carr. Lord Haldane was a neo-Hegelian idealist influenced (among others) by Hermann Lotze. Carr's philosophy was an idealist monadology, influenced (among others) by Henri Bergson. Haldane and Carr both promoted bringing together modern science and metaphysics. They firmly believed that Einstein's theories of relativity in physics confirmed their theories of idealism in philosophy. Whitehead disagreed. In his 1922 lectures, he showed that whereas relativity advances the claim of the relatedness of all events, it does not imply the idealist claim of his friends. Whitehead rejected the view of Haldane and Carr that Einstein had done something decisive to advance idealism, and the aim of this paper is to elaborate, first, on Whitehead's philosophical stance with respect to idealism, secondly, on Carr's idealistic stance with respect to the principle of relativity, and last but not least, on Whitehead's rejection of Carr's view.

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§1 WHITEHEAD'S PROCESS PHILOSOPHY AND IDEALISM

There are various forms of idealism, but they all have in common that everything that exists is in some way mental. In *Idealism: A Critical Survey*, A.C. Ewing asks what idealist philosophers have in common, and his answer starts as follows: "They have in common the view that there can be no physical objects existing apart from some experience, and this might perhaps be taken as the definition of idealism" (Ewing, 1934: 3). If this were Ewing's complete answer,

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then Whitehead would certainly qualify as an idealist. Indeed, according to Whitehead, the whole of reality is constituted by occasions of experience, and he wrote: “apart from the experiences of subjects there is nothing, nothing, bare nothingness” (*PR*, 167).

But then why did Whitehead oppose idealism? In *SMW*, he writes: “I am speaking of the philosophic idealism which finds the ultimate meaning of reality in *mentality that is fully cognitive*” (*SMW* 63 – my emphasis). In other words, according to Whitehead, one can only speak of idealism if the experience that is given ontological priority is identified with full cognitive mentality, whereas in his philosophy of organism – also called process philosophy – occasions of experience are occasions of “*prehension*”, and a prehension may or may not be a “*cognitive apprehension*”, but in general is an “*uncognitive apprehension*” (*SMW*, 69). This is in line with Ewing’s more complete answer to the question what idealist philosophers have in common: “They have in common the view that there can be no physical objects existing apart from some experience, and this might perhaps be taken as the definition of idealism, *provided that we regard thinking as part of experience*” (Ewing, 1934: 3 – my emphasis).

So, as one of his students attending Whitehead’s Harvard lecture on January 8, 1925, noted down: if “prehension” necessarily involved “cognition,” Whitehead would be some sort of idealist (*HLL*, 162) – but it does not, and he is not. On April 16, 1925, the same Harvard student – Winthrop Bell – jotted down that, according to Whitehead, to be an idealist is to find cognition in the nature of everything (*HLL*, 338).

Consequently, whereas Whitehead, in *SMW*, goes along with Berkeley’s critique of scientific materialism (with Berkeley’s “immaterialism”), he rejects the issuing idealism. For Berkeley, to be is to be perceived, but according to Whitehead, “the word *perceive* is ... shot through and through with the notion of cognitive apprehension” (*SMW*, 69). For Berkeley, “mind is the only absolute reality, and the unity of nature is the unity of ideas in the mind of God” (*SMW*, 68), but Whitehead writes: “For Berkeley’s mind, I substitute a process of prehensive unification” (*SMW*, 69).

Whitehead’s critique of Kant is another example of Whitehead’s stance with respect to idealism. In *PR*, Whitehead writes: “We have now come to Kant, the great philosopher who first, fully, and explicitly, introduced into philosophy the conception of an act of experience as a constructive functioning” (*PR*, 156). However, according to Whitehead, Kant was led “to balance the world upon thought – oblivious to the scanty supply of thinking” (*PR*, 151). For Kant, “*process* is mainly a process of thought” (*PR*, 152), “primarily a process of understanding,” but for Whitehead, “this is not the primary description of it; the process is a process of *feeling*,” of prehension, and “understanding is a special form of feeling” (*PR*, 153). In a footnote, Whitehead adds “that where Kemp Smith, expounding Kant, writes *thinking*, the philosophy of organism substitutes *experiencing*”

(*PR*, 215). Whitehead “aspires to construct a critique of pure feeling, in the philosophical position in which Kant put his *Critique of Pure Reason*” (*PR*, 113).

Whitehead notes that “Kant introduces the Leibnizian notion of the self-development of the experiencing subject” (*AI*, 224), and he is well aware that his process philosophy is a kind of Leibnizian monadology too. In fact, Whitehead writes that “the monads of Leibniz constitute ... an atomic doctrine of the universe” (*AI*, 131), and that his own occasions of experience also constitute “an atomic theory of actuality,” one of the many “monadic cosmologies” (*PR*, 27). On Leibniz, Whitehead adds:

He employed the terms “perception” and “apperception” for the lower and higher ways in which one monad can take account of another, namely for ways of awareness. But these terms are too closely allied to the notion of consciousness which in my doctrine is not a necessary accompaniment. Also they are all entangled in the notion of representative perception which I reject. But there is the term “apprehension” with the meaning of “thorough understanding”. Accordingly, on the Leibnizian model, I use the term “prehension” for the general way in which the occasion of experience can include, as part of its own essence, any other entity, whether another occasion of experience or an entity of another type. This term is devoid of suggestion either of consciousness or representative perception. Feelings are the positive type of prehensions. (*AI*, 233–234)

Whitehead calls his own philosophy “a theory of monads,” and holds: “Each monadic creature is a mode in the process of *feeling* the world, of housing the world in one unit of complex feeling” (*PR*, 80). But again, Whitehead’s prehensions or feelings are not necessarily cognitive apprehensions. Also, prehensions are actual inclusions of other entities in the essence of an occasion of experience, whereas Leibniz’s apprehensions are divinely pre-established modes for monads of taking other monads into account. Hence, Whitehead speaks of “Leibniz’s windowless monads with their pre-established harmony” (*PR*, 48).

Whitehead’s monadic philosophy was inspired by the idealist monadologies of James Ward and Wildon Carr. Ward and Carr were personal friends of Whitehead, and in the Preface to *PNK*, Whitehead writes that he has “heavy obligations” to acknowledge to Ward and Carr (*PNK*, viii). In fact, in his 2009 book, *Leibniz, Whitehead and the Metaphysics of Causation*, Pierfrancesco Basile has convincingly argued Ward’s influence on Whitehead, and in the second section of this article, more will be said about Carr.

The idealist monadologies of Ward and Carr are examples of pluralistic and subjective idealism, but Whitehead was also inspired by versions of monistic and absolute idealism. Francis Herbert Bradley’s idealism is an example. At a symposium in honor of Whitehead’s seventieth birthday, Whitehead said: “I admit a very close affiliation with Bradley, except that I differ from Bradley where Bradley agrees

with almost all the philosophers of his school” (*ESP*, 116). In *PR*’s Preface this reads: “though throughout the main body of the work, I am in sharp disagreement with Bradley, the final outcome is after all not so greatly different,” and, more particularly: Bradley’s “insistence on *feeling* is very consonant with my own conclusions” (*PR*, xiii). Again, in *AI*, Whitehead writes:

Bradley uses the term Feeling to express the primary activity at the basis of experience. It is experience itself in its origin ... There are of course grave differences between my own doctrine and that of Bradley. This was a reason for expounding my point of view in some independence of Bradley, with due acknowledgement. (*AI*, 231)

To go short, the main divergence between most idealist philosophies and Whitehead’s process philosophy arises when idealist philosophers give ontological priority to cognitive apprehension instead of non-cognitive apprehension, which Whitehead calls prehension or feeling. But there is another reason why Whitehead dislikes idealism, and especially absolute idealism:

This idealistic school, as hitherto developed, has been too much divorced from the scientific outlook. It has swallowed the scientific scheme in its entirety as being the only rendering of the facts of nature, and has then explained it as being an idea in the ultimate mentality. In the case of absolute idealism, the world of nature is just one of the ideas, somehow differentiating the unity of the Absolute; in the case of pluralistic idealism involving monadic mentalities, this world is the greatest common measure of the various ideas which differentiate the various mental unities of the various monads. But, however you take it, these idealistic schools have conspicuously failed to connect, in any organic fashion, the fact of nature with their idealistic philosophies. (*SMW*, 63–64)

In *PR*, Whitehead rephrases this as follows:

It has been a defect in the modern philosophies that they throw no light whatever on any scientific principles. Science should investigate particular species, and metaphysics should investigate the generic notions under which those specific principles should fall. Yet, ... modern idealisms have merely contributed the unhelpful suggestion that the phenomenal world is one of the inferior avocations of the Absolute. (*PR*, 116)

Clearly, Whitehead does not aim at Berkeley. According to Whitehead, Berkeley is very important for the search of a “wider basis for scientific thought,” necessitated by the twentieth century revolutions in physics, biology and psychology, because in the eighteenth century, Berkeley already “laid his finger exactly on the weak spots” of the scientific materialism that emerged in the seventeenth century

(*SMW*, 66-67). However, in his Harvard lecture of October 28, 1926, Whitehead speaks of the “catastrophe of German idealism” (*HL2*, 205), and on February 24, 1927, he states that it is characteristic of German idealism that its entities had little to do with what the men of science talk of (*HL2*, 291). So, Whitehead aims at “the great German idealistic movement ... as being out of effective touch with its contemporary science” (*SMW*, 139), and he adds:

Kant, from whom this movement took its rise, was saturated with Newtonian physics, and with the ideas of the great French physicists ... who developed the Newtonian ideas. But the philosophers who developed the Kantian school of thought, or who transformed it into Hegelianism, either lacked Kant’s background of scientific knowledge, or lacked his potentiality of becoming a great physicist if philosophy had not absorbed his main energies. (*SMW*, 139)

So, Whitehead does not aim at Berkely or Kant, nor does he aim at Leibniz, Ward, Carr, or his neo-Hegelian friend, Lord Haldane. Leibniz was as famous a mathematician and a physicist as was Newton; Ward had the reputation of being the British William James in psychology (in his Harvard lecture of December 21, 1926, when dealing with the notion of the continuity of becoming in psychology, Whitehead puts them next to each other – *HL2*, 268); and both Carr and Haldane had a great interest in science, and they endeavored to present the scientific principle of relativity as a special application of the general philosophical principle of relativity. Whitehead was well aware that his friends Carr and Haldane “were among those who have been engaged in giving a philosophical interpretation to the recent theories of relativity” (*SMW*, 90), and Carr’s interpretation will be discussed in sections two and three of this article.

Given the fact that Whitehead refers to absolute idealism when complaining that idealist philosophies are divorced from the scientific outlook, and given his assessment of the German idealist movement, it is clear that his critique ultimately aims at Hegel. At the symposium in honor of his seventieth birthday, Whitehead told his audience why he ignored Hegel in *PR*:

I said very little in my book *Process and Reality* about Hegel for a very good reason. You remember that the greater part of my professional life was passed as a mathematician, lecturing and teaching mathematics, and a great deal of the rest has been devoted to the elaboration of symbolic logic. So you will not be surprised when I confess to you that the amount of philosophy I have not read passes all telling, and that as a matter of fact I have never read a page of Hegel. That is not true. I remember when I was staying with Haldane at Cloan I read one page of Hegel. But it is true that I was influenced by Hegel. I was an intimate friend of McTaggart almost from the very first day he came to the University, and saw him for a few minutes almost daily, and I had many a chat with Lord Haldane about his Hegelian point of view, and I have read books

about Hegel. But lack of first-hand acquaintance is a very good reason for not endeavoring in print to display any knowledge of Hegel. (*EPS*, 115–116)

This lack of first-hand acquaintance, however, is not the whole story. In his autobiographical notes, Whitehead further confesses: “I have never been able to read Hegel: I initiated my attempt by studying some remarks of his on mathematics which struck me as complete nonsense. It was foolish of me, but I am not writing to explain my good sense” (*EPS*, 7). As a mathematician and physicist, Whitehead simply disliked Hegel because – according to Whitehead – Hegel, contrary to Leibniz and Kant, failed to connect his philosophy with science. And yet, what Whitehead said in the Preface to *PR* of Bradley – that the final outcome of *PR* is after all not so greatly different from Bradley’s absolute idealism – he generalized when highlighting *PR*’s “final analogy to philosophies of the Hegelian school” (*PR*, 167). And he gave an example by first claiming that the concrescence of an occasion of experience is the development of a subjective aim, and then adding: “This development is nothing else than the Hegelian development of an idea” (*PR*, 167).

The intimate friend Whitehead mentioned, John M. E. McTaggart, wrote in the Preface of his 1921 book, *The Nature of Existence – Volume I*, that he was “much indebted to Dr. A. N. Whitehead.” However, given John Passmore’s assessment in *A Hundred Years of Philosophy*, that “McTaggart either ignored or scorned science” (Passmore, 1970: 82), we may assume that McTaggart has contributed to Whitehead’s rash claim that Hegelian philosophies are unscientific or even anti-scientific.

No matter the idealists’ cognitive bias and alleged scientific deficit from which Whitehead distances himself, his own philosophy bears much affinity to idealist philosophies. However, his affinity with idealism should not lead us to label him as an idealist, just as his divergence from idealism should not lead us to label him as a realist. Ultimately, Whitehead’s philosophy of organism, his process philosophy, goes beyond the idealism/realism opposition: “your ultimate outlook may be realistic or idealistic,” but according to Whitehead “a further stage” is required, which is “founded upon the ultimate concept of *organism*” or *process* (*SMW* 64). After all, Whitehead’s dominant passion is not to oppose abstractions – idealism versus realism, monism versus pluralism, subjective versus objective, etc. – but to think things together; Whitehead’s philosophy is not polemical but synoptical; it aims at a “synoptic vision” (*PR*, 5).

For example, according to Whitehead, occasions of experience are bipolar, physical and mental: “The mental pole originates as the conceptual counterpart of operations in the physical pole. The two poles are inseparable in their origination” (*PR*, 248). Abstraction from the physical pole and inflation of the role of cognitive apprehension gives rise to idealism; abstraction from the mental pole and inflation of the role of physical objects gives rise to realism. Thus, Kant’s idealism

downplays the physical pole of the experiential process to the chaotic input of “sensational data ... only applicable to conceptual registration” (*PR*, 248).

Another example is the following quote from *PR* on the interplay of the subjective and the objective in Whitehead’s philosophy as distinguished from Kant’s:

The philosophy of organism is the inversion of Kant’s philosophy. *The Critique of Pure Reason* describes the process by which subjective data pass into the appearance of an objective world. The philosophy of organism seeks to describe how objective data pass into subjective satisfaction, and how order in the objective data provides intensity in the subjective satisfaction. For Kant, the world emerges from the subject; for the philosophy of organism, the subject emerges from the world ... The word “object” thus means an entity which is a potentiality for being a component in feeling; and the word “subject” means the entity constituted by the process of feeling, and including this process. The feeler is the unity emergent from its own feelings; and feelings are the details of the process intermediary between this unity and its many data. (*PR*, 88)

In *PR*, Whitehead utilizes the expression “synoptic vision” without mentioning Alfred Hoernlé, who coined it in his 1923 book, *Matter, Life, Mind, and God: Five Lectures on Contemporary Tendencies of Thought*. But in Whitehead’s Harvard lectures, when stating that the “object of philosophy is the synoptic vision” (*HL1*, 79), and that in order to reach it, “one must get beyond abstractions” (*HL1*, 449), Whitehead does attribute these ideas to Hoernlé. Hoernlé was for some years the assistant of the British idealist Bernard Bosanquet, and the friendship thus begun endured until Bosanquet’s death. In his 1923 book, Hoernlé endeavors to conciliate idealism and realism to bring about the task set by Bosanquet in his 1921 book, *The Meeting of Extremes in Contemporary Philosophy* – to find a common basis from which the various contemporary schools of philosophy could all start in a joint attack on the problems of philosophy. In Hoernlé’s 1923 book, Whitehead’s *PNK* and *CN* figure prominently, and in Whitehead’s Harvard lecture of October 16, 1926, Whitehead makes clear that he agrees with Hoernlé, even though Hoernlé is an idealist, and he adds that Bosanquet’s 1921 book, which also refers to *CN*, is an important exponent of the convergence of idealism and realism – the idealism of Bosanquet, Hoernlé, Norman Kemp Smith, etc., and the realism of Whitehead, Bertrand Russell, George Edward Moore, Charlie Dunbar Broad, etc. (*HL2*, 187).

Whitehead relativizes the opposition of idealism and realism by saying that the “distinction between realism and idealism depends on what university you have been brought up in” (*HL1*, 347): “If you have been brought up in Oxford, you call yourself an idealist,” but if you have been brought up in “Cambridge, a realist” (*HL1*, 349). But this does not necessarily imply a deep divergence. “When I talk to Kemp Smith or Hoernlé,” Whitehead says, “I am never actually certain how much I differ” (*HL1*, 165), and he tells his students a story about Bosanquet and Russell,

who are “agreeing on symbolic logic, agreeing on a fact, and disagreeing only in emotional reaction to fact” (*HL1*, 347).

Whitehead knew Bosanquet personally. They met at the Aristotelian Society, for instance, at a symposium on July 7, 1918, during which Whitehead took part in the discussion on papers by idealists Bosanquet, Lord Haldane, and Andrew Seth. Most likely, Whitehead was more critical of Bosanquet and idealism in 1918 than after his reading of *The Meeting of Extremes in Contemporary Philosophy*. This claim agrees with a Whitehead quote in J. H. Muirhead’s book, *Bernard Bosanquet and His Friends*:

Bosanquet’s death is a great loss – a big man gone. Of recent years, I have been more and more appreciating his size. Also, his broad outlook and his single-minded devotion to truth have made him an inspiring figure. He is one of the outstanding men who have collectively made the epoch of thought of the last forty years. I am sure that some of the real principles for which he contended will be found embodied in the slow philosophic reconstruction of the future. (Muirhead, 1934: 316)

To conclude this section on Whitehead’s stance with respect to idealism, a most appropriate quote is from Robin George Collingwood’s book, *The Idea of Nature*. Collingwood captures Whitehead’s stance beautifully:

Whitehead’s work in philosophy forms part, and a very important part, of the movement of twentieth-century realism; but whereas the other leaders of that movement came to it after a training in late nineteenth-century idealism, and are consequently realistic with the fanaticism of converts and morbidly terrified of relapsing into the sins of their youth, a fact which gives their work an air of strain, as if they cared less about advancing philosophical knowledge than about proving themselves good enemies of idealism, Whitehead’s work is perfectly free from all this sort of thing, and he suffers from no obsessions; obviously he does not care what he says, so long as it is true. In this freedom from anxiety lies the secret of his success. (Collingwood 1945:165)

§2 CARR’S MONADIC PHILOSOPHY AND RELATIVITY

Like his friend Whitehead, Herbert Wildon Carr (1857–1931) did not have a career as a professional philosopher to start with. But whereas Whitehead was a mathematician and a physicist first, Carr was a businessman. However, already while training for a career in business, he attended evening courses at King’s College London and developed an interest in philosophy, and as a twenty-four-year-old philosophical amateur he joined the Aristotelian Society in 1881. Carr soon became its secretary and one of its leading members, but only after more than three

decades, after a life in business, and after reading Henri Bergson's *Évolution Créatrice*, Carr's career as a philosophy writer sparked off. As he himself wrote:

The leaders who have influenced me most are first of all, Bergson, to whom I owe the distinct orientation of my philosophy. (Benedetto) Croce's aesthetic theory came as a revelation to me. To (Giovanni) Gentile I owe the full concept of the immanence of the ideal in every form of the actuality of experience. But it is to friends past and present of the Aristotelian Society that I owe the interest in philosophy which has sustained me throughout my life. (Carr, 2022a: vi)

Philosophy was not his only interest. His other area of interest lay in modern science, and he was particularly influenced by Einstein's principle of relativity. Carr wrote:

I first became acquainted with it at the International Congress of Philosophy at Bologna in 1911, when M. Pierre Langevin, Professor of the Collège de France, revealed its philosophical importance in a remarkable paper entitled "L'évolution de l'espace et du temps." I introduced the subject to the Aristotelian Society in a paper read in the Session of 1913–1914 ... (Carr, 1920: vi)

In fact, in July 1912, Carr already suggested to Russell, who was just re-elected President of the Aristotelian Society, to search for someone to read a paper on the principle of relativity, and on July 10, 1912, Russell wrote to Carr:

I think a paper on the principle of relativity, which you suggested earlier, would be a very good plan. Probably Norman Campbell, at Leeds, would be the best man ... Possibly Whitehead might do it. But it is no use writing to him, as he doesn't answer; one would have to ask him by word of mouth. I know he has been going into the subject. (Russell, 1992: 191)

Ultimately, neither Campbell nor Whitehead introduced the principle of relativity to the Aristotelian Society; Carr did with his paper, "The principle of relativity and its importance for philosophy." But the quote from Russell's letter to Carr is interesting, because it confirms the thesis that Whitehead first studied Einstein's Special Theory of Relativity while replacing Karl Pearson as a Lecturer in Applied Mathematics and Mechanics at University College, London, in the academic year 1911–1912.

As for Carr, "he continually urged the importance of bringing together modern physics and metaphysics" (Mander, 2005: 155), and "he believed that Einstein's theory represented the renewal and verification by the methods of modern science of the monadology of Leibniz" (Metz, 1938: 442).

Carr bemoaned the distinction always made between science and philosophy – "Science deals with Nature, the objective aspect of the world ... Philosophy deals

with Mind, the subjective aspect ...” (Carr, 1922a: 1). He held that science simply assumes “the entire independence of the object in its existence of the act by which it is known” (Carr, 1922a:2), and that “science has certainly seemed to be justified by success” (Carr, 1922a: 3). However, according to him, “the very advance of science ... has brought it face to face with the philosophical problem it set out by ignoring,” and “its fall of the Bastille” was the verification of Einstein’s calculation of the shift of the stars, observed during the total eclipse of May 29, 1919, which “proved that the path of the light rays is curved in a gravitational field” (Carr, 1922a: 3). Also taking into account Berkeley’s critique of what Whitehead called the bifurcation of nature into the objective and material world of primary qualities and the subjective and mental world of secondary qualities, “the Darwinian theory of evolution,” which suggested “that the intellect is itself a product of evolution” (Carr, 1922a: 5), and “the criticism of the foundations of the mathematical sciences,” which liberated the geometry of space from its Euclidean shackles (Carr, 1922a: 6), Carr concluded that “concrete Nature is not matter” and “concrete Mind is not contemplation” – they are “activity” and hence: “It is no longer true ... that the mathematical, physical and natural sciences depend on the realistic hypothesis in philosophy” (Carr, 1922a: 8). For Carr, modern science has come into contradiction with its initial realism and in line with modern idealism:

The keynote of modern idealism and its strength is the affirmation that reality is concrete. It rejects the abstract only in so far as it is set up as concrete in its abstractness. It rejects the presupposition of an object independent in its existence of the subject for which it is object ... on the ground of its abstraction. ... Science hitherto, in claiming concreteness for its object, has imagined a pure object free from all subjectivity. Modern science is now coming into line with modern philosophy in the recognition that *actual* experience alone is concrete. This is what is meant by the idealistic interpretation of the principle of relativity, – not that scientific reality has no other basis than the ideas in the minds of subjects of experience, but that it is based on an objectivity which derives its whole meaning from the concrete experience of the subject. Science no longer asks us to assume that there are abstract things-in-themselves contemplated by pure intelligences. (Carr, 1922a: 9)

For Carr, Leibniz was “the founder of modern idealism” (Carr, 1920: 103). He offered “the way of escape” from the bifurcation of nature by a reform of “the concept of substance itself”:

In place of the concept of substance as the substratum of two systems, ... one inert and mechanical, the other contemplative and volitional, Leibniz formulated the concept of substance as essentially active and dynamic. Reality was constituted, he said, of simple substances, but these were the monads, active subjects of experience, each having the universe mirrored in its acting centre. These monads were not conceived as independent minds dotted about in an

alien matter, in an independent universe ... ; they were conceived as centres of activity, an activity consisting in the perceptions of which the objective world or nature consists. ... The essence of this reform of the concept of reality is to substitute concrete experience for the independent abstractions, mind and matter ... (Carr, 1922a: 11)

Moreover, for a Leibnizian, according to Carr, space and time are realities “which must fall within the universe as the monad perceives it mirrored, and ... cannot fall outside the monad” (Carr, 1920: 112). In other words, neither space nor time is an external reality; both are subjective orderings: “Space is the order of co-existences, time the order of succession” (Carr, 1920: 113).

According to Carr, Einstein’s principle of relativity renewed and verified that “space and time are concepts of the mind” (Carr, 1920:12), and that “the adoption of the principle of relativity means, therefore, that the subjective factor ... must enter positively into physical science” (Carr, 1922a: 340). Indeed: “The essence of it is to introduce the bane of the physicist, subjectivism, into the arcana of physical science” (Carr, 1920: 21). According to Carr:

It shows that it is impossible to abstract from the mind of the observer and treat his observations as themselves absolute and independent in their objectivity. It requires us to give up the assumptions of an absolute standard of reference for ... measurement ... It rejects the inference ... that beneath the objects we perceive ..., there is an absolute space ..., and that behind the events which succeed one another in our consciousness, there is an absolute time ... The study of nature has revealed to us that the nature we study is not independent of the mind which studies it. (Carr, 1920: 21–23)

According to Carr, in the history of physics the principle of relativity caused “a sudden upheaval” (Carr, 1920: 3) because the introduction into physics of “a subjective element seems not only a sacrilege but a downright betrayal of the very principle on which science is based” – the principle of objectivity (Carr, 1920: 20–21). In the history of metaphysics, however, the principle is not new: “To the metaphysician there is nothing subversive or revolutionary in the new principle, it is practically identical with principles which have, time and again, been formulated in philosophy, ancient and modern” (Carr, 1920: 3). Carr even holds that “it is indeed a commonplace of philosophy” (Carr, 1920: 18) and “only a revolution in physical science” (Carr, 1920: 20). No wonder that Carr’s first book on the topic, published in 1920, is entitled: *The General Principle of Relativity in Its Philosophical and Historical Aspect*. Prior to dealing with the modern scientific revolution and its leaders, it offers an historical overview of the principle of relativity in the domain of philosophy, culminating in a chapter on Leibniz.

In his chapter on Leibniz, Carr compares Newton and Leibniz and writes: “We have then in the contrast between the principles of Newton and Leibniz, the distinction, in its full intensity and most emphatic expression, between a nature-

philosophy based on a materialistic principle and a nature-philosophy based on a spiritualistic or idealistic principle” (Carr, 1920: 117). Further, in his chapter on the scientific principle of relativity, Carr writes: “It is a triumph of philosophy, for the principle of relativity is a return to the concept which Leibniz indicated and which was abandoned by the scientific successors of Newton” (Carr, 1920: 151). And finally, in the last chapter, Carr writes:

Carried to its logical conclusion the principle of relativity leaves us without the image or the concept of a pure objectivity. The ultimate reality of the universe, as philosophy apprehends it, is the activity which is manifested in life and mind, and the objectivity of the universe is not a dead core serving as the substratum of this activity, but the perception-actions of infinite individual creative centres in mutual relation. (Carr, 1920: 162)

Carr did not leave it at his 1920 historical overview and developed his own monadology, his own philosophy of relativity. In 1922 his opus magnum was published, *A Theory of Monads: Outlines of the Philosophy of the Principle of Relativity*. Carr’s monadology is Leibnizian, but it is clear that he held that it is not satisfactory to just repeat what Leibniz said in order to account for the mutual relations of the creative centers of activity, which are the monads. Leibniz said that monads have “no windows by means of which anything can come in or pass out” (Carr, 1920: 110), and consequently, the monadic relatedness is not causal, and the harmony they achieve, is “pre-established” – “by an act of creation the harmony entered into the creative design and was brought into existence with the universe” (Carr, 1920: 109). For Carr:

Philosophy is the science of the monad, and the order and arrangement which it studies is the monadic order. Philosophy is monadology. The term was made familiar in the celebrated work of Leibniz which bears that title. In adopting it I am not advocating a mere return to Leibniz ... We have come, it is true, to associate it with the special form which Leibniz gave it in his system and more especially with the difficulties he strove to overcome by the hypothesis of the pre-established harmony. I propose to use the term in a sense in which it seems to me no philosopher can reject it ... (Carr, 1922a: 17)

Carr was well aware of the difficulties of a Leibnizian monadology, and in particular, that the charge of solipsism can be raised against it. Indeed, Leibnizian monadic relatedness rather seems monadic isolation. But in the Preface to his 1922 book, Carr writes:

For many years it seemed to me that philosophy was paralysed by the inability to offer any escape from the solipsistic dilemma, and in the theory of the monads this difficulty has always seemed to assume its most intractable form. The argument which I have developed in my second chapter and illustrated in

my tenth, may not appeal with the same force to everyone, but it is the argument which satisfies me on this point. (Carr, 1922a: v)

In the second chapter, Carr writes:

Monadism means that reality is activity and not a stuff of which activity may be an attribute, quality or endowment. It denies substance as inert substratum, but affirms substance as active experience. Monads are not a crowd with spatial boundaries, plurality is not mutual exclusiveness. The monad mirrors the whole universe and infinite monads are within the universe of the monad. Yet there are not an infinity of universes limiting one another. The monads all enter into and constitute the universe of every monad, but the perspective of one monad forms no part of the universe of another monad. The perspective of the monad is its in-itself-ness and incommunicable.

Monads are things-in-themselves, for in themselves they are subjects of experience. They know and are unknown, for to become known they would have to enter as objects into the experience of a subject, and in so far as they were objects they would cease to be subjects. (Carr, 1922a: 57)

From a Whiteheadian point of view, Carr is still struggling with the classical concept of substance here. On the one hand, he replaces substance as inert substratum with substance as active experience, but on the other hand, he sticks to the classical idea that no substance can enter into another substance. On the one hand, he introduces subjectivity in the concept of substance, but on the other hand, he fails to think together the subjective with the objective aspect of an active experience. Clearly, Carr heads in the same direction as does Whitehead – he tries to overcome the bifurcation of nature by avoiding the fallacy of misplaced concreteness and by conceiving reality as a plurality of subjective centers of activity. But Carr is still liable to the fallacy of simple location because he conceives of his centers of activity as isolated. For Whitehead, the introduction of the concept of “field” in electromagnetism, relativity, and quantum mechanics, implied the togetherness, the solidarity, the intra-connectedness of the activities studied by physics, and Whitehead’s process philosophy, his monadology, is much more radical and consistent than Carr’s because it took this intra-connectedness into account. And yet, even in this respect, Carr, in the tenth chapter of his opus magnum, takes a small step in the direction of Whitehead’s later process philosophy.

In this chapter, Carr agrees that, in terms of causality, his monads are still solipsistic, but he holds that “we are not thereby rendering an intercourse between monads inconceivable,” because we have to realize “that intercourse depends not on the power of one monad to impart something of its substance to another, but on its power to evoke aesthetic activity in another” (Carr, 2022a: 243). Carr holds that “when we conceive the mind in the first moment of its expression as an aesthetic activity ... the problem of intercourse disappears” (Carr, 2022a: 244). And then he makes an analogy with wireless telegraphy:

Intercourse is impossible and unmeaning if the interrelatedness it implies is conceived on the analogy of the ordinary action and reaction in the physical world. Such interaction is not and could not by any kind of transformation become intercourse. If we want an analogy of the intercourse of mind with mind in the physical world, we must seek it, not in the kinds of compensation we discover in colliding billiard balls, but in a phenomenon like that of wireless telegraphy. In wireless telegraphy two instruments when tuned to the right pitch will respond to one another by reciprocal adaptation, the communication between them being established by the Hertzian waves. By the use of the discovery intercourse is established between two operators. If we complete the scheme by including the minds of the two operators we have an illustration of the relatedness of monads in intercourse. ... Only when two minds are attuned ... is there intercourse, and the intercourse depends on the creation by each mind for itself of the appropriate ... express(ion of) that accord. (Carr, 2022a: 246)

One might wonder why Carr thinks that the communication via electromagnetic field-waves between attuned instruments is an analogy for an acausal phenomenon, but it is interesting to see that he resorts to an analogy that relies on the notion of field, which inspired Whitehead to more radically depart from the Aristotelian and Cartesian notions of substance. Anyhow, with his account of the intercourse of monads, Carr holds that he has given a new account of the pre-established harmony of monads in which the harmony is “not imposed upon them by the transcendental act of a creator,” but is “inherent in their existence and nature” (Carr, 1922a: 257).

Regardless of the details of Carr’s new account of the pre-established harmony of monads, with respect to Einstein, his stance remained unchanged in his 1922 opus magnum:

The work of Einstein has been to turn the principle of relativity to general scientific account. This meant the abandonment of any independent objective absolute as the basis of physical science. It was at once seen to involve much more than this. It implied a change to a monadic concept of reality ... (Carr, 1922a: 339).

§3 WHITEHEAD VERSUS CARR

On February 20, 1922, the Aristotelian Society met for a discussion on Carr’s idealistic interpretation of Einstein’s theory. The discussion was chaired by Lord Haldane; Carr’s thesis was stated, explained, and argued for in a paper by Carr himself; and then, independently of each other, Percy Nunn, Whitehead, and Dorothy Wrinch formulated their realistic criticisms of Carr’s idealistic thesis. Carr’s thesis read: “Einstein’s ... principle of relativity ... is in complete accord with the neo-idealist doctrine in philosophy, and in complete disaccord with the fundamental standpoint of every form of neo-realism” (Carr, 1922b: 123).

This article focuses on Whitehead's critique, leaving aside Nunn's and Wrench's. And it does so by relying, not only on Whitehead's contribution on February 20, 1922, "The Idealistic Interpretation of Einstein's Theory," but also on a paper he read at a joint session of the Aristotelian Society, the British Psychological Society, and the Mind Association, on July 16, 1922, "The Philosophical Aspects of the Principle of Relativity," and to a lesser extent, on Whitehead's inaugural address as President of the Aristotelian Society on November 6, 1922, "Uniformity and Contingency." These three 1922 papers of Whitehead have been disregarded in most accounts of his philosophy, unjustly, for together with his 1922 book, *The Principle of Relativity*, they throw light on Whitehead's development from mathematical physics to metaphysics in general, and on his relationship with philosophical idealism in particular.

Let's first have a look at how Carr defines the neo-realism and neo-idealism of his thesis:

Neo-realism I take to be the philosophical standpoint that knowledge requires us to presuppose existence, and that in some sense a universe exists in space and time, the entities within which are discoverable by minds, which themselves are accorded a place therein on equal terms with the entities they discover.

Neo-idealism is the philosophical standpoint that reality in its fundamental and universal meaning is mind or spirit. Mind, in this universal meaning, is not an abstract thing opposed to nature, or an entity with its place among other entities in space and in time, it is concrete experience in which subject-object, mind-nature, spirit-matter, exist in an opposition which is also a necessary relation. Apart from their relation the opposites are meaningless abstractions. Experience does not present us with entities existing independently of their relation, as, for example, men (subject) who see (external relation) the sun (object), but with concrete wholes, as, for example, eye-seeing-sun. Experience is analysable but cannot be dissociated into constituent elements. Moreover, experience is essentially activity and process, not passive contemplation. The standpoint of neo-idealism, therefore, is thought thinking, mind as pure act, reality as eternal history. (Carr, 1922b: 123–124)

Whitehead largely agrees with Carr's definitions:

I presume that the fundamental position of idealism is that all reality can be construed as an expression of mentality. For example, I suppose that Mr. (Samuel) Alexander is a realist because for him mind is one among other items occurring in that evolution of complexes which is the very being of space-time. On the other hand, Mr. Wildon Carr is an idealist because he finds ultimate reality in the self-expression of monadic mentality. The test, therefore, of idealism is the refusal to conceive reality apart from explicit reference to some or all of the characteristic processes of mentality; it may be either thought, or experience, or knowledge, or ... valuation ... (Whitehead, 1922b: 136).

Notice, however, that Whitehead, when speaking of realism, does not speak of existence in space and time as Carr does, but of the evolution of complexes which is the very being of space-time. This implies two very important differences. First, by speaking of existence in space and time, Carr implies that a realist holds fast to the concepts of absolute space and time as if space-time is a container in which occasions, events, history evolves. However, by speaking of the evolution of complexes as the very being of space-time, Whitehead implies that a realist can embrace the relativity of space and time – a realist can conceive of space-time as relative to the complexes of entities that constitute the universe. In other words, Whitehead does not take a realist to be committed to an absolute theory of space and time, hence undercutting, from the start, the argument of Carr that Einstein's relativity of space and time is in accord with idealism, and in disaccord with realism. No wonder Whitehead opens his critique on Carr's 1922 thesis as follows:

The necessary association of the physical theory of relativity with any form of idealistic philosophy is not at all evident to me. Why should a realist be committed to an absolute theory of space or of time? Again, why should he be restrained to reject any assimilation of space and time?

A relative theory of space necessitates that we admit the "spaciness" of the ultimate substance of nature; and a relative theory of time necessitates that we admit the "timeiness" of this substance. Accordingly, the ultimate fact of nature must, on this theory, be an event. So far, I agree with Professor Carr. But I cannot see why a realist should choke at having to swallow events. There is nothing wrong with them on his theory. (Whitehead, 1922a: 145)

A second difference between Carr's and Whitehead's definition of realism and idealism is that Carr seems to hold that it is an exclusively idealist view that experience does not present us with entities existing independently of their relation, but with concrete wholes, analyzable but not separable into constituent elements. However, according to Whitehead, a realist can also endorse this view, his complexes of entities can be such concrete wholes – for example, *PR*'s organic processes are – and consequently, this view cannot be taken as exclusively idealist. In Whitehead's words: "To a large extent I am here in agreement with Professor Carr. ... But Professor Carr, in claiming this conclusion from neo-idealism, pushes me over the edge where I do not want to go" (Whitehead, 1922a: 147–148).

Moreover, according to Whitehead, the complex relatedness of entities cannot be analyzed in terms of the simple classical substance-quality relationship, which corresponds to the linguistic subject-attribute relationship. Instead of the two-termed relation of quality to substance, of predicate to subject, multi-termed relations are needed, and it is exactly because philosophers failed to see this, that idealism arose. Indeed, when Berkely attacked the bifurcation of nature by erasing the difference between primary and secondary qualities, his argument was that all observed qualities are observer dependent and that, consequently, they all have to

be attributed to mental subjects. “Berkeley,” Whitehead holds, “enforces by a variety of illustrations that there is nothing left when you have torn the observer out of the observation” (Whitehead, 1922b: 136). And having no qualities left to attribute to them, material substances evaporated, and modern idealism was introduced into philosophy.

Whitehead adds that if you agree with Berkeley’s substance-quality and subject-predicate based argument, then it is reasonable to conceive of Einstein’s theories of relativity as strengthening Berkeley’s argument. He writes:

It stands to reason that modern relativity strengthens this argument, since previously there were two elements in our experience which the argument did not touch, I mean space and time. Berkeley’s argument rests on the basis that appearances in space and through time are personal to the observer. But space and time were left as common facts. But now it has been shown that space and time cannot be excluded from the scope of Berkeley’s argument. Accordingly, you can no longer meet the argument by showing that there are exceptions to it. Hence, so far as idealism is concerned with the facts of nature – and it must be concerned with them – its characteristic type of argument has been strengthened by the recent scientific bombshell. (Whitehead, 1922b: 137)

However, Whitehead does not agree with Berkeley’s argument. He does not consent with “the idealist position that nature is nothing else than a common expression for diverse processes of mentality,” and holds that “Berkeley must be stopped at the very beginning” (Whitehead, 1922b: 137). To start with, Whitehead questions the concreteness of the two-termed relations of substance-quality and subject-attribute. He agrees that when, for example, a green object is observed, the green color is observer dependent. But according to Whitehead, this does not imply the validity of the question, “Is green a quality of the object or of the observer?”, nor does it imply the answer, “Of the observer!” For Whitehead, qualities are not to be attributed to either the object or the observer, they ingress in a situation involving all entities constituting both the object and the observer and a lot more: “If you ask how many other items of nature enter into the relation,” Whitehead thinks that “we must answer that every item of nature enters into it” (Whitehead, 1922b: 139–140). All observed qualities are involved in a complex multi-termed relation of entities of which both two-termed relations (of quality to object and quality to observer) are abstractions. Mistakenly conceiving these abstract two-termed relations as concrete is committing the fallacy of misplaced concreteness. He writes: “The exact conclusion which we ought to draw, and must draw, is that the form of thought of a two-termed relation of predicate to subject imposed by the Aristotelian logic is not adequate to express the immediate deliverance of observation. A wider relativity is needed” (Whitehead, 1922b: 138).

And Whitehead points at another fallacy in Berkeley’s argument. Berkeley, and in his footsteps most idealists, including Carr, tacitly reduce the observer to the

observer's mind – “for Berkeley the observer is mind, and therefore Berkeley is an idealist” (Whitehead 1922b: 138–139). That all qualities as well as space and time are observer dependent is taken by idealists to mean that they are mind dependent. Whitehead, however, holds that when a realist admits that qualities and space and time are observer dependent, “he is thinking of the observer's body” (Whitehead, 1922b: 139), and from that perspective, “modern relativity ... is all to the advantage of (realist) philosophical systems” – indeed:

The fact that different observers may cognize different sets of relations as the spatial relations within nature and different temporal relations as the temporal relations in nature creates no difficulty. The relations observed are in every case dependent upon what happens to the body of the observer within nature. All the relations disclosed are relations between natural entities, and the conditions which determine the choice are also particular characters of relations between natural entities. The whole set of conditions lies within nature and yields no ground for impugning its reality. To give point to Professor Carr's argument on this heading, he ought to show that the conditions lie without nature. For example, he should show that a man in love necessarily measures space and time differently from a man given over to avarice. (Whitehead, 1922a: 147)

According to Whitehead, Einstein has not “done something to advance the claims of idealism” – “all he has done is to make it more difficult for us,” for example, “to compare our watches with those of the inhabitants of Mars,” but this and similar difficulties are due entirely “to circumstances over which we have no control,” that is, circumstances which are “obstinately independent” of our mental processes (Whitehead, 1922b: 142).

For Whitehead, relativity is all about the relatedness of the entities of the universe – of events and of qualities –, and we might summarize the above three points made by Whitehead in three sentences. First, space and time do not form an absolute and concrete framework for the deployment of events; they are abstractions from the relatedness of events. Second, qualities are not involved in a two-termed relation with substances, but ingress in multi-termed relational wholes. And third, the relativity or relatedness at play in Einstein's theories is physical and not mental: “The relativity to an observer is dominated by the physical state of the observer's body” (Whitehead, 1922b: 141). But there is a further point that Whitehead raises in order to criticize Carr's thesis.

Whitehead is aware of the critique that neo-realists often raise against idealism, namely, that if everything is related to everything, you cannot know a thing unless you know everything, and hence, knowledge is impossible. But Whitehead, who also holds fast to the universal relatedness of all entities, thinks that this critique is not justified. Unlike Einstein, Whitehead claims that the spatio-temporal relatedness of events is a uniform relatedness, and this prevents the deadlock of knowledge. Also, even though the ingression of qualities in events is

contingent and requires detailed examination in each particular situation, we are able to divine some lawfulness with respect to the ingression of qualities – this is what science is all about. Without spatio-temporal uniformity and without scientific laws, Whitehead holds, “we know nothing, and there is simply nothing to talk about,” and he adds:

For example, we should have no reason to believe that there is an interior of the earth, or any lapse of time applying to it. We ask whether this interior is occupied with condensed matter or is empty, and whether this matter is hot or cold, solid or gaseous, because we know that the uniform systematic spatio-temporal relations must supply entities which have the status of forming the interior of the earth. (... And) the laws of nature enable us to make a shrewd guess at the types of status which are possible. (Whitehead, 1922b: 140–141)

Likewise, even though we do not directly observe the events of bygone ages, we have no reason to doubt their existence because the spatio-temporal uniformity supplies us with historical events, and the laws of nature enable us to make a shrewd guess at the qualities that characterize these historical events. All this leads Whitehead to a firm denial of idealism. He writes:

In fact, my own doubts as to any form of idealism come from the very difficulty of conceiving any close association with mind of bygone ages, when the granite was formed or when the sun first blazed. We now cognize them by their direct relatedness in space and time with events which we directly perceive as qualified by contingent characters. But the contingent characters of the remote events are only surmised by us as the outcome of doubtful inferences. Yet we know that some such characters they must have had. Accordingly, we know of events whose connection with any mental process, as we know it, appears to be doubtful, incomplete, and extremely unessential to them. That is my reason for being very shy of leaning too heavily on mind in any endeavor to express the general character of reality. It comes to this, that there has been so much happening, and that, so far as we know, there is not enough mind to go round. (Whitehead, 1922a: 145–146)

Recall that according to Whitehead’s definition of idealism, idealists refuse “to conceive reality apart from explicit reference to some or all of the characteristic processes of mentality; it may be either thought, or experience, or knowledge, or ... valuation” (Whitehead, 1922b: 136). But also recall that Whitehead’s own process philosophy holds that the whole of reality, including the remote events of bygone ages, is constituted by occasions of experience. Consequently, when Whitehead holds that there is not enough mind to go around, he clearly differentiates mind from experience, and we are back to where we started in the first section: experience in Whitehead’s process philosophy is not necessarily conscious, cognitive experience as is mind in idealist philosophies. And in 1922 he writes:

My own position is that consciousness is a factor within fact and involves its knowledge. Thus apprehended, nature is involved in our consciousness. But in its exhibition of this character our consciousness exhibits its significance of factors of fact beyond itself.

I differ from the idealists, so far as they consider such an external significance as peculiar to consciousness and thence deduce that the things signified have a peculiar dependence on consciousness. (Whitehead, 1922c: 118)

In other words, our scientific experience of nature is a conscious, cognitive experience, but this does not imply that the natural things we are conscious of, the things we have some knowledge of, are dependent on our consciousness, or on any consciousness whatsoever. We think of things that don't rely for their existence on our thinking, or on any thinking. Whitehead writes:

I cannot appreciate what accession there has been to the arguments on behalf of idealism. We still find mental processes faced with an obstinately independent nature, so that the correlations of mental processes with natural processes appear as unessential for the course of natural events. I am not denying that there are such correlations ... But what I am denying is that some correlation with mentality can be proved to be essential for the very being of natural fact. (Whitehead, 1922b: 142)

And Whitehead concludes his February 1922 paper against Carr as follows:

There is a desperate attempt, by bifurcating nature into appearance and a cause behind the veil, to save for causal natural independence from mentality. ... I do not believe that such a bifurcation is tenable. Accordingly, it would seem that nature is an abstraction from a more concrete reality which Lord Haldane calls knowledge. To a large extent I am here in agreement with Professor Carr ... But Professor Carr ... pushes me over the edge where I do not want to go. I am haunted by the seeming indifference of nature to mind ... Lord Haldane's term "knowledge" also rather alarms me. I should like him so to explain it as to tone down its sheer mentality, in fact to make it look more like old red sandstone. What I really doubt is whether there is any term sufficiently comprehensive to embrace the ultimate concrete fact. It seems impossible to obtain a term with positive content which does not thereby exclude. But in speaking of ultimate fact there is nothing to exclude. Our analysis is always by way of abstraction, thus we have Bergson's urge for life, Haldane's knowledge, Berkeley's mind, and so on. Some of these terms are better than others as being less misleading, but they are all too narrow. Against the background of the becomingness of existence we can only project the various abstractions which are the product of differing modes of analysis. (Whitehead, 1922a: 148)

However, in the conclusion of his July 1922 paper, the conclusion with which we also end this article, we can witness how the philosophical relevance of the

principle of relativity pushes Whitehead in the direction of his process philosophy in which “process” is Whitehead’s term to embrace the ultimate concrete fact:

I should ... not like it to be concluded that I am maintaining that relativity has no philosophical importance. The general character of its importance arises from the emphasis which it throws upon relatedness. It helps philosophy resolutely to turn its back upon the false lights of the Aristotelian logic. Ultimate fact is not a mere aggregate of independent entities which are the subjects for qualities. We can never get away from an essential relatedness involving a multiplicity of relata. (...)

The more special aspect of the importance of relativity in philosophy is its treatment of space and time, particularly time. Space and time can never be mere side shows in philosophy. Their treatment must color the whole subsequent development of the subject. The relational treatment of space is a well-established principle, and I doubt whether relativity has made much difference here, so far as philosophers are concerned. But it has made an immense difference to the treatment of time. The unique serial character of time has gone by the board; also a thoroughgoing relational treatment of time is now necessitated and made possible. (...)

Furthermore, the fusion of time with space and the dropping of the unique seriality involves the necessity of looking on ultimate fact as essentially a process. Accordingly, wherever the idea of “process” has been lost, we are dealing with a very advanced type of abstraction. ...

I still think that a scientific doctrine which enforces consistent emphasis on these ideas has the utmost importance for philosophy, even although it does not settle the established controversies between realism and idealism. (Whitehead, 1922b: 142–144)

BIBLIOGRAPHY

- Pierfrancesco Basile, *Leibniz, Whitehead and the Metaphysics of Causation*, Palgrave Macmillan, 2009.
- Paul Boogard, Jason Bell (editors), *The Harvard Lectures of Alfred North Whitehead, 1924–1925: Philosophical Presuppositions of Science*, Edinburgh University Press, 2017 (abbreviated to *HLL*).
- Bosanquet, Bernard, *The Meeting of Extremes in Contemporary Philosophy*, Macmillan and Co., 1921.
- Wildon Carr, *The General Principle of Relativity in Its Philosophical and Historical Aspect*, Macmillan, 1920.
- Wildon Carr, *A Theory of Monads: Outlines of the Philosophy of the Principle of Relativity*, Macmillan, 1922a.
- Wildon Carr, “The Idealistic Interpretation of Einstein’s Theory”, in *Proceedings of the Aristotelian Society – New Series*, vol. 22, 1922b, pp. 123–127.
- Robin George Collingwood, *The Idea of Nature*, Oxford University Press, 1960 (first published in 1945).
- A.C. Ewing, *Idealism: A Critical Survey*, Methuen, 1934.

- B. Henning, J. Petek, G. Lucas (eds.), *The Harvard Lectures of Alfred North Whitehead, 1925–1927: General Metaphysical Problems of Science*, Edinburgh University Press, 2021 (abbreviated to HL2).
- Alfred Hoernlé, *Matter, Life, Mind, and God: Five Lectures on Contemporary Tendencies of Thought*, Harcourt, Brace and Company, 1923.
- William Mander, “Carr, Herbert Wildon (1857–1931)”, in *The Dictionary of Twentieth-Century British Philosophers*, vol. I, A–L, Thoemmes Continuum, 2005, pp. 154–156.
- J.M.E. McTaggart, *The Nature of Existence*, vol. 1, Cambridge University Press, 1921.
- Rudolf Metz, “Herbert Wildon Carr (1856–1928)”, in Rudolf Metz, *A Hundred Years of British Philosophy*, George Allen & Unwin Ltd, 1938, pp. 440–443.
- J.H. Muirhead, *Bernard Bosanquet and His Friends*, Routledge, 2007 (first published in 1935).
- John Passmore, *A Hundred Years of Philosophy*, Penguin Books, 1970.
- Bertrand Russell, *Logical and Philosophical Papers 1909–13*, in *Collected Papers*, vol. 6, ed. by John G. Slater, Routledge, 1992.
- Alfred North Whitehead, *An Enquiry Concerning the Principles of Natural Knowledge*, Dover Publications, 1982 (first published in 1919, abbreviated to PNK).
- Alfred North Whitehead, *The Principle of Relativity with Applications to Physical Science*, Dover Publications, 2004 (first published in 1922, abbreviated to R).
- Alfred North Whitehead, *Science and the Modern World*, The Free Press, 1967 (first published in 1925, abbreviated to SMW).
- Alfred North Whitehead, *Process and Reality: An Essay in Cosmology*, Corrected edition ed. by David Ray Griffin and Donald W. Sherburne, The Free Press, 1978 (first published in 1929, abbreviated to PR).
- Alfred North Whitehead, *Adventures of Ideas*, The Free Press, 1967 (first published in 1933, abbreviated to AI).
- Alfred North Whitehead, *Essays in Science and Philosophy*, Greenwood Press, 1968 (first published in 1947, abbreviated to ESP).
- Alfred North Whitehead, *The Interpretation of Science*, ed. by A.H. Johnson, The Bobbs-Merrill Company, 1961 (abbreviated to IS).
- Alfred North Whitehead, “The Idealistic Interpretation of Einstein’s Theory”, 1922a (IS 145–148).
- Alfred North Whitehead, “The Philosophical Aspects of the Principle of Relativity”, 1922b (IS 136–144).
- Alfred North Whitehead, “Uniformity and Contingency”, 1922c (IS 108–124).