Function, Mind and Novelty: Organismic Concepts and Richard M. Goodwin formation at Harvard, 1932-1934. Insights from his papers at Siena University
This paper is concerned with the threads connecting Richard Goodwin's early formation as an Harvard undergraduate student in political science and philosophy, with his life-long concern with the modes in which novelty and innovation enters into social systems and modifies their working. We shall consider the evidence, based on Goodwin's papers at Siena University, suggesting that Goodwin's interest in the causes and effects of novelty generation in social systems pre-dates the much emphasized acquaintance with Schumpeter, and even the decision to direct his post-graduate formation towards economics. This interest has strong roots in his outspoken involvement with the Marxist political movement in the years 1932-1934, which made him particularly concerned with the relation between the objective historical inheritance and the freedom for innovation and social change embedded in human creativity. Goodwin’s formation on such matters was strongly influenced by the cultural seeds he could harvest, directly or indirectly, through the Harvard scientific and philosophical community and most notably as a result of the intellectual fascination for the philosophy of Alfred North Whitehead.

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1 Introduction

This paper is concerned with the threads connecting Richard Goodwin’s early formation as an Harvard undergraduate student in political science and philosophy, with his life-long concern with the modes in which novelty and innovation enters into social systems and modifies their working. Social systems are here identified with the set of mutual relations that hold between human activities, and between them and their material support. The coevolution of culture, technology, economic relations and social institutions are all included in this broad definition of a social system. We shall consider the evidence suggesting that Goodwin’s interest in the causes and effects of novelty generation in social systems pre-dates the much emphasized acquaintance with his Harvard mentor Joseph Schumpeter, and even the decision to direct his post-graduate formation towards economics. This interest has strong roots in his outspoken involvement with the Marxist political movement in the years 1932-1934, which made him particularly concerned with the philosophical standing of Karl Marx ‘law of motion of the capitalistic economy’, with respect to the ‘free will’ inherent in the very idea that revolutionary change and transformation are possible.1

At face value, Goodwin interest in the problem of social change and the relation between determinism and free will is well entrenched in the world wide cultural debates of the early 20th century decades. We shall argue, however, that his formation on such matters was more unconventional and was strongly influenced by the cultural seeds he could harvest, directly or indirectly, through the Harvard scientific and philosophical community and most notably as a result of the intellectual fascination for the philosophy of Alfred North Whitehead.

In the opening pages of the 1982 interview prepared by Maura Palazzi ([22]), Goodwin recollects how the formation of his ideas during his undergraduate years had been influenced by the great Cambridge philosopher and mathematician, eventually moved to Harvard. Goodwin’s lecture notes of the course Philosophy 3.b, date October and November 1932 and are gathered in a ‘Black Notebook’ also containing his reading notes of at least part of the material he had to study for that course. The ponderous philosophical content of the Black Notebook is interrupted now and then by quick free-hand sketches, some presumably depicting Whitehead’s head. The influence of the intellectual seeds disseminated by these lectures turned out to be non momentary, and was greatly reinforced by the fact that Goodwin wrote his B.A. thesis A Critique of Marxism, dated April 13, 1934, under Whitehead supervision.

Goodwin wanted to add a one page preface and a twenty-six pages introduction to the thesis, with the aim of making its philosophical basis more explicit:

...a theory is no better than the philosophy upon which it is founded. Thus anyone who writes about political theory and does

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1 His preoccupation with this problem pre-dates the work he did in preparation of his B. A. thesis on Marxism. Referring to the tension between deterministic evolution as ‘scientifically’ analyzed in Capital and revolution emphasized in The Manifesto, he observes: “Before this year [1934] I myself was firmly convinced that this [tension] represented a hopeless conflict” ([10], p.67, footnote 1).
not push back his assumptions as far as he can and does not connect them with what he believes to be the best available philosophy, is in error. For this reason I am including an introduction...in this connection it is necessary to say that I accept without reservation the metaphysics of Professor A. N. Whitehead. My whole thought is colored by his philosophy and many of the methods, concepts, terms that I use can only acquire their full meaning against a background of his philosophy of organism ([10], p. I).

One of the central and recurring concerns in *A Critique of Marxism* [10] is Marx’s analysis of historical development, that is, of the process by which a new historical epoch arises dialectically out of the previous one:

The old epoch lays the foundation, places the limiting factors, but what about the specific character, the positive, constructive new element? Did the old society cause that, or is it not the somewhat independent product of human ingenuity?([10], pp. 103-104)

Although Goodwin was prepared to admit that Marx did not believe in a rigid determinism, in a rigid mechanical chain of events ([10], pp. 34-35), his conclusion was that Marx substantially begged the question and was not able to demonstrate historical causation ([10], p. 104). Goodwin strongly sympathized with the philosophical position of 'idealistic realism' he thought Marx had expressed in *Zur Kritik der Hegelschen Rechtsphilosophie*, and lamented that Marx did move from this 'semi idealistic' position to one in which 'die Materielle Grundlage' was everything and 'Philosophie' nothing. His identification with this work of the young Marx was so strong that, referring to a statement on "Die Waffe der Kritik" and "the Kritik der Waffen", he quite emphatically observes:

This is a somewhat specific application of the general social philosophy (based on my interpretation of the metaphysics of Prof. Whitehead) which I advanced in my introduction([10], p.75).

Goodwin’s preoccupation with the creative role of ideas, purposiveness and intentionality in historical development made him particularly receptive with respect to two related, but distinct, philosophical issues which had been presumably brought to his attention by Whitehead: on the one hand, the use of teleological arguments in the natural as well as in the social sciences, and the characteristics separating the different notions of teleology employed in such contexts; on the other, the position of 'mind' and 'mentality' within the physical and natural world and the implications with respect to the emergence of novelty. These two themes are the subject of the next two sections.

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2 'not' is added with pencil, presumably by Whitehead.
2 Mechanism, function and teleology

2.1 L. J. Henderson

Surprisingly enough for a student in political science, a relevant share of Goodwin’s reading notes taken in the Black Notebook, is concerned with two works by the Harvard biochemist and physiologist L. J. Henderson. They are *The Order of nature* (1917)[12] and *The Fitness of the Environment* (1913)[11]. Both of them were part of the background reading material for the course Philosophy 3b, suggested by Whitehead. In *Process and Reality* ([27], p. 89) the philosopher cites the two books in question (and, in addition, *Blood* [13]) as "fundamental for any discussion" of the subject of the ‘order of nature’. L. J. Henderson was very active on the Harvard and American academic scene. Philosophically inclined, he was personally close to the Harvard philosopher J. Royce and to Whitehead himself, whom he contributed to bring to Harvard from England (cf. [5], p. 158). Henderson’s intellectual appeal may have been enhanced in the eyes of a student in social science by the fact that since the early 1930’s the physiologist extended his interests from the systemic and ‘organismic’ thinking he was advocating for biology to the systemic approach in the sociology of V. Pareto (on which subject he published a book [14] in 1935).

Following upon his systemic approach to the study of nature, Henderson’s central concern was: (i) that the notion of the fitness of the life forms must be supplemented with the notion of the fitness of the environment with respect to life in general, and (ii) that the evidence suggesting that Earth’s environment is maximally fit for life required an explanation. We may notice here Henderson’s somewhat inaccurate use of the term fitness, which fails to distinguish between relative and absolute fitness. In his writings the term simply means ‘well adapted’, 'functional to', and it is precisely in relation to this notion of function and 'teleology' that Goodwin refers to Henderson in his introduction to [10]. To place Goodwin’s comments on Henderson in a more clear perspective, it is worth expanding on the philosophic and scientific ideas of the latter. This is also because Goodwin came in contact, through Henderson, and well before he could attend Wiener’s seminar at Harvard, with a remarkable example of a systemic approach to science, which, like Wiener’s, emphasized Willard Gibb’s theory of probabilistic systems. Henderson’s approach was qualified by a philosophic position on the notion of function in biology which was critical of the vitalistic interpretations, not unlike Wiener’s position; compared to Wiener, however, it layed less emphasis on the power of the notion of mechanism and was more influenced by organismic concepts [23].

Henderson’s main concern was how to explain that the general physical and

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3The notes concerning *The Order of Nature* occupy the odd pages 199-215 and the even pages 216-186 of the Black Notebook. The notes concerning *The Fitness of the Environment* occupy the even pages 186-172 of the Book. The reason for the strange ordering lies in the fact that Goodwin wrote his lecture notes and the first part the following reading notes only on the odd numbered pages of the Black Notebook. Having reached the last-but-one page (p. 215), Goodwin rotated the Book by 180° and kept writing on the even pages, starting from p. 216 and going backward.
chemical properties of the universe produced very special conditions uniquely favourable to the birth and evolution of life on planets like the Earth. He linked such conditions to the combination of the special properties of the three elements hydrogen, carbon and oxygen, a fact which in itself is probabilistically so special that it could hardly be conceived as a chance outcome. In the pronounced evolutionary framework of *The Fitness of the Environment*, this outcome is presented as the product of cosmic evolution, a process which is placed by Henderson on the same footing of organic and biological evolution, on the ground that "apart from differences scientifically explainable, organic and inorganic phenomena are alike" ([11], p. 304). In this respect, he assimilated the difficulty in explaining the cosmic evolution of the physical and chemical environment towards the special conditions maximally favourable to the birth and subsequent evolution of life forms, to the difficulty that biology met in explaining the origin of life. His argument against Bergson’s version of vitalism exploits precisely the assimilation of organic and inorganic evolution. Since the latter, as 'conclusively' proved by the successes of physics and chemistry, is pure mechanism, the same must be true of biology. The reason is that "physical science, no less than biological science appears to manifest teleology" ([11], p. 305).

On the issue of teleology Henderson oscillates between a more dynamic and a more static view. Though strongly objecting to Bergson’s vitalism, he is part of a cultural milieu which regarded the difficulties of the Darwinian program with respect to the origin of life problem as overwhelming. His generation of scientists was not fully committed to a "continuity thesis" which proclaimed a continuous necessary connection between prelife and life ([5], p. 191); at the same time, he rejected chance as a valid explanation of coincidences that form an unmistakable pattern. In such cases, he believes, an effort to eliminate randomness is the proper scientific activity ([5], p. 189).

In [11] (pp. 305-312), the problem of teleology is tackled by introducing the idea of a tendency towards fitness. Henderson insists that his proposal of introducing a metaphysical principle does not make the concrete working of physical, chemical and biological processes less mechanistic, much like the design of the architect does not make the building of a house less mechanistic.

What then becomes of fitness? Clearly there are two logical possibilities. Either there exists an unknown mechanistic explanation of that common issue of the organic and cosmic evolutionary processes, or there does not. If such an explanation be possible, at least it must be admitted that it is very hard to conceive. Yet, recalling the difficulty before the idea of natural selection arose of imagining any mechanistic explanation whatever of fitness, we shall do well not to decide against such a possibility. On the other hand, it is conceivable that a tendency could work in parallel with mechanism without interfering with it... Where then can the origin of such a tendency be located? Why clearly, if we accept the induction in
favour of mechanism, only where Bergson has shrewdly placed his vital impetus, at the very origin of things, just before mechanism begins to act. In short, our new teleology cannot have originated in or through mechanism, but it is a necessary and preestablished associate of mechanism. Matter and energy have an original property, assuredly not by chance [italics added], which organises the universe in space and time. This is in very truth a metaphysical doctrine...

In [12] Henderson shifts to a more static view of teleology. The principle of a preestablished tendency towards fitness is replaced with the idea of a preestablished teleological character of the properties of the three elements. These properties are uniquely fit for assigning to the process of evolution maximum freedom in the "increase of diversity" and "the production of much from little", which is, in his interpretation, what evolution is all about. It may be worth to observe, in passing, how Henderson is influenced by Spencer’s view of diversity as a goal and effect of evolution, as opposed to Darwin’s idea of diversity as a mean to evolution by natural selection. In spite of the more static twist of mind characterizing The Order of Nature, the ground for introducing the metaphysical principle is unchanged with respect to the previous book. Teleology is introduced to make intelligible an outcome which is "almost infinitely improbable as the result of contingency" ([12], p. 190), but which the scientific knowledge of the time is still unable to unveil, partly because its main explanatory weapons, dynamic equilibrium and natural selection, do not seem to offer in this case a sufficient guide to knowledge (p. 189).

If these [coincidences] taken as a whole are ever to be understood, it will be in the future, when research has penetrated far deeper into the riddle of the properties of matter. Nevertheless an explanation cognate with known laws is conceivable, and in the light of experience it would be folly to think it impossible or even improbable ([11], pp.277-278, and [12], p. 189).

2.2 Goodwin and Henderson: purposeful mind vs. Nature’s teleology

Henderson’s ideas had a remarkable impact upon R. Goodwin’s formation in the years 1932-34, partly because the close contact with Whitehead’s philosophy made the young student certainly inclined to consider sympathetically the explicitation of metaphysical principles in scientific explanation. Not only he reads through, and takes extensive notes on, Henderson’s two major books of 1913 and 1917, but takes the trouble of studying some of the sources that the physiologist cites, when he presents his notion of organized, complex "system of systems", exhibiting function and self-regulation. Among the references in [10] we find a book on experimental medicine [3] by the French physiologist Claude Bernard, the first part of which is concerned with a general discussion of experimental reasoning in science. Presumably, Goodwin came to know of Bernard’s
ideas on organization in biological systems while reading [12] (see p. 76), and was so impressed by Bernard’s arguments to the point of adding a noteworthy comment to the bibliography item ([10], p. i of Bibliography) concerning [3]:

...it contains the best discussion yet written of the experimental method.

From his reading of [3] the young Goodwin drew the conviction that social sciences could not completely escape the necessity of validating their hypotheses by means of empirical tests. Admittedly, his criticism of Marx’s method of scientific investigation, as worked out "in both the Introduction to the Critique and the prefaces to the first two editions of Capital", is written under the influence of Bernard’s discussion:

Hence in stating that he is substituting the power of abstraction for experiment, Marx is indulging in a brilliant half truth. Certainly in the human studies it is necessary to depend much more on the agility of mind, but on the other hand he is accepting the common fallacy that there is no thought or abstraction behind the experimental method. There is a great deal of it as a matter of fact, but the point is that experiments offer the opportunity for relatively pure empirical verification of hypotheses. thus it is really not justifiable to substitute abstraction for experiment because this still leaves no satisfactory method of obtaining a reliable empirical test of hypotheses, and renders the whole thing highly suspect as science([10], p. 80).

The scope of Henderson’s influence on Goodwin’s formation was wider than this. Through Henderson, Goodwin had the opportunity to appreciate "Willard Gibbs’ epoch-making methodological discoveries" ([10], p. XII) and received at least some hints to the relevance of Gibb’s ensamble approach to equilibrium and non equilibrium in statistical mechanics. It may be also worth mentioning the convergence between the future development of Goodwin’s ideas concerning the proper ways to tackle the problem of technological innovation and Henderson’s repeated belief that, wherever the property of things exhibit an unmistakable pattern, pure chance does not offer a persuasive basis of scientific explanation, because it would make that pattern infinitely improbable.

In spite of the multiple threads of influence, Goodwin’s interest in the problem of teleology during the years 1932-1934 was not concerned with the way in which the problem had been posed by Henderson. For the latter, the fundamental problem consisted in the presence and significance of teleology in Nature at large and the reconciliation between teleology and mechanism within the general processes of cosmic and biological evolution. To him, the purposiveness of the human mind and the scientific explanation of free will were part of the more

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4The reading notes concerning Henderson’s treatment of Gibbs are on pages of the Black Notebook.
general problems posed by the origin of life and consciousness and had to be considered in the light of the movement of scientific thought ([12], p. 105):

...the whole tendency of science is either to destroy the novel character of the products of nature by discovering how they did really originate through necessary processes, or else to regard them as contemporaneous and coexistent with the universe itself...In the course of this movement of thought Driesch’s "dynamic" teleology of vitalism loses itself in the larger problem of the "static" telology of nature\(^5\), and Bergson’s *élan vital*, if it be admitted, becomes a question of detail.

In contrast with Henderson, for the politically involved young Goodwin, deeply interested in the problem of social revolution, the central concern was precisely a teleology of a sort apparently much closer to vitalistic ideas, a purposiveness which he, following Whitehead’s footsteps, associated with the creative power of mentality and the ingestion of originality in history. He insisted that teleology in Henderson’s sense was consistent with a mechanistic, if not a deterministic view of nature, and apparently failed to perceive that different notions of teleology co-existed in Henderson: in particular that the ‘static teleology of nature’ presented in *The Order of Nature* was much closer to a metaphysical hypothesis than the basic idea, recurring in Henderson’s writings, that a system of heterogeneous interacting parts performing specialized functions embeds a teleology of some sort. Interestingly, it is only the latter meaning of teleology that Goodwin attaches to the author of *The Fitness of the Environment*. Referring to Henderson’s books and to Professor MacDougall *Psychology* ([18]), Goodwin observes:

Purpose is a factor resulting from relation and is present in all systems or organisms. The universe is a system of systems. Any system is characterized by a division of function and a division of function is characterized by purposive action, thus teleology of a sort pervades everything. All this is quite different from Platonic normative teleology or purpose. This sets up an absolute standard which has a relation to the world of sense and a possibility of ingestion into this world. It is, unlike the other type of teleology, in direct logical opposition to a complete material determinism. It is this type of teleology, purpose, value, to which I shall refer in the use of these words henceforth.

2.3 Travelling on a metaphysical spaceship: close encounters with cybernetic themes

Before proceeding to discuss at greater length the Whiteheadian influence on the philosophical standpoint taken by the young Goodwing, concerning the

\(^5\)The statement gives further evidence of the static way in which the problem of teleology in *Nature* is posed by Henderson in 1917, as opposed to 1913.
problem of nature, mind and novelty, it is worth expanding on the fact that through Whitehead’s lectures, and as a result of the recommended readings for the course of ‘Philosophy 3B’, Goodwing is already exposed in 1932-33 to ideas that he was to re-encounter later in the period 1945-1950, possibly in a much refined form, while attending Norbert Wiener seminar at MIT.

In the 1982 interview to Maura Palazzi [22], Goodwin mentions only one among these ideas, namely the notion of negative feed-back, clearly a fundamental analytical tool throughout his scientific life. In the interview, Goodwin associates negative feed back to the delicate control mechanisms at work in the human body and in animals. Presumably, this fact had been already brought to his attention by the reading of The Order of Nature, where Henderson expresses the conviction he developed through his physiological studies on acidosis during the period 1913-1915 ([23], pp. 82-85), that biological organization is rooted in regulatory processes.

"...this idea of regulation, ... is certainly well defined in some departments of the science [of physiology]. And is unquestionably everywhere in use.

Perhaps the most convinient definition of regulation is Driesch’s: "We shall understand by regulation any occurrence or group of occurrences in a living organism which takes place after any disturbance of its organization or normal functional state, and which leads to the reappearance of this organization or this state, or at least to an approach thereto."

This statement bears the mark of having been formulated for the purposes of experimental morphology, and accordingly lacks the quantitative character that one finds in the investigations of physico-chemical regulations." ([12], p. 85)

Coherently with the ‘static teleology of nature’ presented in his 1917 book, Henderson is here inclined to present biological regulation and organization as in direct opposition to mechanism: "For biological organization is teleological and non-mechanical". ([12], p. 205). This view marks a sharp contrast with the way in which Norbert Wiener, jointly with Arturo Rosenblueth were to present their outlook of the relation between behavior, purpose and teleology in the years 1943-1950 marking Goodwin’s participation to Wiener’s discussion group ([29]; [31], pp. 1-29; [30]). According to Wiener and Rosenblueth:

Purposeful behavior is behavior oriented toward or guided by a goal ...[in the sense that] it should tend to minimize an error in one or more of its relations to the goal....Purposeful behavior requires that the acting object be coupled with the goal, that is, it registers messages from its surroundings.... Purposeful behavior is to be attributed only to an object which forms part of a larger system, i.e. to an object that is coupled to other objects or features in the environment in such a manner that changes in these objects or features will modify its behavior. This criterion renders the behavior
of an ordinary clock purposeless... Passive behavior may be purposeful or non-purposeful, much like active behavior. For example, it appears desirable to regard the motions of a magnetic compass that has been deviated from its resting position as purposeful, with the final resting orientation as the goal. ([30], p. 324-325)

This methodological approach does not imply the philosophical belief in final causes. ... We also wish to explain why we use the humanistic terms purpose and teleology in the description of the behavior of some machines. ... We believe that men and other animals are like machines from the scientific standpoint because we believe that the only fruitful methods for the study of human and animal behavior are the methods applicable to the mechanical objects as well. ([30], p. 326)

I quoted at some length from Rosenblueth and Wiener to contrast their notion of teleology with Hederson's and to suggest that Goodwin's 1934 remarks on "purpose as a factor resulting from relation and present in all systems or organisms" is much closer in spirit to the former than to the latter. For the young Goodwin, the fact that "any system is characterized by a division of function and a division of function is characterized by purposive action" makes teleology in this sense fully consistent with 'mechanism'. Precisely on this ground, however, he strongly objected to the view that as an object of scientific enquiry humans could be like machines: teleology as action directed toward a goal or function is well short of what is required by a scientific analysis of the creative power of the human mind and its role in social evolution.

The sharp opposition Goodwin draws in 1934 between mechanistic and non-mechanistic conceptions of reality is accurate enough to allow for the awareness that 'mechanistic' does not necessarily mean 'deterministic':

The question is we can apply the materialistic metaphysical outlook and the scientific methodology to the human studies. The answer must be stated plainly and clearly—No [emphasis in the original]. The Scientific materialism is an admirable, narrow abstraction and is applicable only to that part of the world which exhibits no high degree of mentality. Science achieved its amazing success by ignoring mentality (and hence man as a thinking being) and for that very reason it may not be applied uncritically to the study of man...([10], pp. X-XI)

The issue at stake with those who wish to make a science of the study of society is whether or not man's actions are completely determined and whether or not, even allowing indeterminism, there is merely chance, probability or real purpose, teleology [emphasis added]. ([10], p. XII)

From the very beginning of the course 'Philosophy B', Whitehead's lectures of on 'the laws of nature' (delivered between October, 4 and October 13, 1932)
alerted Goodwin on physicists’ knowledge that “most 19th century laws were statistical not absolute”. Maxwell’s equations appear in examples and there is also a hint at the subjective versus objective interpretation of the probabilistic character of the laws of nature. In October, 4 Goodwin writes on his notebook:

Determinism[,] nature is capricious, but to what extent is this due to our ignorance? ([9], p.15)

Most relevant for Goodwin intellectual concerns, were some arguments he come to know through the reading of The Order of Nature, suggesting that the indeterminacy of physical laws could be used to show that "the psychical may impinge upon the physical"[6]. Likewise, Clerk Maxwell’s discussion of free will reported in the appendix to [12], though not reaching a definite conclusion, "revolves about the concepts of singularity and statistics" (p. 103).

These attempts at building a bridge between physics and mind were to the eyes of a politically active student a far cry from a persuasive explanation of the creative power of ideas in social evolution and even more from a serious attack to the problem he was concerned with: the ingestion of ‘value’ in history and its relation with change and revolution. The scientifically inclined, but socially and politically involved Goodwin, found in Whitehead’s philosophy a far richer framework of thought that seemed to be able to tackle both the scientific problem of the relation between mind and nature and, at the same time, the role of ideals and their relation to ‘value’.

A final point concerning Goodwin’s early encounter with cybernetic themes, as observed through the lenses of Whitehead’s philosophy, revolves around the irreversibility of time’s arrow. Thre crucial point to observe here is that Whitehead’s theory of the ‘passage of nature’ and simultaneously, his theory of special relativity, with which Goodwin proves to have at least some degree of acquaintance in 1932-34, have direct and diverse bearings on the way in which times irreversibility is approached. This approach marks a difference, both with respect to Bergson, and also with the line of argument, that Goodwin was to encounter more than ten years later, as developed in Wiener’s Cybernetics ([31], chapter 1).

In Wiener’s line of argument, probability is the key word. With the advent of statistical mechanics, associated with the succession of names Maxwell, Boltzmann, Gibbs, the impossibility to have an accurate record of the initial positions and velocities of the physical particles of a thermodynamical system, implies that "we deal not with a single dynamical system, but with a distribution of dynamical systems". In such a framework, much like in Charles Darwin’s origin of species, "we have a mechanism by means of which a fortuitous variability...is converted by a dynamical process into a pattern of development which reads in one direction" ([31], p. 37, emphasis added). Heisenberg’s theory strengthened the conclusion further, because it implied that even if the complete record of

[6] Henderson mentions in this respect arguments made by Charles Peirce and by the mathematical physicist Boussinesq ([12], p. 100-102), adding that their ideas "have not yet exerted any appreciable influence upon thought".
As shown above, Goodwin’s undergraduate studies made him well aware of the probabilistic nature of ‘most 19th century physical laws’ and of Gibbs’ ensemblable approach to statistical mechanics. Still, at this stage, his persuasions on the structure of time bear a different mark, that of Whitehead’s theory, as developed in his late metaphysical works. In this respect, two characteristic traits of Whitehead’s mature philosophy need be considered here, because they leave an explicit trace in Goodwin’s notes and writings.

First, is the idea that in the ‘organic theory’ we do not have the same permanent ultimate reality postulated by the materialistic theory, such as matter and electricity. The atomic, material, and durable entities considered in physics are conceived as existing independently of their mutual relations. Such relations do not define what these entities are in themselves. The situation is reversed in the organic theory, where the conception of an ultimate entity (an organism) includes the conception of an inner action between organisms. In this philosophy, there are not permanent things except the structures of activities, and these structures are the outcome of evolution ([26], chap.VI). Whitehead’s charge to vitalism is precisely that it accepts the basic fact of mechanism based on materialism, and simply adds to it the vital principle to explain the actions of living things. According to Whitehead there is not a divide in this respect between the living and the not-living. Much like the living occasions, the non living actual occasions are organisms, and what they are in themselves is subject to be modified by the environment, that is the nexus of relatedness (‘social order’, ‘society’) in which they are embedded (ibidem). According to Whitehead, it is an implication of this doctrine that the laws of nature evolve:

Maxwell’s equations of the electromagnetic field hold sway by reason of the throngs of electrons and protons. Also each electron is a society of electronic occasions, and each proton is a society of
protonic occasions. These occasions are the reasons of the electromagnetic laws; but their capacity for reproduction, whereby each electron and each proton has a long life, and whereby new electrons and new protons come into being, is itself due to these same laws. But there is disorder in the sense that the laws are not perfectly obeyed and that the reproduction is mingled with instances of failure. There is accordingly a transition to new types of order, supervening upon a gradual rise into dominance on the part of the present natural laws.

In October 6, 1932 Goodwin aptly reports in his Black book of lecture notes:

Hence laws [of nature] may well evolve. Eternal laws must be tossed out. The older characteristics slowly go out of existence as new forms gradually become more important ([9], p. 23).

Goodwin is therefore aware that the irreversibility of time’s arrow takes in Whitehead’s theory a distinctly cosmological connotation. He is also acquainted with other, and quite different aspects of the philosopher thinking about the structure of time, that derive from the influence that Einstein’s theory of special relativity exerted upon Whitehead since 1915 ([15], p. 95). Goodwin’s lecture notes report various criptic remarks on Einstein’s special relativity, and also on general relativity. As is well known, Whithead rejected the latter, on the ground that the implied deformations of the space-time manifold were not in accord with the uniformity of ‘the extensive continuum’ delivered by sense awareness. Goodwin was presumably familiar with the remarks on relativity contained in Science and the Modern World ([26], chap. VII) Moreover, he reports in his Black Notebook the notes from Whitehead’s lecture of November 8, 1932, which dealt quite extensively with the problem of time measurement. In this lecture Whitehead presented to his class the proposition that what is in the immediate present of one perceiver, may be in the past or future of another ([9], pp. 129 and 131). The same point is addressed in Process and Reality Part 2, Chapter 4, section VIII ([27], pp. 123-126), which was optional reading for the course Philosophy 3B ([9], p.5). The retransitivity, but non-transitivity of the relations 'A is in the immediate present of B' and 'B is in the immediate present of C' means that C may be in A’s past or future. This implication of special relativity poses serious problems to the evolutionary cosmology characteristic of Whithead’s philosophical construction. Events (occasions) in the immediate present of a perceiver, must fully exist for that perceiver. The full existence of occasions A, B, and C means that occasions in A’s past or future fully exist.

The result is that all event-particles in the past, present, and future of all perceivers fully exist, and we seem to be left with the "block universe" advocated by relativity theorists such as Adolf Grundbaum ([15], p. 97).

7 Cf. [27], p. 91. On the evolution of natural laws in Whithead’s theory see [24], pp. 217-218.
Goodwin was not particularly interested in Whithead’s theory of time measurement. He only mentions in his thesis that Whithead had a semi-relativistic theory of time, and he may even have skipped the reading of Chapter 4, Part 2 of *Process and Reality*, on the ground that it was optional material for the course. He was probably unaware of the problems posed to Whitehead cosmology by special relativity, and of the solution the philosopher offered to such problems in *Process and Reality*. In this period, Goodwin was most interested in a kind of irreversibility, which was different from, and less general than the irreversibility tied with the emergence of novelty in nature at large. The latter regarded all natural phenomena, including the most simple, elementary non-living occasions, and the possible evolution of the laws of nature. The type of irreversibility Goodwin was most concerned with in 1932-1934 was, instead, that brought into the world by the creative power of the human mind.

3 Nature, Mind and Novelty

For a young undergraduate student in political science and philosophy, with a strong intellectual curiosity for the hard and natural sciences, a special gift for visual art, a deep concern for social problems, and, last but not least, a gentle, sensitive soul, Whitehead’s philosophy offered a unique framework apt to creatively reconcile interests, aspirations and emotions.

A number of aspects of Whitehead’s construction are worth recalling in this respect. Most important, is the attempt pursued by Whitehead to produce a cognitive model that would bring coherence between man’s subjective perception of nature through sense awareness, and the brilliant achievements of man’s scientific knowledge of nature. Commenting on this point, P. Hurley observes: ([15], pp. 89-90) "By doing so, he hoped to avoid what he called the 'bifurcation' of nature—the separation of our scientific knowledge of nature from our everyday expression of this knowledge". This project finds its full expression in the metaphysical works, and notably in the "scheme of ideas" of *Process and Reality*, which tries to interconnect "all that is given for thought, for perception and for feeling". The bifurcation of nature had its origin in the duality between mind and matter, which is characteristic of western philosophy after Descartes. At the time, and in the years immediately preceding the publication of *Science and the Modern World* ([26]), this problem occupied a position at the center stage of the discussion that was taking place between the British Emergentists. This is a philosophical tradition that began with John Stuart Mill’s *System of Logic* (1843), proceeded through Alexander Bain’s *Logic* (1870), George Henry Lewes’s *Problems of life and Mind* (1875), Samuel Alexander’s *Space, Time and Deity* (1920) and Lloyd Morgan’s *Emergent Evolution*. In the preface to his 1925 book ([26]), Whitehead admits his indebtedness to Lloyd Morgan and Samuel Alexander. Notably, in 1934 Goodwin had direct knowledge of the British emer-

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8 In the reading list for the course Philosophy 3B, reported on pages 1, 3, and 5 of the Black Notebook, Goodwin did not attach to chapter 4, part 2 of [27] the small marker attached to most other items in the list.
gentists through the reading of the 1925 book *Mind and Its Place in Nature*, by C. D. Broad, which is, according to B. P. McLaughlin ([19], p. 49), the last major work in this tradition. Chapter 3 of Broad’s book deals with the mind-matter duality, and its telling title "The Traditional Problem of Body and Mind" is explicitly quoted in Goodwin’s thesis ([10], p. XV).

This suggests that Goodwin had the opportunity to appreciate the fundamental differences separating Whitehead’s ideas on mind and body from the position expressed by the British emergentist. The latter believed in the ontological supremacy of physical reality:

> everything is made of matter: There are, for example, no Cartesian souls, or entelechies, vital elan, or the like. matter is grany, rather than continuous: it bottoms out into elementary material particles, atoms or more fundamental particles...nothing happens, no change occurs, without some motion of elementary particles([19], pp. 49-50).

There is however a hierarchical structure in the organizational complexity of the aggregates of material particles composing the world of nature, and each layer in this hierarchy defines a particular level of reality, from the physical, to the chemical, to the biological, to the psychological. Each layer, in as far as it *partly* results from a deducible re-organization of the structures dominating in the previous more basic layer, is derivative with respect to the latter: it has "reducible characteristics". Other properties of the layer are instead to be found unchanged in all lower layers. "These might be called ... Ordinarily Neutral properties, since they appear unchanged in living bodies, chemical compounds, elements, etc." ([4], chap. 2). There are, finally, unique, specific characteristic of the given layer "that cannot be deduced from the structure of the aggregate and the properties of its constituents by any law of composition which has manifested itself in lower orders. These might be called the "ultimate characteristics" of the order" ([4], chap. 2). The fact that the structures prevailing at a given layer possess ultimate characteristics qualifies them as emergent; the laws that derive their causal power from such ultimate characteristics are emergent in the same sense: they can not be derived from the laws governing at the lower, more fundamental levels.

Richard Goodwin was intrigued by the possibility he envisaged of extending Broad’s idea of emergence to society, conceived as a complex system exhibiting hierarchic organization. In a footnote to his thesis he writes:

> Broad, *Mind and Its Place in Nature* [underlined in the original]. Speaking from his intimate knowledge of science argues for the theory of emergence and shows the necessity of viewing the universe as exhibiting different orders of reality (based on the concept that a whole may contain aspects for investigation not found in the parts). With intra-ordinal laws, as well as trans-ordinal laws thus for society we would have different types of reality requiring a different method of investigation. ([10], p. XXI, note 1)
Whitehead rejected the ontological supremacy that the British emergentists assigned to matter; in his view 'mentality' participates to every layer of reality. His ultimate entities are actual occasions that are not permanent, but quanta extended in time and space, each endowed with a possibly very low level of mental characteristics, such as 'experience'. An elementary particle of physics is, in Whitehead's construction, a temporally extended sequence of actual occasions, such that the coming into being of an actual occasion is causally related to the passing out of existence of the occasions preceeding it. Perception in the mode of 'causal efficacy', that is the mode of inheritance from the past, is a characteristic shared by every elementary actual occasion. The other pure mode of perception is 'presentational immediacy', that is, the distinct consciousness of the extensive relations of the world ([24], p. 236). Finally, there is a mixed mode of perception, 'symbolic reference', which is an integration of, and an interplay between, the previous two pure modes, and which is characteristic of fully alert human perception ([24], p. 246). Perception other than causal efficacy is shared only by the more organized 'societies' of actual occasions. Indeed, it is only the evolution of highly organized societies of actual occasions that enables the development of intense, coherent and fully conscious thought ([28], chap. 13, par. 6). The activity of symbolic reference characteristic of the human mind is subject to the possibility of error, but this very possibility is the source of learning and of originality, that is, of creativity.

In the divergence between Whitehead and the British emergentists concerning the mind-body problem, Goodwin totally sided with the former. In the introduction to his 1934 thesis, with the telling subtitle 'on the necessity of metaphysics' he produces a synthesis of Whitehead's standpoint, which is worth quoting at some length:

Professor Whitehead has attempted to widen the theoretical basis of science in such a way as to include mentality, human beings and at the same time to destroy none of the validly useful scientific operating assumptions. By doing this he has potentially cross-fertilized the working concepts both in the field of science and in the humanities.

I can only give the merest suggestion of his metaphysical reconstruction and its application to concepts used in the humane studies. He attacks the basic conception of matter having the property of simple location in space and time. To remedy this narrowness he proposes the philosophy of organic mechanism. This leads to a rejection of the ruinous duality of mind and matter and substitutes the conception of reality as bi-polar, being composed of physicality and mentality. The element of mutual relationship assumes great importance and the intrinsic character of each event is a product of his social environment. This basis gives rise to a better set of concepts to deal with the newer approaches to matter as energy and the increasingly organismic aspect which the material world is weaving. It leads to the direct denial of the futile, insoluble mind-body
problem, is it was posed by the scientific Weltanschauung.

Professor Whitehead has developed a semi-relativist theory of time closely following from the character of his whole philosophy…

The future is not determined by the past but is only conditioned by it. Each event is causally free from all other events contemporary with it, though they are not independent for they have a common past and they are the products of the past. Thus in the immediate present there is a possibility of freedom. Mentality is the source of novelty. In the more inorganic world the element of the element of physicality predominates and each event is completely determined by the past. But in the more organic and complex spheres the element of mentality asserts itself and the possibility of freedom is realized. Through mentality and resultant will-actions eternal objects serving as standards of value enter into the world of process and reality. Thus ideas can and do have an effect in the world of sense and there is gradually realized in this world a purposive, normative, teleological element. A determination to do something resulting in action is a final cause in the material world. ([10], pp. XIV - XVI)

4 Conclusions: lasting persuasions from a metaphysical trip

The late Goodwin liked to suggest that the intellectual background with which he first arrived in Cambridge, Massachusetts, was unsophisticated and strongly deficient, if compared to the background of a more typical 1st year Harvard undergraduate. He presents himself as the somewhat uncharacteristic product of a characteristic Mid-West town, which for the first, and possibly last, time in its history was sending to Harvard a best student from its ‘bad highschool’.([22]). In spite of the initial difficulties, Goodwin’s college and undergraduate experience proved ‘wonderful’. Possibly because his first encounter with the Harvard scientific community was so meaningful to him, the intellectual solicitations that he was harvesting in those years come primarily from that community. Be as it may, my reading of Goodwin’s papers of 1932-1934 tells also a partly different story. Goodwin seems to be perfectly at ease with the intellectual stimuli he was receiving. The remarkable scope of his readings was oriented by a genuine and pre-existing interest in the methodological problems that were specific to the social sciences; and it reached further out, into the methods which marked the success of the natural sciences. Notably, his knowledge of the foreign languages enabled him to study at least part of the works of the young Marx in their original German edition. In sum, the undergraduate from a Mid-West town was sophisticated enough to perceptively recognize the wide-reaching scope of the vision embedded in Whitehead’s metaphysics, and its relevance to the questions of social change he was most concerned with at the time, rationally as well as emotionally. This set of circumstances produced a temporary nearly complete
identification with Whitehead’s philosophy. Although Goodwin’s case may be extreme in this respect, let me here recall that fresh, open minds were not insensitive to the intellectual charisma and generosity of the English philosopher. Five years before Goodwin, a 25 years old Oskar Morgenstern formed amid the discussions of the Viennese circles, had been admitted to Whitehead’s Friday private seminar, while visiting Harvard in 1927. He brought back to his Vienna vivid impressions from those evening discussions and from the philosophical conversations taking place on Sunday’s evenings in Whitehead’s house⁹.

Presumably, R. Goodwin’s intellectual fascination for Whitehead’s ontology was not long lasting. I do not know of direct or indirect reference in his post 1934 writings to the bipolar, mental-physical character of reality, or to the notion that reality does not consists of things, but of processes. Perhaps, the fact that Goodwin, after he later turned to economic theory, lost interest in Whitehead’s metaphysics may be explained by Georgescu-Roegen’s remark that Whitehead’s definition of a process was not operational, that is, it could not be of any direct use to science ([6], note 7).

Other aspects of Goodwin’s philosophical formation in 1932-1934 were not indissolubly tied with Whitehead’s metaphysics and exerted probably a more lasting influence on his later scientific work. Among them is the conviction matured in those early years, that metaphysical constructs play a crucial role in science and more generally in the process of producing new ideas. At that time, Goodwin’s explanation of the fact that this conviction was so uncommon among men of science bears unmistakably Whitehead’s imprint: it is presented as a result of the widespread acceptance of the ’bifurcation of nature’:

Hume and Kant showed the inability of two of the greatest of minds to solve the philosophic problem posed by this duality of things. Philosophers plowed even deeper into the mind and became ever more futile. Science had received a valuable if limited oversimplification, philosophy an insoluble problem; Science prospered and flourished, philosophy withered into cribbed narrowness.

Like every parvenu, science came to deny loudly its own origins by denying any philosophical background. The Best way to attack this position was to go back to the beginnings of modern science and show its thorough grounding in metaphysics both explicit and implicit. This is what Professor Whitehead somewhat sketchily but with great insight, and E. A. Burtt, more in detail, have done ([10], p. IV-V).

Burtt’s 1924 book *The Metaphysical Foundations of Modern Science* is cited in the Introduction to *A Critique of Marxism*, together with other works that Goodwin regards as important to the formation of his personal Weltanschaung. It is cited also in the final bibliography of [10]. Here, an enthusiastic remark is added to the corresponding reference item:

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⁹Cf. [16], pp. 302-303. Hints to the power of Whitehead’s vision are still not unfrequent in contemporary science, be it fundamental-particle physics, cosmology, or complexity theory.
I do not think the great importance, value, and excellence of this book has been adequately recognized. He has undertaken to treat an important topic and has done it well. ([10], Bibliography, p. ii)

Obviously enough, the conclusion that the separation between science and philosophy is harmful, or unnecessary, may be accepted quite independently of one's beliefs concerning Whitehead's metaphysics. In particular, there is a weak version of the belief in the scientific role of metaphysical ideas, that amounts to admit that scientific discovery may avail itself, if only temporarily, of conceptual constructs that do not have any testable empirical counterpart, and that do not give rise to the prediction of novel empirical facts that are inconsistent with the received theory. In this weak version, at least, that belief may well have survived after Goodwin lost interest in Whitehead's scheme of ideas. This leads to raising the question concerning R. Goodwin's mature convictions on the relation, if any, between the conceptual constructs of economic modelling, and the methods and contents of empirical analysis. I would rather leave the answer to this question to a future paper, or to philosophically more equipped scholars. Let me observe here, in passing, that the appeal to metaphysical ideas, such that the 'anthropic principle' has become standard practice in contemporary physics, to the point that the now dominant string theory is under attack by some qualified critics for it being persistently unable of producing empirically testable novel predictions. The final and most important item in Whitehead's intellectual bequest to Goodwin is the set of ideas connecting the philosophy of organism to the grand theme of the relation between order and change. This amounts to the relation between givennes, which is causally carried in the present by history, and freedom for action, freedom for the production of a new order. Such freedom is rooted in the fact that the societies of actual occasions evolve into ever more complex organizing structures, and finds its full expression in the production of new ideas by the human mind.

Order is not sufficient. What is required, is something quite more complex. It is order entering upon novelty; so that the massiveness of order does not degenerate into mere repetition; and so that the novelty is always reflected upon a background of system ([27], p. 339).

Whitehead's vision of evolution as resulting from the dynamic relatedness of order and change, being and becoming, was a fundamental guide to Goodwin's reflections on the problem which occupied in 1932-1934, and later, a prominent position in his mind, rationally, as well as emotionally: the relation between historical determinacy, revolutionary change, and emergence of a new social order.

A few years later, the grand theme of the relation between order and change, equilibrium and disequilibrium, emergence of novelty and re-structuring of the

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10 Physicist Lee Smolin's summary of the situation runs as follows: "We have regrettably reached the conclusion that string theory has made no new, precise, and falsifiable predictions" ([25], p. 170)
social order was to come back again forcefully in a second intellectual heritage that Goodwin was to receive at Harvard: I am obviously referring here to the influence of his Master Joseph Schumpeter.

References


