

Epistemology and Metaphysics in Interdisciplinary Communication: Insights from Ian Barbour and Bernard Lonergan, SJ

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ABSTRACT

Interdisciplinary communication is a significant area of concern for researchers who engage in scholarship across academic fields as well as practitioners whose work is intrinsically interdisciplinary. Two twentieth century scholars, Ian Barbour and Bernard Lonergan, SJ, develop novel approaches to promoting interdisciplinary communication (and in some cases interdisciplinary “integration”) by specifying a common metaphysical and epistemological framework for two very different fields. In this article, we concisely explicate their fundamental approaches and also critically engage particular aspects of their work. These philosophical approaches to interdisciplinary communication may be beneficial for both first-order cybernetics, with its emphasis on communication & control in biological and engineering systems, as well as second-order cybernetics, given its emphasis on epistemology, ethics, self-referentiality, and self-organization of socio-technical systems.

Keywords: Interdisciplinary Communication, Ian Barbour, Bernard Lonergan, Epistemology, Metaphysics, Theology & Science, Realism

1. INTRODUCTION

In light of the persistent problem of “academic silos” in the contemporary university, recent work by Nagib Callaos and Jeremy Horne, and others, have demonstrated the importance of interdisciplinary communication for those engaged in the advancement of scientific research [1]. Ian Barbour (1923–2013) and Bernard Lonergan, SJ (1904–1984), offer concrete approaches to interdisciplinary communication by advocating a common epistemology and metaphysics for integrating diverse academic disciplines. In this paper, we strive to answer questions such as, Can we build philosophical bridges to promote interdisciplinary communication? Can we unify discipline *A* and discipline *B* within a comprehensive conceptual scheme? What type of integration can be achieved between discipline *A* and discipline *B* when a systematic synthesis is achieved through a shared epistemology and an inclusive metaphysical system?

2. PHILOSOPHICAL FOUNDATIONS

Given the multivalent character of key terms, we carefully specify their meaning in the context of this paper. The English term, “epistemology,” comes from the Greek, *epistḗme*, meaning “knowledge.” It is the branch of philosophy concerned with the theory of knowledge. Epistemology is the study of the nature of knowledge, its justification, and the rationality of belief [2].

Metaphysics is from the Greek *meta ta phusika* (beyond the physics [of Aristotle]). It is the branch of philosophy that engages the most general and fundamental principles underlying all reality and all knowledge. Metaphysics is the science of being as being, seeking knowledge through causes. The material object of metaphysics is being, the whole of reality (subjective or objective, possible or actual, abstract or concrete, immaterial or material, infinite or finite). Metaphysics is unique in that its focus is “being as being” (the formal object). “Everything that exists comes within the scope of metaphysical inquiry.” [3]

Other sciences are restricted to one or several departments of being. For example, physics studies phenomena from the point of view of quantity, or more precisely, measure. Mathematics is concerned with those things which have quantity, or more generally things that can be characterized by abstract structure and relationships (measurements being only one dimension thereof). Metaphysics has no such restrictions.

Barbour, an experimental physicist and Protestant theologian, and Lonergan, a philosopher, Catholic theologian, and economist, both suggest a “critical realist” epistemology. Barbour’s preferred metaphysical framework for a systematic synthesis between disciplines, in particular natural science and theology, is the process thought of Alfred North Whitehead [4]. Lonergan, on the other hand, develops his own generalized empirical method (GEM) in which the being investigated is that which occurs within consciousness [5]. We compare and contrast these two approaches as well as briefly critique them.

3. IAN BARBOUR

Ian Graeme Barbour was born on October 5, 1923 in Peking (now Beijing), China. He earned a BS (Physics) from Swarthmore College, a MS (Physics) from Duke, a PhD (Physics) from the University of Chicago, and finally a BDiv (Theology) from Yale University. His early career research focused on the use of photographic emulsions to study cosmic-ray mesons. Barbour served briefly as a professor at Kalamazoo College and later, for many years, at Carleton College. He was invited to give the Gifford Lectures (1989-1991) and received the prestigious Templeton Prize (1999) [6, Ch. 1] .

Barbour's formal theological education at Yale Divinity School was a decisive experience in his development as a scholar. In 1953, a Ford Foundation Fellowship enabled Barbour to apply to Yale Divinity School to pursue a formal theological education. He enjoyed his classes so much that he extended his sabbatical leave from Kalamazoo College an additional year. With supplementary course work taken over two summers at Union Theological Seminary in New York, Barbour earned the Bachelor of Divinity degree [6, p. 28].

One of Ian Barbour's significant contribution to the field of theology and science is his four-fold typologies of interaction. He describes how theology and science, indeed any two fields, can be in a relationship of *conflict, independence, dialogue, or integration* [7]. Barbour developed a common epistemological and metaphysical approach for both theology and science. Coming from a scientific background as an experimental physicist, Ian Barbour views theories as representations of the world. He was always a philosophical realist. In the inaugural issue of *Zygon: Journal of Religion & Science* in 1966, Barbour first introduced his notion of critical realism [8]. The idea was popularized that same year when Barbour published his now classic work, *Issues in Science and Religion* [9].

Critical realism is a theory of knowledge that Barbour uses throughout his scholarly work. It considers scientific theories and theological doctrines as offering partial, revisable, abstract, but *referential* knowledge of the world that can often be expressed faithfully with models and metaphors. Surprisingly, Barbour's descriptions and definitions remain somewhat informal compared to other epistemologies. At times, he defines his terms by means of mere negation. Barbour rejects the positivist position that views theories as merely summaries of data, the instrumentalist position that sees theories as simply useful tools, and the idealist position that reduces theories to mental structures. In order to justify his starting point in realism, which he ultimately hopes to apply both in the natural sciences as well as theology, he confronts the other common epistemologies present in the mid-twentieth century [6, p. 98]. Barbour writes,

Against the positivist, the realist asserts that the real is not the observable. Against the instrumentalist, he affirms that valid concepts are true as well as useful. Against the idealist, he maintains that concepts represent the structure of events in the world. The patterns in the data are not imposed by us, but originate at least in part in objective relationships in nature. The object, not the subject, makes the predominant contribution to knowledge. Hence science is discovery and exploration, not just construction and invention [9, pp. 168–169].

Here we note a strong contrast with the even more Kantian “constructivist epistemology” popular among second-order cyberneticists [10], [11]. The German-American philosopher and psychologist, Ernst von Glasersfeld, defines “radical constructivism” with the following two principles:

- 1) “Knowledge is not passively received either through the senses or by way of communication, but is actively built up by the cognizing subject.
- 2) The function of cognition is adaptive and serves the subject's organization of the experiential world, not the discovery of an objective ontological reality.” [12, p. 88]

Although they represent a great diversity of viewpoints, Barbour mentions Max Planck, Albert Einstein, Norman Robert Campbell, William Henry Werkmeister, Alfred North Whitehead, Thomas Nagel, and the Neo-Thomists, as significant thinkers (or schools of thinkers) who support some form of philosophical realism. The creativity of the human imagination and the presence of mental constructs certainly influences the interpretation of experiences, including scientific ones. Therefore, Barbour advocates a “critical” realism that acknowledges the creativity of the human mind as well as the true presence of patterns in events that are not the product of mental operations. This realism must also recognize the indirectness of reference and the realistic intent of scientific language. According to Barbour, critical realism supports both the highly abstract nature of theoretical physics, as well as the requirement for corresponding experimental investigation [9, p. 172].

Barbour's critical realism posits that scientific theories are representations of the objective world. A theory is generally said to be valid for a scientist if it is both true and useful. Always careful to avoid naïveté, Barbour also recognizes that all scientific theories are incomplete and selective, i.e., they describe particular aspects of the natural world for specific purposes. His epistemology strives to avoid both the errors of “literalism” and “fictionalism” in theoretical models. A critical realism approach takes these models seriously, but not literally. Ultimately, Barbour's critical realism posits that being, *as event*, precedes knowing [6, pp. 103–104].

Barbour's ontological foundation in process thought can be traced all the way back to the sixth century before Christ with the pre-Socratic Greek philosopher, Heraclitus of Ephesus. Heraclitus' theory of a "ubiquitous dynamicity" conjectures that a cosmic fire is the source of all change in the universe. His fundamental doctrine is often concisely summarized with the maxim: "everything flows." It has also come down in the popular saying: "No man ever steps in the same river twice." With the later development of the theories of atomism of Leucippus, Democritus, and Epicurus, a "counter-model" emerged that would be highly influential in Western thought for many centuries to come [13]. The "substance metaphysics" of Aristotle would eventually eclipse Heraclitus' approach. Process thought did not make a serious return until the twentieth century English-American philosopher of science, mathematician, and logician, Alfred North Whitehead.

In his Lowell Lecture of 1925, Whitehead stated that "nature is a structure of evolving processes. The reality is the process." [14, p. 106] In the next years, Whitehead developed this view into an entirely new metaphysics. Originally presented at the Gifford Lectures, it would take its published form in the 1929 book *Process and Reality*. Whitehead begins his quest stating that his goal is to develop a speculative philosophy, "a coherent, logical, necessary system of general ideas in terms of which every element of our experience can be interpreted." [4, p. 5]

Whitehead's goal was to develop a metaphysical with both a rational side (expressed by the terms "coherent" and "logical") and an empirical side (expressed by the terms "applicable" and "adequate"). Ian Barbour adopts, adapts, and in many ways simplifies Whitehead's exceptionally detailed and complex metaphysics. He identifies four aspects of Whitehead's system that he sees as particularly consistent with twentieth century science and its evolutionary, many-leveled view of nature: the primacy of time, the interconnection of events, reality as an organic process, and the self-creation of every entity [9, pp. 129–130].

Overall, Ian Barbour finds process metaphysics to be an amiable first philosophy for the natural sciences. Both process thought and modern science rely on concepts of temporality, indeterminacy, and holism. In common with evolutionary biology, process metaphysics emphasizes historical continuity. Barbour's panexperientialism, a variety of dipolar monism, posits that every actual, integrated event, no matter how small, includes the capacity for experience. This subjective aspect can be described as "mind" or "consciousness" in higher-level organisms [15, p. 112]. Barbour also appreciates the parallels with the general systems theory of Ludwig von Bertalanffy, the systems philosophy of Ervin Laszlo, and the theory of cybernetics of Norbert Wiener, which emphasize concepts such as hierarchy, constraints,

emergence, communication, and feedback [16, pp. 291–292].

4. FR. BERNARD LONERGAN, SJ

Bernard Lonergan was born in Buckingham, Quebec, Canada in 1904. He studied philosophy at Heythrop College, London as well as mathematics and classics at the University of London. He ultimately earned the Doctor of Sacred Theology degree (the ecclesiastical equivalent to the American research doctorate, i.e., the PhD) from the Pontifical Gregorian University in Rome. Over the course of his academic career, Lonergan served on the faculties of Le Collège de l'Immaculée-Conception, Montreal; the Thomas More Institute, Montreal; Regis College, Toronto; and the Pontifical Gregorian University, Rome [17].

In his 1957 book, *Insight*, Lonergan, developed his now popular "generalized empirical method" (GEM). The GEM divides the process of human knowing into four levels: experience, understanding, judgment, and decision. Lonergan refers to the GEM as a transcendental method and a critical realism [18]. Like Ian Barbour, his realism is inspired by the practice of natural science. He too wants to avoid the errors of naïve realism on one hand, and empiricism on the other [19, p. 224].

Following Saint Thomas Aquinas, Lonergan maintains realism by according a priority to being and affirming that man makes true judgments of fact and of value. In light of Kant, Lonergan incorporates a "critical aspect" as he sought to establish a theory of cognition in a critique of the operations of the mind. Lonergan, and his fellow influential Jesuit philosopher and theologian, Karl Rahner, believed that one needed to investigate the conditions in man for the possibility of knowing. This led to ideas such as Rahner's *Vorgriff* [20]. One goal of the GEM is to inspire an "intellectual conversion" by which an individual has personally engaged the tasks of a cognitive theory, an epistemology, a metaphysics, and a methodology. This "conversion" involves a "breakthrough" into the operations of one's own mind [5, p. 532]. It is similar to Saint Augustine's transformative experience in the summer of 386 when he read "a few books by the Platonists" and learned about the existence of spiritual realities, the eternity of the soul, and the notion of evil as a privation [20, p. xv].

Lonergan's critical realism emerges from a personal journey of philosophical self-appropriation, using exercises that stimulate insights from mathematics, the natural sciences, and common sense. For Lonergan, the key question is, What do I do when I know? In *Insight*, Lonergan states,

The crucial issue is an experimental issue, and the experiment will be performed not publicly but

privately. It will consist in one's own rational self-consciousness clearly and distinctly taking possession of itself as rational self-consciousness. Up to that decisive achievement all leads. From it all follows. No one else, no matter what his knowledge or his eloquence, no matter what his logical rigor or his persuasiveness, can do it for you [5, p. 13].

According to Lonergan, to correctly arrive at the fourth level of the GEM (i.e., decision), one needs the intellectual conversion that consists in the getting the first three levels correct. In the view of the Canadian theologian, Paul Allen, what is crucial to appreciate from Lonergan's theory of knowing "is that the justification of critical realism as a theological epistemology arises from the success of theological method, not as something presupposed by artificially imposed categories." [22, p. 428]

The German philosopher and theologian, Andreas Losch's, research has shown that Lonergan's critical realism includes the medieval sense of the term "realism," vis-à-vis the reality of universals. Barbour's critical realism on the other hand is primarily concerned with the question of the existence of the spatio-temporal cosmos in light of Kant [23, p. 104]. The American philosopher, Phillip Thompson, points out that Lonergan made a significant contribution with his epistemology as it created a "bridge," or "single perspective," that could be shared by mathematicians, natural scientists, philosophers, and theologians, to promote an authentic dialogue [24, p. 1]. For Lonergan's metaphysics, the axioms are not a "set of propositions, but the dynamic structure of the human mind." [5, p. 532]

The GEM's metaphysics includes the relationship between the processes that direct our curiosity as well as the realities that we wonder about. Concisely describing Lonergan's vision, the American theologian, Tad Dunne, writes,

The assumption is that when they operate successfully, the processes of wonder form an integrated set isomorphic to the integral dimensions of reality. For example, the scientific movement from data to hypothesis to verification corresponds to Lonergan's view that knowing moves from experience to understanding to judgment, as well as to Aristotle's view that reality consists of potency, form, and act. In GEM, then, metaphysics comprises both the processes of knowing and the corresponding features of anything that can be known. [17].

Lonergan posits three stages of metaphysics. He defines "latent metaphysics" as the immanent and operative structure of human knowing, guided by the unrestricted desire to know. "Problematic metaphysics" is how he describes the attempts throughout the history of philosophy to make explicit the so-called "latent

metaphysics." Finally, Lonergan defines "explicit metaphysics." He claims that one may reach this level only after one has achieved "self-appropriation." Lonergan's "method of metaphysics" is primarily oriented toward self-appropriation, which is a personal achievement [5, Ch. 14].

In *Method in Theology*, Lonergan groups the processes by which theology reflects on religion into eight specializations (research, interpretation, history, dialectic, foundations, doctrines, systematics, and communications), each with functional relationships to the others. These may be adapted and apply equally well and be equally important (*mutatis mutandis*) in other disciplines. In fact, Lonergan expanded the concept of functional specialties to other disciplines such as ethics, historiography, and the social sciences by associating his notion of "doctrines, systematics, and communications" with "policies, plans and implementations," respectively [19].

His four levels of human self-transcendence are being attentive, being intelligent, being reasonable, and being responsible. They are applicable both for understanding the past and preparing for the future. For example, one learns about the past by moving upward through research, interpretation, history, and a dialectical evaluation. One may prepare for the future by moving downward through foundational commitments, basic doctrines, systematic organizations of doctrines, and communication of the resulting meanings and values. Lonergan points out that the future moves quickly into the past, and the process continues [17]. There are many striking parallels between Lonergan's work and that of second-order cybernetics. The reader is referred to [25] for an analysis of some of these issues.

5. CRITICAL ENGAGEMENT

While it is impossible to address all the nuances of the thought of Barbour and Lonergan in a short paper, in this section we assess aspects of their thought that clearly contrast with classical, Aristotelian-Thomistic realism. In light of Descartes and Kant, both Barbour's and Lonergan's critical realism does not give an adequate account of the important metaphysical fact that the simple actuality of being precedes the knowing of any particular individual. Barbour's critical realism can easily be interpreted as an attempt to elevate potency over act, creating two, interrelated problems. First, Barbour envisions that being precedes subjective knowledge as "process" or "fluid event," not as actuality [16, p. 294]. Second, "being as process" cannot be fully known. The human mind grasps only changing parts, not the actual whole. Unity is a transcendental property of being—all being is intelligible as one [26].

Barbour's critical realism seeks to address what he sees as the partial, cumulative nature of scientific discovery as well as study the change in creation. He focuses on potency and the "immediacy" of entities in the world. However, physics, or an ontology like Whitehead's, that in some aspects is more "physical" than "metaphysical," is unsuitable to explore the most fundamental questions of reality. A rational metaphysics must acknowledge an underlying, stable reality. Absolute, eternal primacy is "in act," the ground of potency. One moves from potency to act. A rational metaphysics must presuppose that there is a stable truth to discover about a thing, i.e., essences. There is also the truth of *esse* known through affirmative judgment [6, p. 192].

Whether in the form of subjective idealism, or in the more reasonable approaches of Barbour's and Lonergan's critical realism, there is an inclination for those who adopt a Kantian critique of knowledge to attempt to offer a "correction" to the spontaneous certainty of methodical, or moderate realism. The existence of a "bridge" between the mind and external reality is an axiom of realist epistemology. Of course, one does not "prove" axioms because they are self-evident. For example, the French philosopher and historian of philosophy, Étienne Gilson, posits an "intuition of being"—an intellectual vision of the notion of *esse* in any sensible datum [27]. The noted physicist, historian & philosopher of science, and Catholic theologian, Stanley Jaki, OSB, was very critical of the post-Kantian critique of knowledge. Jaki argues

that even the fact, let alone the nature, of external reality, however ordinary, cannot be proven by mere logic or mathematical formulas does not make one's immediate registering of external reality a less than fully rational process. To know the existence of things is in fact the very first step in reasoning. Any critical knowledge or philosophy which does not accept this will remain a mere criticism of criticism and not a criticism of the external reality one registers, and not even one's own registering it [28, pp. 108–109].

According to Gilson (and most other Neo-Thomists), being precedes and causes knowledge because

- 1) Being precedes perception;
- 2) Perception precedes apprehension;
- 3) Apprehension precedes judgment; and
- 4) Judgment precedes reasoning.

The key philosophical issue here, with much at stake, is upholding the relative priority of being over consciousness. As Aquinas himself clearly claims, there is indeed a constitutive polarity between knower and known as regards created truth. But in terms of being, the *actus essendi* precedes one's conscious nature.

One could argue that Lonergan implicitly places epistemology (or perhaps cognitional theory) as "first philosophy" rather than metaphysics (classically understood). Lonergan attempts to validate his metaphysics by beginning with interiority. He clearly desires to affirm metaphysical reality but not from a classical realist starting point. Lonergan gives the impression that he desires to avoid classical "foundationalism" and establish a novel, cognitional foundation, known and affirmed personally.

Interdisciplinary communication is best achieved when the common metaphysical framework supporting both disciplines addresses issues that are the *most fundamental* or at the highest level of generality, e.g., "being as being" or "the act of being." Traditional, Aristotelian-Thomistic metaphysics studies the nature of existence, the universe, and being. Aristotle originally divided his "first philosophy," metaphysics, into three main sub-disciplines:

- 1) Ontology—the study of being and existence, e.g., the classification of entities (such as physical or mental), the nature of the properties of entities, and the nature of change in the cosmos.
- 2) Natural Theology—the study of God from reason alone, e.g., the nature of religion, God, and the world, as well as the rationality of belief in the existence of God, and the relationship of God and creation.
- 3) Universal Science (Logic) —the study of first principles of reasoning, e.g., the law of non-contradiction [29].

When bringing two disciplines into creative, mutual interaction in a coherent way, they should have a common ontology and the same rules of logic. When engaging topics in religion, natural theology is also an indispensable tool, e.g., when attempting an integration of natural science and the theology of creation.

The aforementioned distinction between ontology and natural theology is less determinative for Thomas Aquinas. Aquinas' metaphysics studies being *qua* being—not as God. God is only demonstrated as the necessary first principle of beings. His notion of *esse* as complete and simple, but not subsistent (given over to form), makes possible a fully integrated ontology, rooted in *ipsum esse subsistens*, without transgressing God's transcendence of beings.

6. CONCLUSION AND FUTURE WORK

Philosophy, especially metaphysics and epistemology, has an important role to play in interdisciplinary communication. Some of the insights of Ian Barbour for the theology-science interaction are applicable for

bringing other fields into beneficial contact. In addition, Lonergan's generalized empirical method and functional specialties offer interesting and creative opportunities for interdisciplinary communication. Neither of these proposals are perfect, given the aforementioned epistemological and metaphysical concerns. Nonetheless, Barbour and Lonergan each make a substantial contribution to interdisciplinary communication and their thought merits further study. Recent work by Alan R. Rhoda and Cyril Orji, looking at parallels and possible influence of C.S. Peirce on Lonergan, suggests additional directions for future research [30], [31].

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