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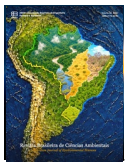

Primacy of the real and interdisciplinarity: contradictions in theoretical production

Primazia do real e interdisciplinaridade: contradições da produção teórica

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ABSTRACT

The purpose of this text is to assert the thesis that scientific work, manifested in the production of analyses, theories, and concepts, irrespective of their disciplinary, multidisciplinary, or interdisciplinary origins, only unfolds when rooted in the primacy of the real. The complexity of scientific objects cannot be fully addressed exclusively within disciplinary confines. Discussions centered solely on theoretical, conceptual, or explanatory models, while assisting in transcending disciplinary limitations, do not propel the advancement of scientific knowledge. Contradictions in theoretical-conceptual and analytical production, explicit within disciplinary fields, arise not only from the limitations of disciplines but from how reality is conceptualized as concrete thought. Regardless of the discipline, theory and concept divorced from reality amount to mere speculation.

Keywords: epistemology of science; scientific theories; environmental sciences; theoretical production.

RESUMO

O objetivo deste texto é defender a tese de que o fazer científico, que se materializa na produção de análises, teorias e conceitos, seja ele de origem disciplinar, seja multidisciplinar ou interdisciplinar, somente se desenvolve com base na primazia do real. A complexidade dos objetos das ciências não pode ser superada no plano das disciplinaridades. A pura discussão teórica, conceitual ou originada de modelos explicativos, mesmo que se valha da superação das abordagens disciplinares, não promove o avanço do conhecimento científico. As contradições na produção teórico-conceitual e analítica, que se explicitam no campo das disciplinaridades, decorrem não dos limites das disciplinas, mas das formas de representação do real como concreto pensado. Independentemente da disciplinaridade, teoria e conceito sem realidade não são senão especulações.

Palavras-chave: epistemologia da ciência; teorias científicas; ciências ambientais; produção teórica.

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Introduction

One of the emblematic legacies of the Enlightenment, whose precursor was René Descartes (2018), was the development of science and humanism, in which the centrality of reason was valued. Kant (2008) viewed the Enlightenment as humanity's departure from the medieval legacy, commonly referred to as the Dark Ages. The renowned 35-volume work, "*Encyclopédie*," edited by Diderot and D'Alembert (2018) and translated into six volumes in Brazilian editions, features writings by various scientists and philosophers challenging absolutism and the dominance of religious thought in knowledge production, advocating for rational and scientific knowledge. Science emerged as the bedrock of rationality in intellectual progress. The intricacy in producing scientific knowledge naturally and historically intensified with the evolution of science itself, leading to its inevitable segmentation into specialized domains, namely disciplines.

Specialties in the sciences evolved as methods to grapple with the intricacies of scientific objects in a dialectical movement. The deeper the sciences delved into their research the more complex knowledge production became. This dialectical movement underscored its contradictions: increased complexity led to greater specialization, and greater specialization resulted in greater distancing from the totality of the objects. Disciplines solidified as forms of knowledge production, each defining its own scientific objects.

With the emergence of the so-called environmental crisis in the 1960s, researchers began to question the ability of disciplines to generate knowledge about the "environment," initiating a process of promoting multi- and interdisciplinarity. It was in this context that Environmental Sciences emerged, initially comprising disciplines such as Ecology, Biology, Geography, Geology, Agronomy, Zoology, Economics, and Sociology—distinct areas of scientific knowledge (sciences). Therefore, as argued by Fernandes and Philippi Junior (2017), there is no singular Environmental Science. It is always Environmental Sciences, in the plural. The epistemological foundation of Environmental Sciences as a convergence of different sciences lies precisely in challenging the capacity of isolated disciplines to fully explain an object that demands more than one type of knowledge.

Multidisciplinarity and interdisciplinarity emerge as practical necessities in theoretical production within the field of Environmental Sciences due to the complexity of their objects, rather than being research panaceas capable of independently solving the problems posed by reality. However, this practical need brings to light three epistemological questions, as already outlined by Bursztyn (2004), Peixoto (2013), and Faria (2022b), concerning the advancement of knowledge in Environmental Sciences: i. Is the structuring of Environmental Sciences based on multi- and interdisciplinarity a sufficient response for knowledge development in this field? ii. Can theoretical discussions, regardless of whether they incorporate multi- and interdisciplinarity, foster knowledge development in Environmental Sciences without reference to the reality they aim to understand? iii. Why should a science that seeks theoretical support in multi- and interdisciplinarity, considering the complexity of its empirical field, limit its development to discussions of theories and explanatory models?

As a foundation for addressing these questions, the purpose of this reflection is to advocate the thesis that scientific practice (the Epistemological Act), manifested in the production of analyses, theories, and concepts, whether originating from disciplinary, multidisciplinary, or interdisciplinary contexts, only evolves when grounded in the primacy of reality. In other words, the complexity of scientific objects cannot be fully addressed within disciplinary boundaries. Discussions solely revolving around theoretical, conceptual, or explanatory models, while aiding in transcending disciplinary limitations, do not contribute to the advancement of scientific knowledge. From an epistemological perspective, dating back to thinkers such as Descartes, Espinoza, Kant, Hegel, Marx, and Popper, among many others, we know that theories and concepts divorced from reality amount to metaphysical speculations.

Scientific knowledge, multi- and interdisciplinarity

As extensively discussed in another reflection (Faria, 2022b), multi- and interdisciplinarity do not offer epistemological solutions to the complexity of the sciences; instead, they represent an approach aiming to transcend disciplinary limitations without entirely discarding disciplines. Research practices intended to surpass disciplines (multidisciplinary, interdisciplinary, and transdisciplinary) fall short in addressing both the subjectivity of the epistemic condition of the sciences and the objectivity of objects. When Environmental Sciences employ interdisciplinarity, the goal is to foster interaction among various disciplinary fields, allowing them to operate together in a convergent direction when studying environmental phenomena. However, this convergence does not advocate for disciplinary consensus but rather seeks to comprehend the complexity inherent in the object. Understanding the complexity of the object involves epistemological and ontological considerations, transcending the scope of disciplinary boundaries.

The notion that disciplinary analysis of an object could be surpassed by multidisciplinarity or interdisciplinarity, offering an ideal perspective of the object's totality, is unfounded. This is because multidisciplinarity and interdisciplinarity do not directly apply to any scientific object. Additionally, the various disciplinarities (multidisciplinary, interdisciplinary, etc.) seek to overcome the limitations of disciplines concerning their objects without abandoning the disciplines themselves. Why? Simply because there is no multidisciplinarity or interdisciplinarity without the disciplines that constitute them. The belief that an interdisciplinary approach alone would guarantee an accurate representation of reality is incorrect. Primarily, the method that analyzes facts without delving into their concrete, cognizable totality ultimately proposes abstract laws that claim applicability to all cases. Facts are not immediately given as concrete entities perceptible to the senses. Their concreteness manifests solely within their specific totality. Facts necessitate mediation by human consciousness

and praxis for apprehension in their true essence rather than being confined to mere appearance or superficiality. Secondarily, the challenge of reaching the totality of the object remains unresolved at the level of disciplinary interaction. The purported direct relationship between the totality of the object and multi- or interdisciplinarity is misleading. Multi- and interdisciplinarity do not accentuate the object but subject it to interactions between disciplines. The concept of totality extends beyond interdisciplinary knowledge of the object; rather, it signifies the refusal to fragment it as an object. Disciplinarities (multi, inter, etc.) are not aimed at overcoming the fragmentation of the object in the epistemic act but rather at addressing the fragmentation of knowledge through its disciplinary dismemberment.

These concepts indicate that we are, in fact, grappling with the issue of the breadth and limits of disciplines, not the extension of knowledge about the object (subject). It is crucial to emphasize that the same forms of classificatory abstraction that initially constructed the division of knowledge into disciplines are precisely those suggesting its transcendence through multidisciplinarity, transdisciplinarity, and interdisciplinarity. The logic that creates the classification into disciplines is exactly the same logic that aims to overcome it. And to operate this idealized overcoming, it makes use of the same classificatory logic, bringing the disciplines together in another classification: multidisciplinarity, transdisciplinarity, and interdisciplinarity.

No form of interdisciplinarity, multidisciplinarity, or transdisciplinarity liberates the object from the confines of the discipline when the latter is fundamental to the genesis of the investigation. Interdisciplinarity (multidisciplinarity, transdisciplinarity) is obviously another form of disciplinarity. In any sense (interdisciplinary, multidisciplinary, or disciplinary), we must insist that the object (the subject, the phenomenon) does not have and is not subject to a discipline. The disciplinary problem does not originate or arise from the object but from its form of representation. When Ecology and Economics investigate — each within its respective domain — the environmental impacts of a landfill, their aim is not to define the object (landfill) itself but to elucidate its manifold causal determinations, its diverse effects on the environment, its value in the public budget, its social cost, etc. In essence, their objective is to theoretically or conceptually represent the reality of the landfill within the confines of their respective disciplines. The landfill, as an object, does not possess the agency to select the discipline that will theoretically or conceptually represent it.

By seeking an epistemological solution to transcend the limitations of disciplines, multi- and interdisciplinarity fail to address the fundamental issue, which is the object's fragmentation imposed by disciplinary subjectivity (interdisciplinary, multidisciplinary, transdisciplinary), and may devolve into a form of bricolage. The fragmentation of the object stems from its disciplinary epistemological constitution, and this division cannot be remedied merely by resorting to interdisciplinarity.

Hence, when we assert, for instance, that Environmental Sciences are inherently interdisciplinary, we mean that the object of this convergence of sciences and its constituent elements can be more effectively represented from an interdisciplinary rather than a disciplinary perspective. In other words, the knowledge derived from the Environmental Sciences cannot be adequately expressed solely within the confines of one discipline. However, this does not signify overcoming the fragmentation imposed by disciplinarity in any of its forms. It entails rejecting the premise that a discipline can adequately address an object whose dimensions surpass the specific objects of individual disciplines. In Environmental Sciences, interdisciplinarity serves as a means to facilitate interaction between disciplines, but it cannot function autonomously without the foundational disciplines that constitute them as sciences.

It is not a matter of rejecting multi- and interdisciplinarity as an epistemological necessity for knowledge production in a science composed of various disciplines. However, it should be acknowledged that multi- and interdisciplinarity, while essential in overcoming disciplinary constraints, do not inherently ensure understanding of objects that, crucially, elude classification within disciplinary or multi- and interdisciplinary frameworks. In practical terms, this implies that constructing theoretical discussions utilizing multi- and interdisciplinarity alone is insufficient for advancing knowledge in Environmental Sciences and other fields. It is imperative to give primacy to reality and not to the disciplines that study it to genuinely progress in scientific understanding.

Theory and speculation: matter and its representation

Speculation and mysticism emerge when theory detaches itself from reality. Theories are coherent and structured scientific representations of real objects and phenomena. As a product of the Epistemological Act, theories represent the most significant expressions of the sciences, given that their statements strive to produce the Real Thought (Thoughtful Concrete). For this reason, engaging in discussions, analyses, inquiries, criticisms, and expanding the horizons of theories is essential not only for their development but also for deepening their epistemological and methodological foundations.

Discussions of theories that deviate from or become detached from the objects and phenomena they intend to represent can generate ideological, doxological, and mystical debates. Engaging in discussions about theories based on arguments from formal logic rather than concrete logic, devoid of reference to reality, and attempting to discover coherences, meanings, relationships, and abstract-conceptual articulations where there are only movements of thought, as previously observed by Lefebvre (1991), amounts to mere speculation, creating a sense of depth where only illusions exist. Theory lacking a concrete scientific object can, at the extreme and depending on the scientific domain, only be considered a hypothesis awaiting empirical validation. The emphasis on material reality does not advocate for empiricism and the depletion of knowledge in the immediacy of the object-phenomenon. Instead, it underscores the primacy of the real in the production of knowledge. The primacy of the real and its emphasis on the material field, the empirical field, cannot be confused with carrying out

so-called empirical research per se, especially research dedicated to exposing and describing phenomena. Primacy of the real is not the same as case study research, questionnaire application, participant observation, and documentary analysis, among other qualitative and quantitative techniques. It is the consideration of the supremacy of reality in theoretical elaboration, in other words, the condition of thought being able to critically elaborate the representation of the real. The technical, instrumental, and "methodological" tools employed by the researcher in the Epistemological Act do not inherently ensure the primacy of reality. In this context, the critique posed by the primacy of the real is not directed at the generation of theories but rather at the deliberation and formulation of theories grounded solely in other theories, models, and presuppositions — essentially, the primacy of ideas (idealism). The representation of the concrete object only becomes objective through thinking about the object. There is no representation of matter except in an abstract form; and this abstract form, in the sciences, is theories, concepts, analyses, etc. Science should be, epistemologically and ontologically, a rigorous way of producing the representation of the concrete and not a simple description of reality or an abstract conceptual discussion, as already explained in another text (Faria, 2022b).

This means that conceptual and theoretical discussions are important for expanding knowledge about objects. Conceptual rigor is a fundamental element in the representation of matter. But conceptual rigor about matter cannot be achieved without the matter it aims to represent. In this sense, the requirement for conceptual and theoretical rigor in representation is essential; however, it should not be misconstrued as a precondition for achieving absolute knowledge. Science does not possess an infallible formula for the absolute truth concerning matter (object, phenomenon), even when employing the methodological rigor that defines it. This is attributed to two primary factors: i. scientific knowledge remains non-definitive, perpetually evolving; ii. the inherent complexity of matter surpasses its abstract representation. Moreover, when considering the establishment of disciplines and the growing specialization in sciences designed to tackle these conditions, the attempt to comprehend the complexity of the object involves dialectically distancing itself from the multiple causal determinations inherent in these objects. In essence, there exists a paradox: in its pursuit of specialization to grapple with the intricacies of its object, science analytically reduces and, consequently, drifts away from the causal links determining the object. This paradox arises because, while science can define its object and delineate its status as a scientific object, real objects are not inherently affiliated with any specific science, both ontologically and epistemologically.

This entire process necessitates, even while acknowledging the inherent limitations of science, that scientific knowledge be derived from the primacy of the real, of matter, of objects, of concrete phenomena, not from their abstract classification, of the subject not of the predicate, of the negative essence, and not of the substance (or in Hegelian terms, of the thing itself). The primacy of the real does not imply the dominance of the object over thought in knowledge production. Moreover, it is not an inherent guarantee of truth about the object. While the primacy of the real is a necessary condition for scientific knowledge, it is not sufficient on its own. In essence, science cannot progress without objective reality and critical reflection on that reality.

The historical debate concerning the primacy of the object versus the primacy of reason constitutes the foundational origins of epistemology, characterized by the classical conflict between rationalism and materialism, as well as pure idealism and pure empiricism, a distinction labeled pre-epistemological poles by Bachelard (2006). Despite assumptions that the history of epistemology and scientific knowledge production has transcended the essence of empiricism and idealism, the relevance of academic works structured around abstract theoretical discussions persists. These discussions, characterized by an idealistic approach, treat movements of thought as self-sufficient and rely on the exposition and description of objects without in-depth theoretical elaboration, as elucidated by Faria (2022a).

The conditions for knowledge production

Based on the above, in order to reaffirm the conditions for the production of scientific knowledge (but not only), it is necessary to address at least seven fundamental questions. These questions emphasize the primacy of reality, rejecting empiricism, and stress the importance of elaborate critical thinking, while also rejecting idealism.

The first point to note is that matter exists independently of thinking about it, and it is not known in its immediate form. In its immediate form, only the object's appearance is known, in other words, the way the object presents itself to thought. For instance, when a researcher embarks on studying predatory deforestation for pasture creation, what immediately appears is the intervention in a forested area and the systematic conduct of deforestation. However, the reality is much more complex. Why? Matter initially appears to the subject as a thing-in-itself, meaning a thing that exists in its phenomenal appearance. Yet, the appearance of the thing does not entirely encapsulate the thing itself; hence, it is necessary to transcend its appearance to reach its essence. Reaching the essence does not entail forsaking the immediate form but transcending and surpassing it. This inherently raises the point that representing matter is a prerequisite for thought, as knowledge depends on the existence of matter, and an elaborated knowledge of the object necessitates reaching its essence.

The second aspect to consider is that reality comprises a collection of singular material elements whose significance can only be portrayed through their manifold causal relationships. It represents the amalgamated form of various entities and things existing in specific interconnections. These entities and things establish historical relationships, not haphazardly, and they do not merely constitute matter only from the researcher's perspective. In their known or knowable totality, the constituent elements that unify the diversity in the ways things exist and their essences, manifest as reality. This reality exists independently

of our knowledge of it. Therefore, reality is not a product of the idea, but a result of the intricate thought process required to transcend appearance over matter, revealing its multidetermined essence.

The third point, as Kant (2008a, 2008b) previously articulated, emphasizes that reality belongs to the realm of thingness rather than ideality. While the idea indeed exists, the constituent elements of reality, in their universal or singular forms, manifest their coherence when portrayed in their various determinations — when elevated to the abstract plane, the plane of the idea. Consequently, reality is not the idea itself, nor is it constituted by fantasies, daydreams, illusions, or even theories about it; rather, it is what it materially represents. The act of thinking is undeniably real, but the object subjected to elaborate thought lacks immediate correspondence in concrete reality. This also underscores the notion that thoughts about matter and its concepts are not matter itself but its representation, echoing Espinoza's teachings (1979) that the concept of the dog does not bark (just as the concept of the circle is not the circle).

The fourth point underscores that reality is a unity independent of its representation and, therefore, transcends classifications such as science, art, technique, or philosophy. Reality lacks the capacity for separation and intertwining, contrary to the dictates of formal logic. In formal logic, reality is arbitrarily separated to fit into the forms of science and its disciplines, art, philosophy, and technology. Subsequently, the same logic endeavors to intertwine these forms as if, ontologically, they were inherently distinct. Attempting to integrate what is essentially a unity — arbitrarily separated — makes no sense. The classifications used by humanity to represent reality in distinct and specific ways should not be construed as different realities to be integrated into their expressions. Ontologically, reality is a unity of diversities that can be represented in various ways, including within each of these distinct ways (science, art, philosophy, etc.).

The fifth point is that not only physical, tangible, visible matter, perceived by the senses, is a reality. Thought is also a reality: not a material reality *stricto sensu* but a material reality *lato sensu*. Thought is a reality, as is knowledge. Neither, however, are material realities in themselves, but ideal, abstract realities. The real is what exists in itself and for us and not what exists only as a physical object. When do thought or knowledge leave their subjective condition and become material? When they are cognizable or cognizing things, when they are objectified. The idea that things are simply material or immaterial, in a natural or latent state, does not take into account their movements and their relations of production and interaction. Thought is an immaterial reality in itself, but it is material when it is objectified. Just like any material reality, knowledge about the object, the Epistemological Act (the act of producing knowledge), as a concrete activity of thought, is also a material reality, but a humanized material reality, resulting from human action. The result of the epistemological act, the act of thought, is the production of knowledge about the object or phenomenon, in other words, it is the representation of the object as a concrete thought. The reality of the object, external to the subject, which exists outside thought, is elaborated by thought as thought reality, as thought concrete, in other words, it is objectified, materialized as representation. In short, the real is what exists in itself, and for us, whether it exists in abstract form (as a representation) or as a physical object.

The sixth question prompts consideration of the role of theory in representing reality. As previously explained, theory is a rigorously elaborated form of representing material reality at an abstract level. It is a product of science. However, various conceptualizations, such as viewing theory as a hypothesis, a reference model, a conjecture, a logical system, or a thought distinct from practice, have at times devalued its place, diminished its importance, reduced its scope, and, in some cases, vulgarized it. When theory is treated as something distinct from practice ("in practice, theory is something else"), it opens the door to an endless tunnel of academic work dedicated to speculative abstractionism, as pointed out by Bachelard (1996) in his discussion of epistemological obstacles.

The seventh issue highlights the concern that when scientific knowledge is deemed the sole truth (and therefore treating theories as absolute truths about the subject matter), science becomes dogma, and its formulations may take on the character of mystical precepts. Scientific knowledge is diverse, encompassing various forms and methods rather than a singular entity with a uniform approach. Those who categorize the world into science, pseudoscience, and common sense often oscillate between speculative classification and empiricist descriptivism based solely on immediate data.

Defending science necessitates acknowledgment that the knowledge it generates is inherently relative, contingent on reference systems, methods, epistemological dimensions, areas of investigation, and, crucially, the specific historical conditions of the object (phenomenon, fact, etc.). Advocating for scientific knowledge against unfounded and doxologically oriented narratives does not imply sanctifying science. If scientific knowledge were invariably the ultimate truth about the object, scientific progress would have halted. Thus, caution is warranted against idealized and dogmatized assertions made in the guise of sanctifying science.

Additional considerations

What insights can be gleaned from the aforementioned considerations? Firstly, it is imperative to reject the prevalent academic inclination to narrow reality down to theories and explanatory models. This trend is observable in scholarly works engrossed in extensive theoretical-conceptual discussions, where finalized theories and explanatory models take precedence, substituting the reality they aim to elucidate. These researchers possess preconceived answers (transformed into immediate convictions) to research questions, even before conducting rigorous empirical fieldwork, or sometimes without ever engaging with the empirical field beyond constructing abstract models. Despite its peculiarity, such a procedure is more prevalent than per-

ceived, as Adorno cautioned (2001): finished theories and explanatory models contain answers before genuine questions and objects arise.

The predicament for researchers advocating theories about reality based on abstract models, grounded in formal logic rather than concrete logic, lies in their belief that the explanatory model is reality itself, not merely a model for the rational interpretation of reality, but a reduction of reality to a form comprehensible by thought. Even models attempting to elucidate the forms and conditions of life for beings inhabiting diverse locations on Earth are constrained by environmental, geographical, social, and biological variables, among others. Critical environmental sciences, critical anthropology, critical sociology, critical political economy, critical human geography, etc., have long surpassed the realm of universal explanatory models. However, rationalists, adherents to models, seem to struggle when thinking outside the box of paradigms, much like the dogmatists they paradoxically criticize.

The problem that proponents of explanatory models avoid addressing is precisely that their models lack movement, contradictions, dialectics, and support for multiple determinations of reality along with its dynamic causal links. Explanatory models function like beliefs, resembling dogmas and mirrors of reality. They appear axiologically neutral, devoid of value judgments, and are, therefore, referred to as scientific. Perhaps the most significant pitfall in the maxims of scientific practice lies in the presumed infallibility of theories and models and the purported neutrality of science.

From these considerations, it can be asserted that thought is a real structure irreducible to the event (phenomenon, object, thing) that gave rise to it. In other words, thought about the object neither encompasses the object itself nor the entirety of thought. The real thing, the object, maintains its existence outside the mind and possesses an independent existence, as taught by Marx (2011) in the Introduction to the Grundrisse. Without the real object, thought can only engage in speculation. While discussing concepts and theories is essential for the development of scientific knowledge, conducting these discussions at a metaphysical level (in the classic sense of "beyond physics," "beyond nature," and "beyond the thing") is to place undue value on digressions. In short, the necessity for theoretical and conceptual discussions should not be satisfied solely within the realm of theories and concepts themselves. Speculation arises when theory is pitted against theory and concept against concept. Without concrete input, there is no means to critique, develop, and produce theories and concepts.

In essence, scientific work, materializing in the production of theories, whether stemming from disciplinary, multidisciplinary, or interdisciplinary perspectives, exclusively progresses when grounded in the primacy of reality. Conceptual debates and explanatory models, while significant in constructing robust theories and helping to transcend disciplinary limitations, do not inherently propel the advancement of scientific knowledge. Without an elaborate, rigorous and critical reference to concrete reality, all theory is reduced to speculation.

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