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Science and synthesis

Does late capitalism constrain the systemic thinking required by science? [1]

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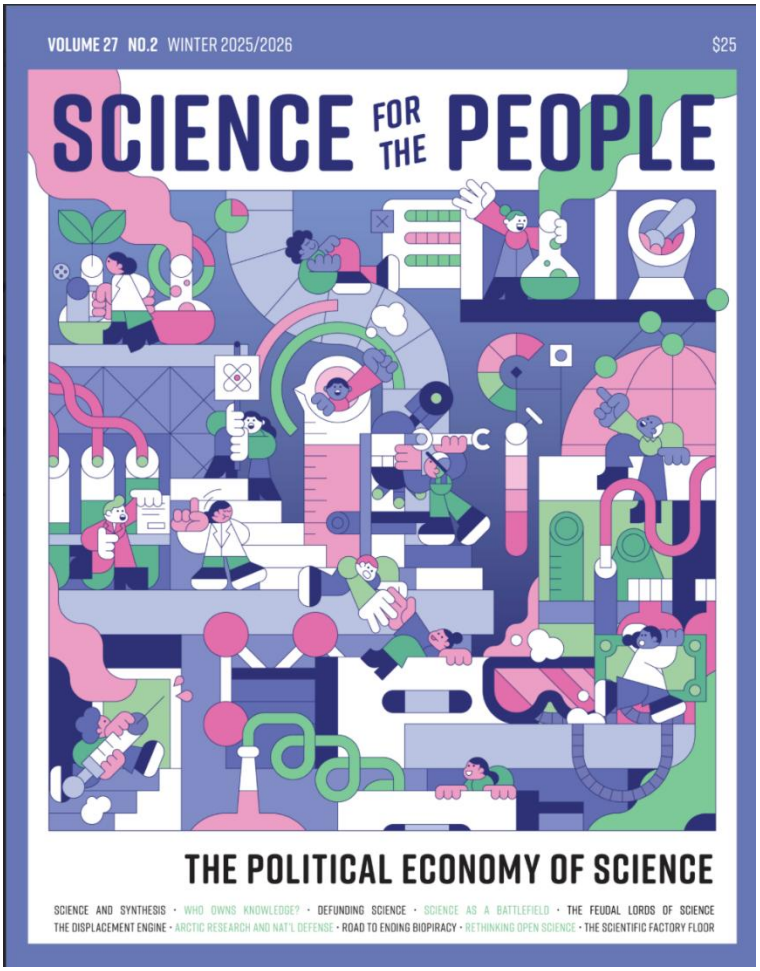

Do sciences, such as ecology and epidemiology, demand an integral philosophy? Is ecological crisis exacerbated by lack of systemic thinking? How does the prevailing social division of labour shape the production of knowledge? Is unity of science a meaningful goal? Can it be achieved without a grounding in a comprehensive world view? What is the role of political economy in this scenario? Is Marxism the answer to these questions?

If ever there was a field demanding systemic thinking, it is ecology. To be pursued seriously, it needs to draw from multiple natural sciences as well as other disciplines such as sociology, politics and economics. The unfolding facts and forecasts about carbon emissions and climate breakdown, of biodiversity loss, of viral replication and vaccine development, of all aspects of ecological crisis cannot be understood properly without an integrative philosophy of nature and science and without a political economy of capitalism. The only philosophy adequate to the task is Marxism.

Further specifying what natural sciences are relevant to ecology, DeepSeek listed: evolutionary biology, genetics, physiology, climatology, hydrology, soil science, biogeochemistry, toxicology, thermodynamics,

geomorphology, palaeontology, mathematical modelling, geography, agronomy, meteorology, oceanography, computer science. It further concluded:

"The integration of these empirical sciences allows ecologists to build a comprehensive understanding of ecosystems and address complex environmental challenges. By leveraging insights from multiple disciplines, ecology can develop more effective strategies for conservation, resource management, and sustainability."

But to what extent is there integration of these empirical sciences? There is some degree of interaction between these sciences in various studies and projects, but is there deeper integration?

As science has developed over the centuries, it has gone in the opposite direction. The trajectory from ancient to modern to contemporary times us one of increasing specialisation and separation. This has escalated into more and more subdivisions of subdivisions, resulting in us knowing more and more about less and less. Although there are both positive and negative aspects to the prevailing the intellectual division of labour, there are worrying consequences of the fragmentation this has brought.

Experiments proceed and data accumulates. But how does it all add up? What does it mean? Is it possible to have an overview of contemporary knowledge? There have been some efforts to address this. Various interdisciplinary projects, popular science magazines, tv documentaries, 101 courses, AI-platforms, Cochrane reviews, are all forms which sum up existing knowledge in specific domains to some degree. However, these can leave important gaps and be based on unexamined assumptions. We need to go further.

Ecosystems are systems that can only be comprehended by systemic thinking. Moreover, they are embedded in larger social-political-economic systems. However, scientists – and academics in other disciplines too – are not educated to think systemically, to see the interconnections between their own research area and the wider development of science and society. Moreover, they are rarely educated in history of science, philosophy of science or political economy of science, so they fail to see the forces shaping the agendas of science as well as the social impacts of those agendas. Their modus operandi in the laboratory is most often an implicit positivism, although most have never explicitly chosen it or considered alternative theories of knowledge.

Most scientists have never worked out their fundamental world view. In fact, most academics in most disciplines have never done so. As a result, their work is unmoored and they lack the ability to see their work in the wider scheme of things.

This makes scientists inadequate to address the depth and breadth of the contemporary distrust of science, which has epistemological, ontological, moral and political dimensions.

There is deep epistemological confusion about the very cognitive status of science. There are not only contending claims, but conflicting criteria about how to sort out these contending claims. On top of that, there are positions contending that there can be no such criteria. With the rise of anti-science science studies, science itself is invoked to justify mysticism and obscurantism. For example, quantum physics, in hopelessly garbled interpretations, is used to justify just about everything that anyone wants justified, particularly with ludicrous misinterpretations of Heisenberg's uncertainty principle. There is also ontological paralysis about conceptualising what particular discoveries reveal about the basic nature of reality, even about the very notion of reality itself.

There are layers and layers of suspicion of the veracity and morality of science with the increasing commercialisation of science and general commodification of knowledge. This has been manifested both on the new age left and the virulent new right, the latter now strong enough to win national elections and undermine international public health and environmental infrastructure

There is good reason for much of the scepticism of science, because capitalism is such a powerful force in shaping its agenda, both determining its priorities and distorting it results. We need to stand with science but against capitalism, and we need a clear philosophy to do this.

It is interesting to trace the rise and fall of philosophy under capitalism. As a rising class, the bourgeoisie took philosophy seriously. In the early days of capital accumulation, in the struggle to break free of the fetters of

feudalism, to make the world safe for science and commerce, they needed philosophy in their quest for self-realisation and cultural hegemony.

The intellectual dimension of their struggle for power brought forth the modern epistemologies of rationalism and empiricism, ontologies of new forms of materialism and idealism, political philosophies of liberalism and conservatism. Theories, from epistemology and ontology to politics, economics and law, were underpinned by radical individualism and pluralism. Science moved in parallel development of specialisation to atomism and fragmentation. All were subsequently rent by contradictions that could not be resolved within the system bringing them forth.

Thinking about the impact of capitalism on production of knowledge, it is clear that the production of knowledge is shaped by the mode of production of everything. As capitalism has evolved, it has generated multiple contradictions that cannot be resolved within capitalism. Among these is a social division of labour that has made much progress possible, but it has become increasingly one-sided, atomised and impoverished.

Capitalism has created a vast chasm between production and consumption, an extreme disconnection between mental and manual labour. The class freed to pursue knowledge and culture has become ever more remote from the process that produces the material basis of their existence, making it more and more decadent. It also makes it more difficult to achieve an integral perspective.

Capitalism is decadent yet still dominant. With the degeneration of capitalism, its radius of cognition has tended to diminish, and philosophy has lost its place in the scheme of things. What survives of it has become increasingly unhinged.

Capitalist intellectual culture tends to fly off in all directions, chasing one myopic version of reality after another, from the plodding particularity of positivism to the deconstructionist exotica of postmodernism. Both positivism and postmodernism renounce overarching world views and grand narratives. Now present mostly in debased forms, both are renunciations of the whole and plays of plurality, discontinuity, are randomness, fragmentation, ultimately meaninglessness and powerlessness.

A few decades ago, classrooms, conferences and journals were alive with the clash of contending paradigms. This has largely disappeared without anything been solved. There is only an eerie silence where a discourse about theoretical foundations should be. When mentioned at all, some even accept and affirm contradictions and disavow any push to resolve them.

Attempts to break through this impasse tend to produce only a leaky eclecticism but not a satisfactory synthesis. They skate along the surface of phenomena and never break through to the core patterns of interconnection, the shape of the whole. Or the struggle is abandoned and there is a renunciation of all isms.

Capitalism is a system that systemically obstructs systemic thinking, masking the realities of itself as a system. Only a philosophy with a critique of capitalism can break through this and can generate a coherent vision.

Is there an optimal philosophy for science? Clearly, not any philosophy will do. Certain philosophical assumptions will block the view and obstruct the path. Others will illuminate the way and move knowledge onwards.

Such a philosophy should be a philosophy which is oriented to explaining the world in terms of the world itself, without appeals to forces outside the world to explain the world. This is materialism or naturalism. It should be a theory of knowledge prioritising empirical evidence while generalising it in theory. This is a synthesis of elements of empiricism and rationalism. It should be a critique of reductionism and affirmation of integrative levels. It should articulate a realisation of time, development and historicity. It should be oriented to totality, seeing everything in terms of its place in a web of dynamic interaction with everything else, giving full scope to consciousness and will but with full realisation of their inextricable materiality. It should include an analysis of the relation between science and political economy.

This is an evolutionary, integrative, emergentist form of materialism that is also a critique of capitalism and vision of socialism — which is Marxism.

Marxism has developed a rich tradition in what JD Bernal called "the science of science". This tradition has been embraced by generations of intellectuals engaged in complex drama of battles of ideas and struggles for power. In my book *Marxism and the Philosophy of Science: A Critical History,* [2] I set out to give a comprehensive account of this tradition and to defend it vis a vis other positions in philosophy of science. I did a short but sweeping summary of this tradition in an earlier edition of *Science for the People*.[3] In *The Return of Nature*, [4] John Bellamy Foster has gone back through this history with a focus on ecology. There have been many books and journals articulating these ideas and arguments over the decades. These days *Monthly Review* has been perhaps the strongest standard bearer of this tradition.

Despite this, it has been largely ignored by mainstream academic philosophy of science. which has long been in he grip of tensions between science as empirical investigation and science as social construction. Marxism has resolved this tension. Its distinctiveness vis a vis other positions is that it is a synthesis affirming both the cognitive validity of science as knowledge grounded in empirical investigation and the integral connections of science to economy, culture, philosophy, etc. In this, it rises above all forms of positivism, neo-positivism, post-positivism and postmodernism. It is grounded in the concrete flow of data while looking toward totality against the detotalising trajectory of capitalism.

Capitalism not only creates and intensifies economic injustice and political corruption. It also poisons nature, culture, education, everyday life. Capitalism colonises not only economies and governments. It colonises schools, universities, mass media, social media. It colonises psyches. The centralising market decentres the psyche. It organises production and consumption, but disorganises community.

Capitalism requires ever greater specificity of outcomes without criticism, reflection or integration.

It is a central paradox of our times: Never has there been such a totalising force as contemporary global capitalism and yet never has there been such inhibition of totalising thinking. Capitalism is a system that systemically blocks systemic thinking. Perhaps it has never been so challenging to pursue such totality, because the detotalising pressures of the age are so strong.

The crises of recent years, particularly with the shocks of the pandemic and climate breakdown, have highlighted problems that cannot be solved within existing parameters and exposed the Inadequacies of other intellectual alternatives.

So what has Marxism to offer in a world where climate catastrophe, future pandemics and nuclear terror loom over all our activities? It provides context, depth, perspective. It puts forward not only a systemic analysis of problems and their interconnections but also a path to systemic solutions.

Marxism is still the unsurpassed horizon.

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[1] This is an abridged version on my keynote presentation at the Marx in the Anthropocene conference in Venice in March 2025.

[2] Helena Sheehan *Marxism and Philosophy of Science: A Critical History* (3rd edition) London: Verso Books, 2018.

[3] Helena Sheehan "Marxism, Science, and Science Studies: From Marx and Engels to COVID-19 and COP26" *Science for the People* May 2022 Marxism, Science, and Science Studies • SftP Magazine

[4] John Bellamy Foster *The Return of Nature: Socialism and Ecology* New York, Monthly Review Press, 2020.