



marxism
& sciences



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Dedicated to Richard Lewontin (1929-2021)

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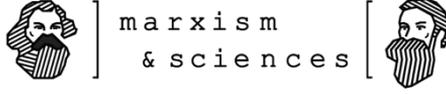
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THE ACTUALITY OF FRIEDRICH ENGELS



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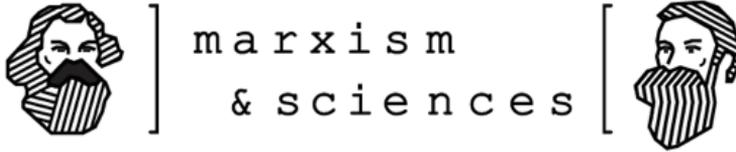
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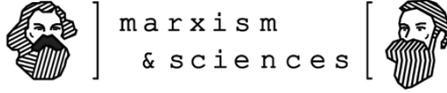
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EDITORIAL

Marxism & Sciences and ‘The Actuality of Engels’

THE SEEDS OF *MARXISM & SCIENCES* (*M&S*) were planted at the first *Bilim Üzerine Marksist Tartışmalar* (Marxist Inquiries on Science), symposium held in İzmir, Turkey during the last 3 days of 2012 summer. Researchers and academics from the fields of history of science, philosophy of science, medicine, biology, physics, mathematics, political economy, sociology, international relations, history, psychiatry, musicology, and film studies presented and discussed the main theme, ‘Is Marxism Alien to Science?’ within the context of their own disciplines. The opening talk was given by Metin Çulhaoğlu, one of the foremost Marxist thinkers and politicians in Turkey.

Although it was not a large event as a Marxist symposium—twenty presentations attended by some fifty participants— it was not an ordinary one, not only in terms of the wide range of topics, but also in terms of the place given to natural sciences.

Four of the current members of the editorial collective of *M&S* also attended the first symposium in 2012: *M&S* natural sciences editor, and the mastermind behind the symposium, Alper Dizdar; *M&S* advisory board member, İzge Günal, who was a member of the organizing committee of the symposium; managing editor, Cenk Saraçoğlu, and the present author were among the presenters. The idea of publishing a journal based on the symposium was first discussed at the closing session, a decade ago.

Other editors of the *M&S* are also participated the later symposiums and schools: the assistant editor, Mesut Y. Yıldız in 2015, the humanities editor, Siyaveş Azeri in 2019, and the social sciences editor, Melda Yaman in 2020.

To put it shortly, it took a decade to decide and publish the journal before you. Literally, this first issue of the *M&S* is based on the seventh symposium organized with the main theme, ‘Actuality of Friedrich Engels at his 200th Birthday’, a year ago (see Yıldız 2022 in this issue).

One of the questions addressed at the first symposium represents the spirit of the symposium series, “Why don’t Marxists today get excited by

the most recent developments in natural sciences such as the results of CERN experiments, as did Marx and Engels when they read Darwin?" My own answer was "because of the 'Marxism without Engels'" which was also resonated with the title of my presentation, in 2012.

Marxist scholars and researchers have typically limited themselves to deal with knowledge and/or convictions produced within the domain of social sciences while remaining rather aloof to the research and scholarly discussions carried out in natural sciences. This is partly related to the commonplace perception of Engels as the culprit of the vulgar and positivist interpretations of Marxism. As Engels openly tried to combine the knowledge produced on natural sciences with his reflections on the history and development of human societies, his being discredited by certain Marxists and critical thinkers also brought about the debasement of the intellectual efforts to think natural and social world in unity and hence reflect on the knowledge produced in the domain of natural sciences.

Engels was at the heart of the problematic relation of Marxism with natural sciences. Nevertheless, 'Marxism without Engels' did not only mean a disinterest in natural sciences but also the loss of the sense of totality in Marxism. The symposium was organized in such a way as to address and problematize such a disconnection between natural and social sciences, and that is why it tried to bring together scholars especially from both social and natural sciences.

In fact, the term 'science' used in the title of the symposium is in line with this comprehensive approach. Science (*bilim*) in Turkish corresponds to *wissenschaft* in German which implies any kind of disciplinary knowledge, rather than implying natural sciences as in English.

While the subsequent symposiums continued to discuss the relation of Marxism and sciences, we also organized in due process *Marksizm ve Bilimler Okulu* (The School of Marxism and Sciences) alongside the symposium in 2017. While in the symposiums we tried to initiate scholarly discussions that aimed to frame and discuss contemporary political and social issues via a Marxist theoretical framework, in the school we rather turned our attention to revisit and discuss with the students the very fundamental concepts and premises that would constitute the building blocks for a thorough Marxist interpretation of the world today. Afterwards we published the papers presented in the first three symposiums in the form of three-volume books series.

Unsurprisingly, the unsettling political dynamics in Turkey casted its effects on our symposium and the school as well. In the aftermath of the

unsuccessful military coup attempted by an Islamic congregation in 2016, the government put restrictions on all political/academic meetings, leading us to cancel our planned symposium in 2016.

The government used the coup as a justification to suppress the whole oppositional political actors. As a result, hundreds of left-wing scholars, including Marxists have been dismissed from their positions and have not been reinstated yet. Some of them were contributors to the symposium and the school. Nevertheless, we managed to continue our activities and hold our symposiums afterwards.

~o~

We have completed the website of the journal exactly a year ago. There we explain our aims as follows:

The fundamental aim of the journal is to contribute to rebuilding the Marxist conception of totality based on a materialist conception of history and materialist dialectics in order to encompass the entirety of intellectual domain and thus merging class struggles in nature, culture and society again, as once developed by Marx and Engels. The journal considers the materialist conception of history as being related to both history of nature and that of human society. The journal considers materialist dialectics not only as general laws of matter in motion where matter emerges mutually interrelated as thought, nature and human society, but also as laws to be investigated and developed in each branch of science, in detail, as defined by Marx and Engels.¹

We eventually invited comrades, who could be interested in the objectives of the journal, from all around the world to join the editorial collective. The qualifications and types of submissions which the journal especially promotes, were also taken in to consideration in determining the names to be invited to the editorial collective.

In this sense, *M&S* especially encourages submissions with following four qualifications:

- *Class struggles*: Studies covering class struggles in nature, culture, and/or society.
- *Geographical prevalence*: Studies from Africa, Asia, Latin America, Central, Eastern and Southeastern Europe as well as Western Europe and North America.
- *Gender equality*: Studies by non-male authors and/or from Marxist and socialist feminist perspective.

1. <https://marxismandsciences.org/aims-and-scope/>

- *Marxist ecology*: Studies which considers human as part of nature, not superior to it.²

The three types of submissions are especially defined in order to correspond to contributions from natural and social sciences, and arts and humanities:

Articles: Articles are original scholarly manuscripts that contribute to any field of research.

Essays: Essays are original contributions with more personal, intuitive and introspective style and do not necessarily have to build on a comprehensive literature review and/or extensive research, unlike scholarly articles. Essays are expected to include critical reflections or political interventions into the past or actual natural/cultural/social issues and/or old or ongoing scholarly and intellectual discussions.

Cultural works: Poem, play, story, music, short film, documentary, video, photographs, graphics design, painting, sculpture etc. (ibid.)

Finally, we also expressed our wish to see members of editorial collective as regular writers of the journal. The response to our invitations were beyond our expectations. We are especially grateful to all of the members of our advisory board for accepting our invitation and for their kind and encouraging responses.

Moreover, some of the members from abroad were known by at least some of us personally. Colleagues and comrades invited from Turkey were those who we mostly met during one of the symposiums. All other members were those whom we knew through their works.

All of their responses to our invitations were no less kind and encouraging. We are also grateful to all of them. Those few comrades who could not accept our invitations due to their workloads were also supportive and encouraging. We are also grateful to them particularly to those, such as John Bellamy Foster, who promised to support the project in other possible ways.

Furthermore, it was invaluable to meet some of the comrades—those we had not met before—either online, as was the case with Joost Kircz and/or through email correspondences for discussing the project, as with Sascha Freyberg. We have also been delighted by the considerable support we received from comrades, like Farooque Chowdhury, who started to follow the journal and we hope to see them soon as contributors.

2. <https://marxismandsciences.org/guideline-for-authors/>

Meanwhile, we received some questions, particularly concerning the political position of the *M&S*. Our introductory documents provide sufficient information about our theoretical position as much as our political stance. We, as acting editors, do not aim to represent an explicit political position. Hence, the heterogeneous political positions of the editors and the members of the editorial collective.

It should be clear that the *M&S* is not politically exclusivist. It is open to publish any piece of work that complies with the theoretical principles of the journal and makes an original contribution to Marxism.

~o~

Finally, yet importantly, the call for papers was announced on March 15, 2021 and we received a great number of submissions. We were pleased to see how submissions perfectly fit into the aims of the journal and the theme of this issue. It is no less remarkable to see how we look at matters similarly with the authors, as if we all knew each other already and have been discussing the issues for long enough time.

I should also add that we are especially grateful to Sahotra Sarkar not only for his contribution, but also for his suggestion to dedicate this issue to Richard Lewontin, one of the very few Marxist natural scientists who unfortunately passed away less than a year ago. Furthermore, we were able to contact Stuart Newman, a former colleague of Lewontin, through Sahotra Sarkar for asking his contribution to the issue as an obituary. We are grateful to Stuart Newman for accepting our invitation. Since Engels' studies on natural sciences had largely influenced Lewontin, it is a great honor for us to dedicate this issue to him.

The first contribution is an introduction by the present author. He tries to provide both an historical and theoretical framework for the main theme of this first issue, 'The Actuality of Engels'. The essay first discusses the history of 'Marxism without Engels', accompanied by a defense of Engels and then discusses the position of Marxism found itself trapped in a kind of *Mexican Standoff* as a result of its efforts to survive without Engels. The essay continues by presenting the developments, which reintroduces Engels to Marxism and concludes with presenting the recent developments for Marxism and corresponding tasks for Marxists as defined by the *M&S*.

The next contribution titled, 'Remembering Richard Lewontin (1929–2021)' has been written in memory of Lewontin by Stuart Newman. We learn from his memories that they first met when Newman was 15 and Lewontin was 31. Newman presents his firsthand account of Lewontin's

studies in biology and his struggles in *Science for the People*, in which they both took part side by side.

The next essay titled 'Lewontin's Legacy and the Influence of Engels: A View from the Trenches' is written by Sahotra Sarkar. Sarkar's essay is certainly more than a reminiscence of Lewontin and his studies and personal memories of Sarkar with him. The contribution of Sarkar gets into the details of Lewontin's intellectual legacy, his contributions to science and politics, and his relation to Engels and Marxism.

The rest of the articles and essays consider Engels in terms of the importance of his stance for reworking the concept of totality in Marxism and in addressing the *epistemological crisis* caused by his exclusion. In this sense, Roney Piedra Arencibia's article titled 'Engels' Fourfold Revenge: On the Implications of Neglecting Engelsian Dialectics in Science, Philosophy, Ecology, and Revolutionary Practice' is a great contribution in its attempt to bridge the gap between science, philosophy, nature, and history. While Arencibia defends Engels against Western Marxism, it also demonstrates how science, philosophy, nature, and history took their revenge in the face of negligence of Engels' contributions in these fields.

Joost Kircz is one of the few Marxist physicists who has been involved in these debates since early 1990s. Kircz's essay titled, 'Friedrich Engels' Importance for Contemporary Materialist Epistemology,' focuses on the contributions of Engels in terms of epistemology. Kircz not only tries to clarify Engels' contributions, but also tries to project them onto the present-day developments. His contribution stands out especially in considering such crucial questions as "to what extent scientific theories represent the known world and to what extent theories in the natural sciences and biology can serve as a model for the humanities and sociology?"

Siyaveş Azeri's article titled 'Engels' Dialectics of—Human Activity in—Nature' presents a theoretical foundation for many problems discussed in this introduction and in this issue. Azeri updates the contributions of Engels, based on a re-evaluation of Vygotsky and Ilyenkov in a revolutionary way: "laws of dialectics are the most general laws of human activity in social nature." Azeri presented a shorter version of his paper at the symposium, 'The Actuality of Engels'.

'Origin of Engels' *The Origin: A Reappraisal in the Light of The Ethnological Notebooks of Marx*' by Melda Yaman is a unique contribution focusing on anthropological contributions of Engels. Yaman's article shows how nature, society and history are interwoven even for the patriarchal family by discussing the divergences between Engels' work and that of Marx on the

matter. Her article also stands out in this issue by *a certain critical look to Engels* from a *Marxists and socialist feminist perspective*. Yaman also presented a shorter version of her paper before at the symposium, ‘The Actuality of Engels’.

Cihan Cinemre’s article titled, ‘Unity, Motion, and Reciprocity in Friedrich Engels’ *Dialectics of Nature*’ challenges the dualities such as human and nature, organic and inorganic by not only reminding the contributions of Engels famous ‘book’, *Dialectics of Nature*, but also by contributing to the materialist dialectics as the objective law of motion on earth. Cinemre’s challenge also covers the discussion of the crucial topic for dialectics, the transformation of different types of motion into one another.

Hari Kumar’s contribution titled, ‘Engels, Reductionism and Epigenetics: The Lysenko Debate’ no doubt is one of the most ambitious studies in this first issue. Its ambitiousness not only stems from the volume of the article but also from its delving into challenging domains where a great expertise is required—the Epigenetics and the role of Stalin in the Lysenko debate. However, the real challenge of Kumar lies in rejecting commonsensical assumptions in both domains.

Although ‘On the Differences between the Classical and the “Western” Marxist Conceptions of Science’ by Zeyad el Nabolsy does not seem to focus particularly on Engels in terms of its title, the reader will quickly see that the author challenges the most serious critique of Engels, namely Western Marxism. More specifically, Nabolsy’s essay challenges the roots of Western Marxism’s conception of science which was developed by the Frankfurt School. Nabolsy shows that “Marcuse and Horkheimer, even though they presented themselves as revolting against the alleged ‘economism’ of Classical Marxism, ended up endorsing a view of science which is functionally equivalent to a reductive economic conception of science.”

The next three contributions are cultural, specifically musical works. Furthermore, two of them are accompanied by video recordings of the musical performances, the other by audio recording. As has been announced, the *M&S* invites and encourages cultural workers to contribute to our journal in any format such as poetry, play, short story, musical work, short film, documentary, video, photography, graphics design, painting, and sculpture. We also ask a written text to accompany such products. We expect the products to be specifically related to the theme of the issue to be published.

Consequently, the composers Ömer Er and Mert Morali, and bass player İlker İsaletli contributed to this issue by their musical works and accompanying texts on their creation process. Ömer Er’s work titled ‘Variations on Themes Composed by Engels’ was already commissioned by the aforementioned online symposium and performed by the composer at its opening. Ömer Er composed this work based on musical exercises of Engels written during his youth.

‘*Die Produktion des Bewusstseins* for Soprano and Trumpet’ by Mert Morali, a Berlin-based composer, has already received the First Prize in Duo Category in the competition organized within the frame of *Wilde Lieder Marx Music* (2018) project by Birmingham Contemporary Music Group and *Verein zur Förderung des Jubiläumsprogramms* Trier, as a part of event series for the 200th anniversary of Karl Marx’s birth. The text of the work is a quote from *German Ideology* by Marx and Engels. The accompanying video presents the performances by Camila Mandillo (soprano) and Xukun Tong (trumpet) recorded at *Hochschule für Musik Hanns Eisler*, Berlin in February 9, 2020.

An İstanbul based bass player in popular, jazz and latin music, İlker İsaletli presents his work titled ‘Electric Bass Improvisations on Engels’ inspired from one of Engels’ musical exercises. Ömer Er also contributed to the work by his performance of musical ambient sounds.

There are three reviews in this issue. Tiago Camarinha Lopes reviews *How the World Works* (2019) by Paul Cockshott, Gedik reviews *Trajectories and Themes in World Popular Music* (2018) by Simone Krüger Bridge, and Yıldız reviews the symposium, ‘The Actuality of Engels’ which this issue is based on.

We are grateful to all authors and anonymous reviewers for their contributions and collaboration throughout the publication of this issue. On behalf of the editors, I would like to share our unmatched excitement with the outcome. Yet, the real assessment of our project comes from the editorial collective, the authors, the reviewers and the readers. It should be added that any comments and criticisms, positive or negative, from all those comrades would be seriously taken in to account, be it from either a worker, a university student, or a professor.

ACG.



Back to Engels: A Long Century of the First Fiddle without the Second

Ali C. Gedik

*In hearing nature hears itself,
in smelling it smells itself,
in seeing it sees itself.
(Marx, 1841)*

BOTH WESTERN MARXISM AND SOVIET MARXISM share the assumption that Engels and Marx agreed upon a division of labour between them: Engels had specialized in nature and Marx in history.¹ Therefore, the contributions of Engels were either rejected or embraced for this exact reason in Western Marxism and Soviet Marxism, respectively. Consequently, these two seemingly contrasting camps had agreed on a similar positivistic approach that amounted to a ‘Marxism without Engels’.

There was a period when Marxism had not fully divided into two opposite camps; this is roughly the period between the Second International and World War II. Marxists in this period did not assume such a division of labour between Engels and Marx. Those Marxists such as Lafargue, Kautsky, Adler, Labriola, Plekhanov, Lenin, Trotsky, Bogdanov and Bukharin, who were also political leaders, represented this line of Marxism in various degrees in this period.

For example, Lenin especially tried to integrate natural sciences² into Marxism: “Lenin took the occasion of the second issue of *Pod znamenem*

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1. I use the term *history* to refer social sciences and humanities in general within the context of the alleged division of labour between Engels and Marx.
 2. I use the term *natural science* to refer any discipline studying natural science, as well as for any discipline studying on natural science such as the history, philosophy, anthropology, and sociology of science. Similarly, the term *natural scientist* is also used in this broad sense throughout this essay.

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marksizma (Under the Banner of Marxism), the new journal of Soviet Marxism launched in 1922, to call for an alliance between communists and natural scientists inclined to materialism” (Sheehan 1993 [1985], 157).³

Bukharin, similarly, was among the delegations from Soviet Union—other well-known names were Hessen and Vavilov—attended to the special session, ‘Science at the Crossroads’ at *The International Congress of the History of Science* held in London in 1931. This date also marked the final years of Marxism prior to the division. Unfortunately, those Soviet delegates could not survive much: Hessen, Vavilov and Bukharin were executed in 1936, 1938 and 1943, in the Soviet Union, respectively.

Two separate traditions of Marxism emerged after the Comintern. Western Marxism that was mainly based on philosophy, sociology, political science and history, excluding natural sciences almost completely. Soviet Marxism that mainly existed as an official ideology based on a formulation according to which historical materialism corresponds to social sciences and humanities, and dialectical materialism to natural sciences.

One specificity of Western Marxism was obviously rejecting Engels. On the contrary, Engels was uttermost embraced and respected besides Marx in Soviet Marxism. Yet, Engels shared a similar fate in the Soviet Union, ironically, since he was rather considered as a specialist in natural sciences. However, the place of Engels in the Soviet Union was not as the widely shared simplistic assumption:

In the Soviet Union and its allied states, the image of Engels had an increasingly negative connotation. “As a result, Engels was forgotten as a historian, as a political theorist and as a military specialist, and as a whole his intellectual achievement was irrelevant, compared to the Marxian, his work was not congenially and rather negatively dismissed” (Krätke 2007, 142).

(Altieri 2020, 276–277)

On the contrary, the study of Graham (1987) shows in detail the complexity of the problem about the appropriation of Engels throughout the history of the Soviet Union.⁴ He argues that discussions and works on Engels went much beyond the official party discourses, despite tragic tensions. Although, the appropriation of Engels in Soviet Marxism is as much

3. The monograph of Helena Sheehan (1993 [1985]) is still a unique source on the relation of Marxism and natural sciences. Sheehan especially focuses on the period between the formation years and the Comintern years, in detail, where the problem of Engels also occupies a central place.

4. Sheehan (1985) also shows that the picture of Engels and natural sciences is quite complicated in Soviet Marxism until the end of Comintern.

important, the topic is wide in scope enough to be the subject of another essay.

In what comes next, I will try to provide both an historical and theoretical framework for the main theme of this first issue, 'The Actuality of Engels'. I will first discuss the history of 'Marxism without Engels', accompanying a defense of Engels. To this end, the relevant discussions in Western Marxism, where criticism against Engels was originated and developed, will be presented. The section after, will discuss the position of Marxism as found itself trapped in a kind of *Mexican Standoff* as a result of trying to survive without Engels. In the last section, I will present and discuss the events, which brings Engels back, and this first issue of the *M&S*.

MARXISM without ENGELS

According to Perry Anderson, the disreputation of Engels historically overlapped with the emergence of Western Marxism, as the incompatibility of some of his arguments in *Anti-Dühring* with the recent findings of natural sciences became more evident after 1920 (Anderson 1976, 59–60). Anderson (1976) adds that Western Marxism was an outcome of various 'legitimate' attempts to fill the gap left by Engels. This argument had been formulated previously by Sebastiana Timpanaro (1975) in a more radical way:

Perhaps the sole characteristic common to virtually all contemporary varieties of Western Marxism is their concern to defend themselves against the accusation of materialism. Gramscian or Togliattian Marxists, Hegelian-Existentialist Marxists, Neo-Positivizing Marxists, Freudian or Structuralist Marxists, despite the profound dissensions which otherwise divide them, are at one in rejecting all suspicion of collusion with 'vulgar' or 'mechanical' materialism; and they do so with such zeal as to cast out, together with mechanism or vulgarity, materialism tout court. (Timpanaro 1975, 29)

Furthermore, the contribution of Timpanaro is unique as he insists on the crucial place of nature and natural sciences within Marxism. Consequently, he considers Western Marxism, overtly 'illegitimate'.

In short, Engels had been made a 'scapegoat' throughout the history of Western Marxism. Economic determinism, positivism, Stalinism, reductionism, vulgar or 'mechanical' materialism, reformism and revisionism were all the sins (of Marxism) that Engels committed. These criticisms had started with a rather moderate tone with Gramsci, Lukács and Korsch in 1920s and got severer with Colletti, Althusser, Sartre, Marcuse and

Lefebvre (see Anderson 1976, 59–60). Finally, the intensity of criticisms reached to the level of excommunication of Engels by Lichtheim, Schmidt, Lewis, Avineri, Jones, Kolakowski, Levine and Carver after the 1960s (see Rees 1994).

All these criticisms were more or less variations of the aforementioned assumption: there is a division of labour between Marx and Engels according to which the former focused on history and the latter on nature. However, the *original sin* committed by Engels was his attempt to extend the domain of dialectics to include nature. Hence, the following argument: “Marx’s method was anthropological, critical, pragmatic, empirical. Engels’, in contrast, objectivist, contemplative, determinist, abstract” (Sheehan 1993[1985]: 54).

The remaining task was to explain the reasons behind Marx’s silence. The growing aversion towards Engels in Western Marxism also paved the way to accomplish this task based on the following insulting argument: Engels was *Marx’s bulldog* who had slipped the leash at the final years of his ill owner and got completely free after his death (Hunt 2009).

Therefore, Engels had felt much freer for deviating theoretically from Marx by publishing works such as *Anti-Dühring*, of which, supposedly, Marx was not aware at his final years. After Marx’s death, he had been freer in writing *Dialectics of Nature*, manipulating Marx’s unfinished works such as *Capital Volume 2* and 3, or publishing *The Origin* based on Marx’s notebooks under his own name. Furthermore, Marx had always been aware of every sin Engels committed but kept silent due to his financial dependence on Engels.

No doubt that all these criticisms refer to some facts. It is true that natural sciences and dialectics in relation to nature had not occupied such a central place in published works of either Engels or Marx before *Anti-Dühring* (1878) and *Dialectics of Nature* (1930 [1883]). It is also known that Engels had almost rewritten *Capital Volume 2* and 3 based on Marx’s manuscripts and went beyond a mere editorship. Similarly, *The Origin* was written and published by Engels based on some notebooks of Marx. Finally, it was not a secret that Engels had financially supported Marx throughout their lifetime comradeship.

Nevertheless, these facts do not necessarily support those criticisms. Of course, the most reasonable criticism about Engels is related to his ‘overt’ interest in natural sciences and attempt to extend the domain of

dialectics to include nature. All other accusations such as economic determinism, positivism, Stalinism, reductionism, vulgar or ‘mechanical’ materialism and revisionism were somehow related to this *original sin*.

Studies disproving such criticisms against Engels mainly started by 1970s. The number of such studies have raised recently and more detailed analyses have been provided on the basis of new approaches to Marxism and Marx’s and Engels’ newly discovered texts. It suffices to provide a short list of counter-facts:

- It is now known that it was Marx who commissioned *Anti-Dühring* to Engels; he even wrote one of its chapters; and that Engels was not certainly happy with this task.
- *Dialectics of Nature* was mostly written while Marx was alive and Engels had the opportunity to discuss its topics with him. Furthermore, *Dialectics of Nature* was neither the title given nor completed and published by Engels.
- Engels’ main reason for leaving *Dialectics of Nature* uncompleted was the priority he gave to the publication of *Capital* volumes 2 and 3. Recent comparison of Marx’s manuscripts with the published volumes shows that Engels accomplished a great editorial task, which no one else could.
- It was not a secret that *The Origin* was based on Marx’s notes, which was already stated by Engels in the book.

Lafargue’s memoirs, among others’, witness such a unique comradeship, which invalidates the accusation of self-interest in the relation of Marx with Engels:

Besides, Engels was, so to say, also a member of the Marx family. The girls spoke of him as their second father. He was Marx’s alter ego [...] In our modern age, Marx and Engels realized the ideal of friendship portrayed by the writers of classical antiquity [...] Marx valued Engels’ opinion more than that of anyone else. Engels was the man he deemed worthy to be his collaborator. In fact, Engels was for him a whole public. To convince Engels, to win Engels over to an idea, no labor seemed to Marx excessive. [...] To win over Engels’ opinion was a triumph for him. Marx was proud of Engels. He recounted to me with pleasure all his friend’s moral and intellectual merits; [...] He admired the remarkable versatility of Engels’ knowledge; and he was uneasy at the possibility of any accident that might befall him. “I am always terrified lest he should be thrown on one of his mad cross-country gallops,” said Marx to me one day. (Lafargue 1943 [1890], 23–24).

Here is a short list of evidence against the criticisms of economic determinism, positivism, Stalinism, reductionism, vulgar or ‘mechanical’ materialism, reformism and revisionism:

- *Economic determinism/reductionism*: Engels already wrote a number of letters in his final years in order to correct economic determinist understanding of their theory that was prevalent among young ‘Marxists.’ These letters were the most vivid and brilliant first hand examples directed against determinist-reductionist base-superstructure template.
- *Reformism and revisionism*: Engels continued to support German Social Democrat Party (SPD) after Marx’s death and corresponded with its leaders such as Liebknecht, Kautsky and Bernstein. Since the SDP was one of the founding parties of the Second International and social democracy, Engels has been associated with evolutionary and reformist politics. On the contrary, Engels had already started to struggle against those leaders who censored his article in the official newspaper of the party. He writes, “I was amazed to see today in the *Vorwärts* an excerpt from my ‘Introduction’ that had been printed without my prior knowledge and tricked out in such a way as to present me as a peace-loving proponent of legality *quand même*” (Engels 2004 [1895], 486).
- *Positivism/vulgar or ‘mechanical’ materialism*: The founder of positivism, Auguste Comte (1798–1857) was already familiar to Marx and Engels so that Marx called his work as ‘shitty positivism’ in a letter to Engels. It is not necessary to write anything about the criticism of vulgar or ‘mechanical’ materialism, since most of the works of Engels are based on arguments against them.
- *Stalinism*: In fact, it was Stalin, not Engels, who provided the official “definitions” of dialectical and historical materialism: Dialectical materialism is completely about nature and historical materialism is simply application of dialectical materialism to human society (Stalin 1949, 3).

Of course, all these responses still leave a problem unsolved: The division of labour between Marx and Engels, and extending the domain of dialectics to include nature. The most straightforward solution would be to show that either there was not such a division of labour or Marx had also committed similar sins. I will try to touch upon both briefly.

Lukács, who had initiated this line of criticism against Engels' investigations of dialectics in nature in 1922, retreated from this position as early as 1967, before Timpanaro. Lukács admitted that his book *History and Class Consciousness* unintentionally recapitulated a certain tendency within Marxism which "strike at the very roots of Marxian ontology" (Lukács 1971 [1967], xvi). He also stated that his work had a definite impact on this tendency, which considers Marxism as a mere social theory or philosophy by excluding the theory of nature it embodies (*ibid.*).

It is more interesting that the recent findings of *Marx-Engels-Gesamtausgabe* (MEGA²) by the *Internationale Marx-Engels-Stiftung* (IMES)⁵ showed that the diversions between Marx and Engels is nothing more than a myth of Western Marxism. Michael R. Krätke (2011) shares these findings as follows:

There is a series of notebooks on physiology, on mineralogy, on geology and on agro-chemistry has already done in 1850s. Now huge and much more than Engels by the way. Everybody thinks that Engels was a specialist but Marx's excerpts and notebooks on science are much larger than Engels and of course he was in debate with Engels about their joint project which you probably know under the title, the wrong title, *Dialectics of Nature*. And there is a second series of notebooks from 1877 to 1883 on chemistry, on physics and particularly on electricity and on statistical thermodynamics. (Krätke 2011) (transcribed by A.C.G.)

There was also enough evidence against this myth already available in works and letters of Marx even prior to these recent findings. Marx and Engels, separately express in various letters that they first agree before starting to work on a joint project (e.g. see Marx 1981 [1860], 114). There is not a single word in these letters implying that they shared the workload by dividing their joint project into two parts as history and nature.

On the contrary, Marx wrote to Engels in 1864 that he is studying physiology, anatomy of brain and neural systems and cells and decide to spend more time on these topics, and adds that he is planning to attend to the talks and lectures of scientists (Marx 1985 [1864], 546). Indeed, Liebknecht (1943 [1896], 43) wrote in his memories that Marx had noted every progress in natural sciences and attended to the lectures of foremost natural scientists, such as Moleschott, Liebig and Huxley, conscientiously.

5. IMES was founded in 1990 to continue the publication of the *Marx-Engels-Gesamtausgabe* (MEGA-2). <http://www.iisg.nl/imes/>

Furthermore, Marx wrote how he confirmed one of the categories of dialectics is valid in a similar fashion in both history and nature:

Incidentally, you will see from the conclusion to my Chapter III, where I outline the transformation of the master of a trade into a capitalist—as a result of purely quantitative changes—that in the text there I quote Hegel’s discovery of the law of the transformation of a merely quantitative change into a qualitative one as being attested by history and natural science alike. (Marx 1987 [1867], 385)

The centrality of the relation between human society and nature was expressed overtly even in the first pages of *Capital I*: labour, as the creator of use value, is the material exchange between human and nature, which neither any human society nor life is possible without it (Marx 1996 [1867], 53). Therefore, labour is the father and nature is the mother of material wealth (*ibid.*). This relation between human and nature also represents their unity, which Marx calls *metabolism* in *Capital*. Accordingly, the material exchange between human and nature is a *metabolic exchange*.

This is the exact point which constitutes “the most important real pillars of the Marxist view of the world” according to Lukács (1971 [1967], xvii). The point, which, in his own words, was disregarded in *History and Class Consciousness* is “labour as the mediator of the metabolic interaction between society and nature” (*ibid.*).

Some of the leading Marxists proposed counter-criticisms in defense of Engels following Timpanaro by the end of 1970s. While E.P. Thompson (1978: 69) said that he “will not allow Frederick Engels to be cast as a senile clown after all,” Raymond Williams (2005 [1980]: 105) points to the “unusual uneasiness between Marxism and natural sciences” which he denounces. These responses were also unusual due to authors’ professional backgrounds; they were experts in fields of history and literature, not in natural sciences.

Overall, other studies in defense of Engels were not composed by Marxist natural scientists. These studies either accepted the assumption of ‘division of labour’ such as Gouldner (1980, 279) or did not reject it such as Ollman (1976), Rubel (2005 [1970]) and Larrain (1986).

MARXISM in MEXICAN STANDOFF

Natural Sciences and Nature in Marxism

There were always Marxist natural scientists on both sides who were certainly not positivist and had brilliant achievements. However, Marxists in

social sciences and humanities, on the one hand, and Marxists in natural sciences, on the other, were living as if in different worlds, especially in the West.

Despite tragedies such as *Lysenkoism*, Graham (1987, 431) acknowledges certain achievements of Marxist natural scientists in the Soviet Union, especially in philosophy of nature.⁶ The achievements of Marxists in natural sciences were not limited with the Soviet Union. Although fewer in numbers and less supported institutionally, the achievements of Marxist natural scientists in the West were not less pronounced. In this sense, the existence of Marxists within the domain of natural sciences is another common feature of the two Marxisms.⁷

Marxist natural scientists were at the far periphery of Marxism especially in the West. In this sense, Marxist natural scientists and Marxists were either isolated from each other or in a one-directional communication, from center to periphery. Consequently, Marxists in natural sciences were not represented in Western Marxism especially after the World War II.

A number of Marxists in natural sciences such as Bernal, Haldane and Levy had considerable impact especially during the radical science movement of 1930s.⁸ Tragic cases related with natural sciences in the Soviet Union such as *Lysenkoism* of the 1930s and then the Cold War in general hindered the radical science movement, gradually (Sheehan 2021).

Nevertheless, a number of Marxist journals, such as *Science and Society* (1936–) in United States, *Modern Quarterly* (1938–1953) in Britain and *La Pensée* (1939–2012) in France, that were in line with the *Under the Banner of Marxism* (1922–1944) in the Soviet Union, were founded during this period. The weight of natural sciences in terms of founders, editors and articles were unmatched in comparison to present Marxist journals. Although the weight of natural sciences gradually diminished in these journals, *Science and Society* remains distinguished by its openness to natural sciences.

6. It is very interesting that the name of the Iyenko, who developed a unique Marxist approach towards the unity of history and nature between 1950s and 1970s is not mentioned even once. Considering the detailed work of Graham, this fact either decreases the value of his work or shows the degree of isolation subjected to Iyenko in Soviet Union.

7. I deliberately do not prefer to use Western and Soviet adjectives for identifying those Marxists related with natural sciences, because they do not seem to be an organic part of the two Marxisms, theoretically.

8. For a full consideration of Marxist natural scientists from Britain and other European countries during this period see Sheehan 1993.

Since then other influential Marxist journals have been founded but with an exclusively social sciences and/or humanities orientation. For instance, the *Monthly Review* (1949–) founded in the United States was not a journal especially dedicated to natural sciences.⁹ However, the journal contributed to the development of ecological thinking within Marxism by its emphasis on nature and physical sciences (Foster 2000, vii).

A decisive revival of natural sciences in Marxism was witnessed both in the West and in the East in 1960s. While political climate for natural scientists relaxed in the Soviet Union, another radical science movement, *Science for the People*, emerged in the United States. The prominent figures of this movement were again Marxist natural scientists such as Gould, Levins, Lewontin and Rose whose works and legacies are quite alive.

Sheehan, both as an expert on the issue and a witness to this period, lucidly summarizes the mood and the related events:

The 1960s and 1970s put Marxism on the agenda in a new way in the rest of the world where capitalism held sway. New Left ferment pervaded North America and Western Europe especially. This was a time when all that had been assumed was opened to question, when the universities and the streets became contested terrain. Academic disciplines were scrutinized at their very foundations. Philosophy, sociology, literature, science—all knowledge—was seen as tied to power. University campuses and academic conferences were alive with passion and polemic. Journals such as *Radical Philosophy*, *Insurgent Sociologist*, *Science for the People*, *Radical Science Journal*, and *Science as Culture* gave expression to this ferment. Many of my generation threw ourselves whole heartedly into this. [...] Meanwhile, Soviet delegations were no longer a surprise at international conferences. They were integrated into the organizing structures and gave papers in many sessions. (Sheehan 2021)

In this sense, it is interesting to note the indifference of most Marxists from social sciences and humanities towards these works of Marxist natural scientists. For instance, despite the theoretical and practical militancy of *Science for the People* (*SftP*) movement and its incomparable impact, even factual books reviewing history of Marxism in the States by Marxist social scientists could have been completely ignorant about the movement and its members.

Soon afterwards, the Green Theory emerged as a response to environmental issues that gradually came to the fore in capitalist countries in late

9. However, Albert Einstein' 'Why Socialism?' was published in the first issue of *MR*.

1970s. The emergence and the rise of postmodernist theories also coincided with the rise of Green Theory. Despite their different agendas, they also shared a certain hostility towards ‘natural sciences’ and Marxism.

Although under the heavy influence of Green Theory, eco-socialism also emerged and marked a milestone for the return of nature back to the focus of some Marxists throughout the 1980s and 1990s. One of the founding names of eco-socialism, Michael Löwy (2018) presents the brief history of the movement:

Manuel Sacristan, a Spanish dissident-Communist philosopher, founded the ecosocialist and feminist journal *Mientras Tanto* in 1979, introducing the dialectical concept of “destructive-productive forces.” Raymond Williams, a British socialist and founder of modern cultural studies, became one of the first in Europe to call for an “ecologically conscious socialism” and is often credited with coining the term “ecosocialism” itself. André Gorz, a French philosopher and journalist, argued that political ecology must contain a critique of economic thought and called for an ecological and humanist transformation of work. Barry Commoner, an American biologist, argued that the capitalist system and its technology—and not population growth—was responsible for the destruction of the environment, which led him to the conclusion that “some sort of socialism” was the realistic alternative. In the 1980s, James O’Connor founded the influential journal *Capitalism, Nature and Socialism*, which was inspired by his idea of the “second contradiction of capitalism.” (Michael Löwy 2018)

Consequently, Marxists in social sciences and humanities started to seriously take nature—if not the natural sciences—into account, despite their mostly negative reception of Marx and Engels, as Prometheans and conquerors of nature. Grundmann (1991) briefly summarizes these discussions among Marxists as follows:

Contemporary Marxism has responded in a number of ways to the challenge posed by ecology. Broadly speaking, three currents of thought can be distinguished. The first I shall call the ‘Marxist dissident’ response. Its proponents have abandoned central elements of Marx’s theory, claiming that the new questions posed by ecology cannot be solved within its theoretical framework. [...] Opposed to this group we find a tendency which aims to defend central elements of that theoretical corpus. I shall call this current ‘Marxist orthodoxy’. Between them we can locate a third group of authors who think that ecology in fact presents a serious challenge to Marxism, but who are at the same time convinced that ready-made answers are contained within Marx’s thought. (Grundmann 1991, 103)

Long story short, these first generation Marxists within eco-socialism contributed in large to the subject and thus paved the way for the second

generation. Especially, studies of figures such as Ted Benton (1979, 1989, 1993, 1996a, 1996b) stands out in this sense. Nevertheless, Marxists were not well prepared when the Sokal Hoax broke in 1996.

The Sokal Hoax

The main two targets of postmodern theories were Marxism and natural sciences as two strong representatives of totality and universality.¹⁰ Although Marxists obviously had produced more inclusive and voluminous counter-criticisms¹¹, it was interesting that the most influential counter attack came not from Marxists but from a mathematician and a physicist, Alan Sokal in 1996. This fact was clearly expressed by Brett Clark and Richard York:

In fact, Monthly Review Press published *In Defense of History: Marxism and the Postmodern Agenda*, edited by Ellen Meiksins Wood (then coeditor of *MR*) and John Bellamy Foster (current coeditor of *MR*), around the same time as the Sokal scandal was in full swing, and the essays in that volume leveled many of the same criticisms of postmodernism that were made by Sokal and his supporters. (Clark and York 2006)

This event was called as the Sokal Hoax afterwards. The hoax was about Sokal's paper published in the *Social Text*, a prominent journal of cultural studies. He argued that recent developments in physics were in line with postmodern theories. Sokal intentionally had filled the paper with completely nonsensical, false arguments; the editors, however, swallowed the bait.

Although the result was certainly not a victory for Marxism, the hoax publicly discredited the founding names of postmodern theories such as Lyotard, Derrida, Lacan, Baudrillard, Deleuze and Guattari. However, far from being a victory for Marxists, the Sokal Hoax seemed to put Marxism in a kind of a *Mexican Standoff*— a confrontation of many parties where any shot could trigger a blind kill of all parties. Leading Marxist natural scientists—already very few in number— such as Richard Levins and Hilary Rose were among the contributors of the issue where Sokal published his “paper”. Furthermore, Richard Lewontin, another leading Marxist natural scientist was one of the authors of the book that was an expanded version

10. This fact can be clearly seen from one of the masterpieces of postmodern theories, *The Postmodern Condition* by Lyotard published in 1979.

11. Wood 1986; Jameson 1991; Callinicos 1990; Smith 1993; Larrain 1994; Wood and Foster 1995; Zavarzadeh et al. 1995.

of the same journal issue. Finally, the editor of both the journal and the book, Andrew Ross was a Marxist cultural studies scholar.¹²

In fact, the background of the hoax is more complicated: Sokal's paper (1996a) was published in a special issue of the *Social Text*, titled 'Science Wars' and edited by Ross (1996a). This special issue was a response to the attack of Gross and Levitt (1994), two positivist natural scientists, on 'academic left'. Lewontin (1995) had already criticized the book, before the *Social Text* affair. After Sokal (1996b) revealed the hoax, the special issue of *Social Text* was published as a book, edited again by Ross (1996b). Finally, a short response of Ross (1997) to the hoax was followed by an extensive book by Sokal and Bricmont (1998). For clarity, the whole process of this complex academic scandal is briefly summarized in Table 1 and its corresponding note.

Table 1. Timeline of the Sokal Hoax.

Year	Authors	Title of Publication
1994	P. Gross and N. Levitt	<i>Higher Superstition: The Academic Left and Its Quarrels with Science.</i>
1995	R. C. Lewontin	"A La Recherche Du Temps Perdu." <i>Configurations</i> 3 (2)
1996a	A. Ross (ed.)	"Science Wars." Special Issue, <i>Social Text</i> 46/47
1996a	A. Sokal	"Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity." In "Science Wars." Special issue, <i>Social Text</i> 46/47
1996b	A. Sokal	"A Physicist Experiments with Cultural Studies." <i>Lingua Franca</i>
1996b	A. Ross (ed.)	<i>Science Wars</i> (expanded version of the <i>Social Text</i> issue)
1997	Andrew Ross	"Reflections on the Sokal Affair." <i>Social Text</i> 50
1998	A. Sokal and J. Bricmont	<i>Fashionable Nonsense: Postmodern Intellectuals' Abuse of Science</i>

NOTE: 1994-Paul Gross and Norman Levitt: The book with a clear anti-communist and anti-Marxist stance, was a reactionary and fully positivist response against 'academic left'—including postmodernists—for their 'mistrust' to the 'objectivity' of science. In other words, the authors seemed to be against e.g. history, sociology, anthropology, political economy and philosophy of science, or in short, *science studies*.

12. Ross was a contributor in one of the few sources on Marxism and culture (Nelson and Grossberg 1988), at least. Furthermore, not only Ross but also Aranowitz and two prominent figures of post-Marxism, Chantal Mouffe and Etienne Balibar, and one of the prominent representatives of post-colonialism, Gayatri Chakravorty Spivak were contributors of one of the same book. Henri Lefebvre, Perry Anderson, Fredric Jameson, Stuart Hall and Terry Eagleton were other contributors who were rather on the side of 'traditional' Marxism.

1995-Richard C. Lewontin: One of the first critical reviews of Gross and Levitt (1994) from a Marxist perspective was published by Lewontin.

1996a-Andrew Ross (ed.): *Social Text* published a special issue titled as 'Science Wars' dedicated to the criticisms of Gross and Levitt (1994). Ross presented 'Science Wars' in his editorial introduction as an expansion of Culture Wars into the realm of science: On the one side *Social Text* represents *progressivism* of left, on the other side Gross and Levitt represent *orthodoxy* of right.

1996a-Alan Sokal: The paper of Sokal, "Transgressing the Boundaries" was also published at this exact same issue.

1996b-Alan Sokal: Sokal revealed his hoax with a short article published in *Lingua Franca*. Sokal's position was rather within the context of a discussion among left in contrast to Gross and Levitt's right-wing stance which attack the whole left. Furthermore, Sokal considered himself politically on the side of the *Social Text*. However, he was clearly against epistemic relativism of postmodern theories, which dominated academic left within cultural studies.

1996b-Andrew Ross (ed.): The special issue of the *Social Text* titled 'Science Wars' was published as a book with some additional chapters such as Lewontin (1995) in response to the hoax.

1997-Andrew Ross: While Ross acknowledged that Sokal Hoax did not fit to the picture of Culture Wars, he tried to present the Hoax as a Culture War within the left: *progressivism* was represented by the 'new left' and *orthodoxy* by those supporters of Sokal from the 'old left.'

1998-Alan Sokal and Jean Bricmont: Their book was first published in French in 1997 and presented an extensive critique of leading postmodern theorists' *abuse of science*. Although their stance was not anti-communist and anti-Marxist, they had neither stayed back from accusing any kind of Marxism, including the 'traditional' one or attacking 'academic left' within cultural studies.

As a result, the hoax escalated the *Science Wars*. The clash was apparently between Paul Gross, Norman Levitt, Alan Sokal, Lewis Wolpert, Richard Dawkins, Steven Weinberg on the one side and Andrew Ross, Stanley Aronowitz, Barry Barnes, David Bloor, David Edge, H. M. Collins, Sandra Harding, Donna Haraway, and Bruno Latour on the other.

However, the sides of the *Science Wars* were much more complicated than it looked. Leading positivist natural scientists—including Gross and Levitt—supporting Sokal were the target of Marxist natural scientists' criticisms. While Sokal considered himself rather as an 'old left(ist),' postmodernists accused him of traditional Marxism. Of course, post-Marxists whose trademark is their flirting with postmodern theories were expectedly against Sokal. However, when cultural studies considered, post-Marxism have been almost the only kind of Marxism around since 1980s.

As a result, Marxists, unfortunately, almost completely stayed silent about the Sokal Hoax, as if they were in a kind of *Mexican standoff*. The results of a quick search for the title 'Sokal' at the archives of some leading

Marxist journals within the four years between 1996 and 2000, after the hoax, are presented in Table 2.

Table 2. Search results for the name ‘Sokal’ at the archives of leading Marxist journals within four years after the hoax, between 1996 and 2000. Book reviews are not included.

Marxist Journals (foundation year)	Articles (1996–2000)
<i>New Left Review</i> (1960) <i>Critique</i> (1973) <i>Capital & Class</i> (1977) <i>Nature, Capitalism and Socialism</i> (1978) <i>Thesis Eleven</i> (1980) <i>Historical Materialism</i> (1997)	None
<i>Science & Society</i> (1936)	Editorial Perspectives (1996/1997) Joost Kircz (1998) Derek Lovejoy (1999/2000)
<i>Monthly Review</i> (1949)	Meera Nanda (1997a) Notes from the Editors (1997)
<i>Socialist Register</i> (1964)	Meera Nanda (1997b)
<i>Rethinking Marxism</i> (1988)	In this issue (1999a) Meera Nanda (1999)

It is quite interesting to note that an Indian natural scientist, Meera Nanda stands out with three extensive articles on the Sokal Hoax, while not only leading Marxist natural scientists, but also most prominent Marxist theorists kept quiet on the issue. In her studies, Meera Nanda counter-attacks postmodernists from a particular Marxist stance in support of Sokal based on history and philosophy of science. She especially discusses how epistemic and cultural relativism of postmodernist theories damaged the social life in Third World.

Studies by Kircz (1998) and Lovejoy (1999/2000), two of the very few Marxist physicists, are unique contributions to the issue given the authors’ expertise in both physics and Marxism. Although the Sokal Hoax is not the focus of Kircz’s (1998) study, his contribution is conspicuous in terms of bringing Engels, and thus natural sciences, back to Marxism—one of the first attempts after a long time. Finally, Lovejoy (1999/2000) focuses on the Sokal Hoax from a Marxist perspective in terms of quantum physics, which was at the heart of discussions. Both studies can be considered as being somehow on the side of Sokal.

The other contributions come from editors of the *Monthly Review* and *Rethinking Marxism*. In the 'Notes from the Editors' (1997) of the *Monthly Review* it is stated that the journal organized six panels within Socialist Scholars Conference, where one of the panels was dedicated to the Sokal Hoax. Although Sokal is not mentioned in the editorial note of the *Rethinking Marxism*, 'In this issue' (1999b), it seems that there had been a debate on the issue at the 1996 conference of the *RM*. The editors address the issue as the 'so-called' debate on "relativist-social constructivist, postcolonial, and postdevelopment-views of science" while presenting Nanda's article (1999).

A Marxist colleague and a participant of the conference, Louis Proyect (n.d.a; n.d.b), provides some details of the debate(s) where the Sokal Hoax seemed to be at the center. He argues that the organisers were not happy with these debates. The debates were about the protest of some participants on the side of Sokal. The 'In this issue' (1999a) of the *Rethinking Marxism* that addresses the Sokal Hoax, makes it clear that the journal is not on Sokal's side. For example, the editors present the review of the book by Goshgarian (1999), *Impostures Intellectuelles* by Sokal and Bricmont, as follows:

Goshgarian takes to task the insinuations, summary dismissals, quotations out of context, guilt by association, "gotchas," and so on that comprise Sokal and Bricmont's attack on the "intellectual dishonesty" of postmodernism and ultimately mark the book as a self-referential exercise: "a series of intellectual impostures that decries a series of intellectual impostures." ('In this issue' 1999a, iv-v)

In my view, the 'Editorial Perspectives' (1996/1997) of the *Science & Society*, with its subtitle 'Science and Its Cultural Critics, or Hermeneutical Gravity and Quantum Levity' embraces a genuine Marxist position: roughly, a critical support to Sokal. The editors acknowledge the complexity of the issue and declare their intention to discuss the matter within a Marxist context:

[...] the nature and validity of the cultural critique of science; the question of the social construction of natural and social reality, in relation to materialist philosophical foundations; the problem of explaining the communications gap that evidently exists between scientists and their critics; and the puzzle raised by modern physics of the objectivity of the external world, and the possibility of our knowing it. ('Editorial Perspectives' 1996/1997, 387)

Despite the very few studies on the hoax by Marxists, it is clear that there was not an agreement among them. I contend that Lewontin's brilliant review (1995) of Gross and Levitt's book clarifies this whole complex picture, interestingly, a year before the hoax. Neither Gross and Levitt (and Sokal)¹³ were seriously aware of Marxism and Marxists, nor did they have a clear idea of what 'left' and 'academic left' mean:

The first problem with Gross and Levitt's thesis is that it is impossible to tell what is meant by the 'academic left,' although they spend a lot of energy trying to justify the term. It definitely does not mean academics who are politically left: they exclude all practicing scientists with leftist politics. Indeed, some of their best friends are lefties. They love Steve Gould (*a leading Marxist natural scientist, acg*). Nor does it include all leftist humanists and social scientists. They use, for example, an article in the *New Left Review* by an admirer of Marx, Elizabeth Wilson, to castigate the 'academic left.' On the other hand, the academic left includes such well-known lefties as Paul de Man! Nor does one have to be an academic to be included (Jeremy Rifkin is on the list). Their archetype of the 'academic left' is Stanley Aronowitz, whose leftist credentials are for them that he is actually a member of the Democratic Socialists of America, the left wing of what used to be the Democratic Party. (Lewontin 1996, 296)

Unfortunately, Lewontin also clarifies his own position in this complex picture, while underestimating the impact of postmodernists:

It is certainly true, and Gross and Levitt provide some lovely examples, that some people have written nonsense about the method and content of natural science. What is not clear from their treatment is whether these examples of nonsense represent any significant or threatening attack on rationality, any more than their own vulgar six page history of the Left in the United. (Lewontin 1996, 296)

Unfortunately, the overall picture reminds the painting of Pieter Bruegel the Elder, *The Blind Leading the Blind* (1568) which turns the situation into a blind version of *Mexican Standoff*. For clarification, the parties in the *Mexican Standoff* are presented graphically in Fig. 1. For simplicity, Western Marxism is not represented in the figure; it had already been evolved into post-Marxism, mostly, by the time, as Wood (1998 [1986], 18) implied.

13. While Sokal (1996b) was accusing the *Social Text* and its editors by their names, Fredric Jameson and Andrew Ross as postmodernist, Fredric Jameson (1991) already published a collection of articles against postmodernism dating back to 1984. One of the Jameson's article was then reprinted in a book edited by Wood and Foster (1997), one of the earliest and strongest counter-attacks of 'traditional' Marxists against postmodernism.

Instead, the term ‘Traditional Marxists’ is used to refer those Marxists struggled against postmodernists and post-Marxists.

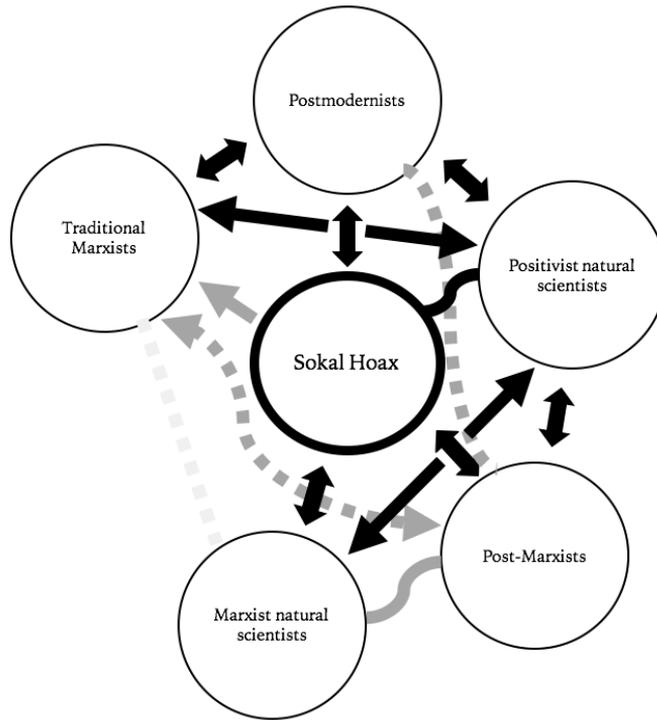


Figure 1. Marxism in Mexican Standoff. Arrowed line/curve represents disagreement; line/curve without arrow represents agreement; darkness of line/curve represents the strength of the relation. Three kinds of strength are used: black, gray and light gray. Dashes are used only for visual reasons.

It seems that traditional Marxists and Marxist natural scientists were not much aware of each other’s existence as it is represented in the figure with light grey that signifies the weakest relation. Lewontin and the rest of the prominent Marxist natural scientists seems to be more prepared and alert to attacks of positivist natural scientists, as already proved by their excellent works in response to them.¹⁴ Similarly, traditional Marxists

14. It is also important to remember that Marxist natural scientists were very interested in Engels, in contrast to Marxist theorists. Dedicating their book, *The Dialectical Biologist* to Engels, Levins and Lewontin (1985) wrote: “to Engels who got it wrong a lot of the time but who got it where it counts.”

seemed to be more sensitive to the attacks of ‘true’ socialists (Wood (1998 [1986])—postmodernists and post-Marxists—when issues on social sciences came to the fore, as already proved by their brilliant works. It turns out to be that the strengths of traditional Marxists and Marxist natural scientists, alone was not valid, enough. At least, the silence of both sides about the Sokal Hoax seems to leave no room for any other explanation.

BACK to ENGELS

After a Long Century

Since the heydays of the Sokal Hoax, Engels and nature have gradually returned to the agenda of Marxism, after a long century, as never before. One of the early signs of this return was the special issue of *Science & Society* on Engels, edited by Joost Kircz and Michael Löwy (1998). The real climax came by the masterworks of second generation of Marxists studying on ecology besides the subsequent works and organizational successes of the first generation:

A new generation of eco-Marxists appeared in the 2000s, including John Belamy Foster and others around the journal *Monthly Review*, who further developed the Marxian concept of *metabolic rift* between human societies and the environment. In 2001, Joel Kovel and the present author issued “An Ecosocialist Manifesto,” which was further developed by the same authors, together with Ian Angus, in the 2008 Belem Ecosocialist Manifesto, which was signed by hundreds of people from forty countries and distributed at the World Social Forum in 2009. It has since become an important reference for ecosocialists around the world. (Micheal Löwy 2018)

While Kovel (2002) and Löwy (2015) continued to develop their approaches within eco-socialism, especially, two studies of the second generation were ground breaking: Burkett (1999) brought nature back into political-economy, for the first time seriously after Marx, and Foster (2000) placed nature back into the heart of Marxism, by extracting the concept of ‘metabolic rift’ from works of Marx and Engels. Furthermore, Foster’s study (2000) was ground breaking not only in its defense of Engels but also in representing Engels’ counter-attack.

Since then, not only Foster (2002, 2009, and 2020) and Burkett (2006) continued to develop their analysis but also they collaborated with others, the outcome of which are works such as Foster, Clark, and York (2010),

Foster and Burkett (2016) and Foster and Clark (2020). Engels and/or nature have been continued to be the subjects of other studies, for example, Kohei Saito (2017, 2021), Xueming Chen (2017) and Kangal (2021).

Unfortunately, these developments do not correspond to a similar revival of interest in natural sciences within Marxism. Therefore, the relation between dialectics and nature, and contributions of Engels in this respect, has been left untouched. Consequently, the core of the problem, resulting a ‘Marxism without Engels’, remained unsolved.

The result of a similar quick search for the title ‘Sokal’ at the archives of these same Marxist journals within twenty-two years between 2000 and 2022 is mainly book reviews, with the exception of Clark and York’s (2006) study published in the *Monthly Review*. It is the only attempt for considering the Sokal affair in a detailed way, within the context of natural sciences and Marxism.

Another exception is the ambitious two-volume book on natural sciences and Marxism by Woods and Grant (2002, 2003). The content of the book, covering physics, geology, archeology, biology, and physiology within the context of Marxist philosophy of science is astonishingly comprehensive. However, it had almost no impact on the aforementioned Marxist journals.

The legendary organization *Science for the People (StfP)* which had ceased to exist in 1989 was reanimated in 2014. The magazine of the *StfP* started to be published again in 2019. The title of the first issue after the renewal was ‘The Return of Radical Science’ reminding radical science movements of the past. It was not by chance that the mathematician Micheal Harris (2019) wrote an article on ‘Sokal Squared’, another academic publishing hoax, referring to the Sokal in this issue. Harris’ discussion of Science Wars and Sokal Hoax is one of the very few critical reviews on the issue written by a natural scientist from a Marxist perspective. While criticizing positivism of Sokal, Harris revealed how the other side of the war, that is, science studies scholars tried to keep themselves distant from *StfP* and radical science movement, and thus Marxism.

Finally, although not published in a Marxist journal, Sheehan’s (2001) review of a book on Science Wars is distinguished by its acknowledgement of the complexity of the subject and the questions it raises, which point to underlying much deeper problems:

What is the basic storyline in the drama of the science wars? Is it a conflict of science versus science studies? Or is it a conflict of pro-science versus anti-

science tendencies? Or is it a conflict of epistemological realism versus relativism; of scientific objectivity versus sociological constructivism? Or more broadly of positivism or neopositivism versus postmodernism, feminism, marxism, afrocentrism, new age mysticism? Or is it a conflict of right versus left? [...] Certainly the left is actively on both sides of it. So the issues involved are quite complex. (Sheehan 2001)

Furthermore, Sheehan genuinely formulated the crucial point of the problem for the both sides, that is, their indifference to Marxism and lack of any backgrounds in it:

Marxism constitutes a long and complex intellectual tradition, which has robustly combined a defence of the cognitive capacity of science with a strong emphasis on its socio-historical character. Given the fact that these current debates dramatise a striving to reconcile the rationality of science with the historicity of science, it would do no harm for those involved in this debate to know more of the preceding debates that have taken place within this tradition and between it and contending positions. (ibid.)

The concluding words of Sheehan is also unique in the sense of grasping the vitality of the problem as a matter of life or death for humanity, nature and Marxism, which I tried to discuss throughout this essay:

The basic storyline, I contend, is the epistemological crisis of our times in its fullest socio-historical context. The conflict between a particular group of scientists and a particular trend in science studies is only one subplot in a much larger and longer drama. (ibid.)

The Actuality of Engels

Unfortunately, the relation between Marxism and natural sciences, despite the brilliant studies of the past and recent hopeful developments, is still in its stage of infancy given a long century of Marxism without Engels.

The recent reintroduction of Engels to Marxism in terms of nature is a great achievement of eco-Marxists. It is clear that Marxists in social sciences and humanities already defined their task and progressed on their way quite seriously. That being the case, it is now time for natural scientists to play their 'natural' part.

However, the solution of the problem is not certainly as simple as concatenating various disciplines in which Marxism need to be developed. No doubt, such kind of work is obviously not a trivial one. The real problem seems to be redefining and rebuilding the totality of Marxism in theory and methodology, and in relation to practice. Therefore, the main problem of Marxism without Engels is not the loss of natural sciences but of totality.

On the one hand, the main weakness of Marxism in defending itself against the attacks of postmodernism was exactly the absence of this totality. On the other hand, the main strength of postmodernists' attacks was based on a totality peculiar to such theories. It is ironic to remember that postmodernists were once present in every realm from arts to humanities, from social sciences to natural sciences and thus politics while Marxism was stuck in social sciences and humanities, exclusively.

Overall, this picture has greatly changed. Recent withdrawal of postmodernist theories coincides with the return of Engels. However, new theories immediately started to occupy the space left by postmodernist theories. After the theoretical shift from Marxism to postmodern theories, known as 'Cultural Turn,' in the 80s and 90s, we witness another theoretical shift from 'Cultural Turn' to 'Material Turn' and thus the emergence and rise of the so-called 'post-humanist' theories.

Rooted in material culture studies in archeology and socio-cultural anthropology, material turn represents an intellectual enterprise covering cultural geography and science and technology studies (STS) (Hicks and Beaudry 2010). The Material Turn, which is as heterogeneous as Cultural Turn, represents a common interest in 'things' with a philosophical background called new materialism hostile to dialectical and historical materialism (Choat 2018).

While material turn emerged as a result of dissatisfaction with Cultural Turn which reduces things to meanings (Hicks and Beaudry 2010), both 'turns' share lack of critical discourses and politics as well as hostility to Marxism. In this sense, Material Turn provided a basis for post-humanist theories (Mukerji 2015) which replaced post-modernist ones. Furthermore, while post-humanist theories have a specific interest in nature, they also share many features of postmodernist theories: An ambitious attempt to dominate the whole intellectual sphere as a result of their own conception of totality and universality against Marxism.

Therefore, in order not to be caught in another Mexican Standoff, Marxism needs to regain its own totality. In fact, Marx and Engels once built this totality. They succeeded in resolving crucial dualities such as nature vs. human, nature vs. culture, mind vs. body and universalism vs. particularism by way of their own conception of totality in theory:

We know only a single science, the science of history. One can look at history from two sides and divide it into the history of nature and the history of men. The two sides are, however, inseparable; the history of nature and the history

of men are dependent on each other so long as men exist. (Marx and Engels 1975, 28)

In terms of methodology, *M&S* defined the totality based on Marx and Engels, as follows:

Marx and Engels were quite clear in defining materialist dialectics as the general laws of matter in motion where matter emerges in the form of thought, nature and human society not in isolation from one another but as mutually interrelated. In this sense, the materialist conception of history, according to Marx and Engels, not only is based on materialist dialectics but also is a study of dialectics. ('About us' 2021)

I consider these principles not as given finalized laws to be followed or applied, but as the principles of a theoretical and a methodological framework to be researched and developed in every single branch of science, as a never-ending process, with the aim of unifying them.

I think that the task of redefining and rebuilding the totality of Marxism in theory and methodology, and in relation to practice is the testament of Marx and Engels, which is the main goal of *M&S*:

The fundamental goal of *Marxism & Sciences* is to develop a research programme, which paves the way for an all-encompassing Marxist grasp of intellectual domain and a merger of class struggles in nature, culture and society as once developed by Marx and Engels and embodied in Marx's *Capital* at the highest level. ('About us' 2021)

I think that such an attempt within Marxism would not certainly result in a tragic end, like the one, Cyrano de Bergerac experienced, while reciting his final words:

Philosopher and physicist,
Musician, rhymester, duellist,
Explorer of the upper blue,
Retorter apt with point and point,
Lover as well,—not for his peace!
Here lies Hercule Savinien
De Cyrano de Bergerac,
Who was everything ... but of account!

(Edmond Rostand 2004 [1654], 246)

REFERENCES

- 'About us'. 2021. *Marxism & Sciences*. <https://marxismandsciences.org/about/>
- Altieri, Riccardo. 2020. "In the Shadow of Karl Marx Perception and Reception of Friedrich Engels in the Digital Age." In *Engels@200: Reading Friedrich Engels in the 21st Century*, edited by Frank Jacob, 271–288. Marburg: Büchner-Verlag.
- Anderson, Perry. 1976. *Considerations on Western Marxism*. London: NLB.
- Benton, Ted. 1979. "Natural Science and Cultural Struggle: Engels on Philosophy and the Natural Sciences." In *Issues in Marxist Philosophy*, Vol. 2, *Materialism*, edited by John Mepham and David-Hillel Ruben 101–142. New Jersey: Humanities Press.
- . 1989. "Marxism and Natural Limits." *New Left Review* 178: 51–86.
- . 1993. *Natural Relations: Ecology, Animal Rights and Social Justice*. Verso.
- . 1996a. "Engels and the Politics of Nature." In *Engels Today: A Centenary Appreciation*, edited by Christopher J. Arthur, 67–93. Hampshire: Macmillan Press.
- . 1996b. *Natural Relations: Ecology, Animal Rights, and Social Justice*. London and New York: Verso.
- Burkett, Paul. 1999. *Marx and Nature: A Red and Green Perspective*. New York: St. Martin's Press.
- . 2006. *Marxism and Ecological Economics: Toward a Red and Green Political Economy*. Leiden and Boston: Brill.
- Callinicos, Alex. 1990. *Against Postmodernism: A Marxist Critique*. Polity Press
- Chen, Xueming. 2017. *The Ecological Crisis and the Logic of Capital*. Leiden and Boston: Brill.
- Choat, Simon. 2018. "Science, Agency and Ontology: A Historical-Materialist Response to New Materialism." *Political Studies* 66 (4): 1027-1042.
- 'Editorial Perspectives: Science and Its Cultural Critics, or Hermeneutical Gravity and Quantum Levity'. 1996. *Science & Society* 60(4): 386–392.
- Engels, Friedrich. 2004 [1895]. "Engels to Karl Kautsky, 1 April." In *Marx and Engels Collected Works*, Vol.50, 486. London: Lawrence & Wishart.
- Foster, John Bellamy. 2000. *Marx's Ecology: Materialism and Nature*. New York: Monthly Review Press.
- . 2002. *Ecology against Capitalism*. New York: Monthly Review Press.
- . 2009. *The Ecological Revolution: Making Peace with the Planet*. New York: Monthly Review Press.
- . 2020. *The Return of Nature: Socialism and Ecology*. NYU Press.
- Foster, John Bellamy and Brett Clark. 2020. *The Robbery of Nature: Capitalism and the Ecological Rift*. NYU Press.
- Foster, John Bellamy, Clark, Brett and Richard York. 2010. *The Ecological Rift: Capitalism's War on the Earth*. New York: Monthly Review Press.
- Foster, John Bellamy and Paul Burkett. 2016. *Marx and the Earth: An Anti-Critique*. Leiden and Boston: Brill.
- Goshgarian, G. M. 1999. "Review." *Rethinking Marxism* 11 (1): 120–131.
- Gouldner, Alwin W. 1980. *The Two Marxisms: Contradictions and Anomalies in the Development of Theory*. London: Macmillan Press.
- Graham, Loren R. 1987. *Science, Philosophy, and Human Behavior in the Soviet Union*. New York: Columbia University Press.
- Grant, Ted, and Woods, Alan. 2002. *Reason in Revolt, Vol. I: Dialectical Philosophy and Modern Science*. New York: Algora Publishing.
- . 2003. *Reason in Revolt, Vol. II: Dialectical Philosophy and Modern Science*. New York: Algora Publishing.

- Gross, Paul and Norman Levitt. 1994. *Higher Superstition: The Academic Left and Its Quarrels with Science*. Baltimore, MD: Johns Hopkins University Press.
- Grundmann, R. 1991. "The Ecological Challenge to Marxism." *New Left Review* 187: 103–120.
- Harris, Michael. 2019. "Science Wars: The Next Generation." *Science for the People Magazine* 22 (1). <https://magazine.scienceforthepeople.org/vol22-1/>
- Hicks, Dan, and Mary C. Beaudry. 2010. "Introduction: Material Culture Studies: A Reactionary View." In *The Oxford Handbook of Material Culture Studies*, edited by Dan Hicks and Mary C. Beaudry, 1–21. New York: Oxford University Press.
- Hunt, Tristram. 2009. *The Frock-Coated Communist: The Revolutionary Life of Friedrich Engels*. London: Penguin Books.
- 'In this issue' 1999. *Rethinking Marxism* 11 (1): iii–v. doi: 10.1080/08935699908685560
- Jameson, Fredric. 1991. *Postmodernism, or, the Cultural Logic of Late Capitalism*. Durham: Duke University Press.
- Kangal, Kaan. 2020. *Friedrich Engels and the Dialectics of Nature*. New York: Palgrave Macmillan.
- Kircz, Joost. 1998. "Engels and Natural Science: A Starting Point." *Science & Society* 62 (1): 62–78
- Kovel, Joel. 2002. *The Enemy of Nature: The End of Capitalism or the End of the World?* London and New York: Zed Books.
- Krätke, Michael R. 2011. "Why Could Marx Not Complete Capital?" *York University, Department of Political Science Seminar Series*, vimeo video: <http://vimeo.com/33204484>
- Lafargue, Paul. 1943 [1890]. "by Paul Lafargue." In *Karl Marx, His Life and Work: Reminiscences by Paul Lafargue and Wilhelm Liebknecht*, 7–29. New York: International Publishers, 1943,
- Larrain, Jorge. 1986. *A Reconstruction of Historical Materialism*. London: Unwin Hyman,
 ———. 1994. *Ideology and Cultural Identity: Modernity and the Third World Presence*. Cambridge: Polity Press.
- Levins, Richard, and Richard Lewontin. 1985. *The Dialectical Biologist*. Cambridge, Mass.: Harvard University Press.
- Lewontin, Richard C. 1995. "A La Recherche Du Temps Perdu." *Configurations* 3 (2): 257–265.
- Lewontin, R. C. 1996. "A la recherche du temps perdu: A Review Essay." In *Science Wars*, edited by Andrew Ross, 293–301. Durham and London: Duke University Press.
- Liebknecht, Wilhelm. 1943 [1896]. "by Liebknecht Wilhelm." In *Karl Marx, His Life and Work: Reminiscences by Paul Lafargue and Wilhelm Liebknecht*, 30–64. New York: International Publishers.
- Lovejoy, Derek. 1999/2000. "Objectivity, Causality and Ideology in Modern Physics." *Science & Society* 63 (4): 433–458.
- Löwy, Michael. 2015. *Ecosocialism: A Radical Alternative to Capitalist Catastrophe*. Illinois: Haymarket Books Chicago.
 ———. 2018. "Why Ecosocialism: For a Red-Green Future." *Great Transition Initiative* (October), <https://greattransition.org/publication/why-ecosocialism-red-green-future>
- Lukács, G. 1971 [1967]. *History and Class Consciousness: Studies in Marxist Dialectics*. Translated by Rodney Livingstone. Cambridge, Massachusetts: MIT Press.
- Marx, Karl. 1981 [1860]. "The Augsburg Campaign." In *Marx and Engels Collected Works*, Vol. 17, 111–132. London: Lawrence & Wishart.
 ———. 1985 [1864]. "Marx to Engels, 4 July." In *Marx and Engels Collected Works*, Vol. 41, p. 545–547. London: Lawrence & Wishart.

- . 1987. "Marx to Engels, 22 June 1867" In *Marx and Engels Collected Works*, Vol. 42, 385. London: Lawrence & Wishart.
- . 1996 [1867]. "Capital Volume 1." In *Marx and Engels Collected Works*, Vol 35. London: Lawrence & Wishart.
- Marx, Karl and Frederick Engels. 1975. "The German Ideology." In *Marx and Engels Collected Works*, Vol. 5. London: Lawrence & Wishart.
- Mukerji, Chandra. 2015. "The Material Turn." In *Emerging Trends in the Social and Behavioral Sciences: An Interdisciplinary, Searchable, and Linkable Resource*, edited by Robert A. Scott and Stephen Michael Kosslyn. 1-13. Hoboken, NJ: Wiley.
- Nanda, Meera. 1997a. "Against Social De(con)struction of Science: Cautionary Tales from the Third World." *Monthly Review* 48 (10) March. doi: 10.14452/MR-048-10-1997-03_1
- . 1997b. "Restoring the Real: Rethinking Social Constructivist Theories of Science." *Socialist Register* 33: 302–352.
- . 1999. "In Search of an Epistemology for Third World People's Science Movements." *Rethinking Marxism* 11 (3): 104–123.
- Nelson, Cary and Lawrence Grossberg, eds. 1988. *Marxism and the Interpretation of Culture*. Urbana and Chicago: University of Illinois Press.
- 'Notes from the Editors'. 1997. *Monthly Review*. June 49 (2). https://monthlyreview.org/1997/06/01/mr-049-02-1997-06_0/
- Ollman, Bertell. 1977. *Alienation: Marx's Concept of Man in Capitalist Society*. Cambridge: Cambridge University Press.
- Proyect, Louis, (n.d.a). "Rethinking Marxism Conference." <http://www.columbia.edu/~lnp3/mydocs/modernism/amherst.htm>
- . (n.d.b) "Deeper Complexities of the Sokal Affair." <http://www.columbia.edu/~lnp3/mydocs/modernism/sokal2.htm>
- Rees, John. 1994. "Engels' Marxism." *International Socialism* 2: 65 (Winter). <http://www.marxists.org/history/etol/writers/rees-j/1994/xx/engels.htm>
- Ross, Andrew, ed. 1996a. "Science Wars." Special issue. *Social Text* 46/47.
- . (ed.).1996b. *Science Wars*. Durham and London: Duke University Press.
- Ross, Andrew. 1997. "Reflections on the Sokal Affair." *Social Text* 50: 149–152.
- Rostand, Edmond. 2004 [1654]. *Cyrano de Bergerac*. Translated and adapted for the stage by Anthoy Burgess. New York: Barnes & Noble.
- Rubel, Maximilien. 2005 [1970]. "The Legend of Marx, or "Engels the founder'." In *Marx Myths & Legends*, edited by Andy Blunden and Rob Lucas. <https://www.marxists.org/subject/marxmyths/maximilien-rubel/article.htm>
- Saito, Kohei. 2017. *Karl Marx's Ecosocialism: Capital, Nature, and the Unfinished Critique of Political Economy*. NYU Press.
- Saito, Kohei, ed. 2021. *Reexamining Engels's Legacy in the 21st Century*. Palgrave Macmillan
- Sheehan, H. 1993 [1985]. *Marxism and the Philosophy of Science: A Critical History*, New Jersey: Humanities Press International.
- . 2001. "The Drama of the Science Wars: What is the Plot? Review of *Beyond the Science Wars: The Missing Discourse about Science and Society* by Ullica Segerstråle (ed)". https://www.academia.edu/1427321/The_drama_of_the_science_wars_what_is_the_plot_Review_Beyond_the_science_wars_the_missing_discourse_about_science_and_society_
- . 2021. "John Desmond Bernal, Marxism, and the Scientific Revolution." *Jacobin*, April 24. <https://jacobinmag.com/2021/04/john-desmond-jd-bernal-marxism-scientific-revolution>

- Smith, Tony. 1993. *Dialectical Social Theory and its Critics: From Hegel to Analytical Marxism and Postmodernism*. State University of New York Press.
- Sokal, Alan. 1996a "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity." *Social Text* 46/47: 217–252.
- . 1996b. "A Physicist Experiments with Cultural Studies." *Lingua Franca*
- Sokal, Alan D. and Jean Bricmont. 1998. *Fashionable Nonsense: Postmodern Philosophers' Abuse of Science*. New York: Picador.
- Thompson, E.P. 1978. *The Poverty of Theory and Other Essays*. London: Merlin Press.
- Timpanaro, Sebastiano. 1975. *On Materialism*. Translated by Lawrence Garner. London: NLB.
- Williams, Raymond. 1982. *Socialism and Ecology*. London: Socialist Environment and Resources Association.
- . 2005 [1980]. *Culture and Materialism*. London and New York: Verso Books.
- Wood, Ellen Meiksins. 1998 [1986]. *The Retreat from class: A New "True" Socialism*. London and New York: Verso Books.
- Wood, Ellen Meiksins and John Bellamy Foster (eds.).1995. Special issue "In Defense of History: Marxlsm and the Postnlojern Agenda." *Monthly Review* (47: 3). <https://monthlyreview.org/product/mr-047-03-1995-07/>
- . 1997. *In Defense of History: Marxlsm and the Postnlojern Agenda*. New York: Monthly Review Press.
- York, Richard and Brett Clark. 2006. "Debunking as Positive Science: Reflections in Honor of the Twenty-Fifth Anniversary of Stephen Jay Gould's The Mismeasure of Man." *Monthly Review*, 57(9). <https://monthlyreview.org/2006/02/01/debunking-as-positive-science/>
- Zavarzadeh, M., Ebert, T. L., Morton, D. E., and Zavarzadeh, D., eds. 1995. *Post-ality: Marxism and Postmodernism* (Vol. 1). Misonneuve.



Remembering Richard Lewontin (1929–2021)¹

Stuart Newman

I FIRST MET THE EVOLUTIONARY GENETICIST Richard Lewontin when I was 15 (he was 31) and had the good fortune to enroll in a course he conducted for science-oriented high school students on Saturday mornings at Columbia University. He had been a graduate student there, but at the time was on the faculty of the University of Rochester, requiring him to travel seven hours by train to New York City Friday night, and return likewise the next day. His lecturing style was to pace back-and-forth at great velocity while chain-smoking, making the complex ideas he delivered easy to understand by using punchy analogies and funny diagrams. It led me to want to be *that* kind of scientist.

The next time I saw him (thankfully no longer smoking) was five years later, during my first days as a graduate student in chemistry at his new academic home, the University of Chicago, where he was to remain until 1973. The re-encounter occurred at a public lecture that Dick (as he was known to friends and colleagues) presented on Darwinism, not as the true theory of biological change, but as a social product, an ideological manifestation of the rise of the Victorian bourgeoisie. This was part of his growing scrutiny of the assumptions of his science, a perspective that sharpened over the next decade into the concept of “biology as a social weapon.” He frequently revisited this formulation in essays and lectures, culminating in a magnum opus, *The Dialectical Biologist* (Harvard, 1985), written with his friend and colleague, the pathbreaking Marxist ecologist Richard Levins (1930–2016).

Dick made his mark on evolutionary biology with empirical work demonstrating an unexpectedly high degree of genetic variation in natural

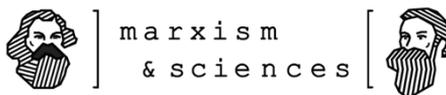
1. First appeared at the web page of Center for Genetics and Society:
<https://www.geneticsandsociety.org/biopolitical-times/remembering-richard-lewontin-1929-2021>

populations. His findings indirectly presented a challenge to Darwinian adaptationism—the doctrine that all features of an organism are attributable to natural selection. His response was to move away from “gene-centrism,” supplementing the roles of genes with extra-Darwinian factors such as invention of new ways of life by organisms considered to be active agents instead of merely passive products of cycles of selection. The burgeoning subfield of evolutionary biology called “niche construction” holds Lewontin as its founding theorist.

Novelties of the phenotype—body segments in worms, insects and vertebrates, the human chin, possibly even human language—rather than arising by gradual selection for improved function, could be incidental side-effects of other evolutionary or developmental processes (“spandrels” in a famous paper with his colleague Stephen Jay Gould). Along the way, he published several influential papers contesting, on rigorous theoretical grounds, the purported genetic basis of IQ differences between demographic groups such as socially defined races.

Although my first two encounters with Dick were at a distance, we wound up in the same department at the University of Chicago, when as a postdoctoral fellow I moved from chemistry to theoretical biology and was drawn into the emerging field of complex systems biology that Dick was helping to forge. We also worked together to organize the University of Chicago chapter of Science for the People, joined in this by Dick Levins, the anatomists Michael Goldberger, Marion Murray, and Len Radinsky, and the mathematician Mel Rothenberg.

We also wound up, by almost pure coincidence, at the same department during the same year at University of Sussex in the U.K., Dick as a sabbatical visitor and me as a visiting research associate. There we and our families, Americans abroad, became close friends. Notwithstanding our differences in age and accomplishments, Dick took me on as a colleague and comrade, serving as a model for a life as a scientist-activist to which I continue to aspire. His death on July 4, which followed by three days that of his wife of 73 years Mary Jane, is a personal loss, and one that leaves an empty space in world science.



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ESSAY

Lewontin's Legacy and the Influence of Engels: A View from the Trenches

Sahotra Sarkar

ABSTRACT: Dick Lewontin's passing on the 4th of July, while this journal's inaugural issue was being compiled, marks the end of a dominating, and yet troubled, era for radical science, especially in the United States. He was preceded in death by his long-term comrade and friend, Richard Levins, who died in 2016. Another occasional collaborator, Stephen Jay Gould, the third member of Harvard's most distinguished triumvirate had died in his relative youth, almost twenty years earlier in 2001. All three were at the forefront of the social—and socialist—struggles of their generation, starting with the movement against the Vietnam War and continuing with the resistance to repeated outbreaks of well-organized scientific racism. It is apt to memorialize Lewontin here—and also mention Levins and Gould—because all three of these figures were explicit in acknowledging their debt to Engels.

KEYWORDS: Richard Lewontin, science, biology, Marxism, Richard Levins, Stephen Jay Gould.

LEWONTIN'S INTELLECTUAL LEGACY

Lewontin received his PhD in Zoology from Columbia University in 1954 under the supervision of Theodosius Dobzhansky, a collaborator of Sewall Wright, and an eminent evolutionary geneticist in his own right. (Earlier, in 1952, he had received a master's degree in statistics, also from Columbia.) Dobzhansky worked on *Drosophila* species that had been made central to research in genetics by Thomas Hunt Morgan's Columbia lab in the 1910s and 1920s, and these remained Lewontin's most favored experimental system for his entire scientific career.

Following his doctoral degree, Lewontin was an assistant professor at North Carolina State University from 1954 to 1958 and then moved to the University of Rochester where he was granted tenure and promoted to professor. In 1964 he moved again, to the University of Chicago where he

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remained until 1973 when he went to Harvard (where he had been an undergraduate, getting his degree in 1951) for the rest of his career, effectively closing his laboratory and retiring in 2003 but remaining active until about 2015. He was elected to the National Academy of Sciences in 1968 but resigned in 1971 because of its involvement in weapons research in the context of the Vietnam War.

Describing Lewontin's scientific achievements adequately would require a volume in itself. He made seminal contributions to theoretical population genetics starting in the 1950s, especially with his analysis of complex modes of natural selection and his work on two-locus models of selection (e.g., Lewontin and Kojima 1960). However, he is best-known for his collaboration with Jack Hubby at the University of Chicago to establish the unexpected extent of variation at the molecular (protein) level in natural populations of *Drosophila pseudoobscura* (Hubby and Lewontin 1966; Charlesworth et.al. 2016). Harris (1966) found the same pattern in humans. Together these results set the stage for Kimura's (1968) challenge to the selectionist interpretation of evolution by formulating a neutral theory that suggested that most variation was not subject to no selection at all or, perhaps, very mild negative selection. Though Lewontin was a strong critic of the received interpretation of evolution—and famously rejected adaptationism in a critique coauthored with Gould (Gould and Lewontin 1979)—, in the neutralist-selectionist controversy he sided with selectionism (Lewontin 1974b).

Lewontin was a founding member of Science for the People in 1969 and his scientific work in the decades that followed was more often than not motivated by social imperatives of the day. That began with a struggle to distance his own discipline of genetics from the scientific racism with which it had often been associated (Lewontin 1970a, b; Provine 1986). This work included, first, a critique of heritability analysis which, in a human context, has always been associated with racism (Sarkar 1998). Next, it included an analysis of human diversity. I will treat this work in some detail below. In the wake of the initiation of the Human Genome Project, Lewontin challenged the science behind genomics-based forensics. With Hartl, he disputed the claim that DNA fingerprinting can identify a suspect with a negligible probability of error (Hartl and Lewontin 1993). It drew the ire of U.S. federal prosecutors but Lewontin held firm.

In tandem with this technical work, Lewontin produced philosophical interpretations of biology to a greater extent than any biologist since J. B. S. Haldane. Much of this work was eventually jointly published in book

form with Richard Levins even if it had been initially authored by only one of them. It is not at all controversial to say that no biologist has influenced the philosophy of biology to a greater extent than Lewontin. I turn to that work next.

THE INTERPENETRATION OF SCIENCE AND POLITICS

In my case, for a biologist and philosopher coming of scientific age in the late 1970s and early 1980s, Lewontin was a towering figure not just because of his science but because his public commitment to social justice led him to draw out the ideological implications of his and others' work including the scientific critiques he provided of genetics and evolutionary biology. At Columbia University, where I was an undergraduate, we were proud to have him as an alumnus.

Many of us worked our way through his dissection of heritability analysis and its irrelevance to the problem of establishing genetic etiology. In the 1970s, an explosion of scientific racism erupted thanks to the work of Jensen (1969). On the basis of a supposedly high heritability value for IQ, Jensen claimed that IQ (which was supposed to measure intelligence—a claim that I have recently critiqued following a path laid out by a large cadre of professional psychologists [Sarkar 2021a]), was genetically determined. Moreover, lower IQs were associated with being Black in the United States. The supposed implication was that Blacks were socially and economically situated where they were because of bad genes, not the pervasive racism of U.S. society.

Lewontin's (e.g., 1970a, b) response constituted a penetrating rebuttal not only of Jensen's scientific racism of but also the versions propounded by figures such as Schockley, and, in a more subtle form, found in the human sociobiology of Wilson (1975). The response was two-pronged. First, in a superb piece of epistemological analysis he showed that the analysis of variance (on which heritability analysis was based) was *not* an analysis of causes (Lewontin 1974a). He then showed why heritability analysis, by its very nature, cannot establish genetic causation (Feldman and Lewontin 1975). This work complemented that of Layzer (1974), Kempthorne (1978), and, slightly later, Jacquard (1983); heritability analysis has never quite recovered its scientific mystique since then among biologists (Sarkar 1998) though psychologists sometimes seem blissfully unaware of the seriousness of its problems (see, e.g., Plomin and von Stumm 2018).

Second, Lewontin laid down the foundation for the genetic analysis of human genetic (and genomic) diversity within and between groups that are resplendent in their cultural diversity in spite of biological homogeneity. He showed that genetic diversity within human so-called races is as great as diversity between races (Lewontin 1972). He took these insights to a popular audience in book form, originally arguing at the level of protein variation (Lewontin 1982) but later at the level of DNA variation when sequences began to become available (Lewontin 1995). The foundation that he established is periodically under attack by new avatars of a desperate scientific racism but, now as in Lewontin's time, these attacks reflect the structural disparities of social power rather than any credible biology.

In the joint work of Lewontin and Levins there are many other contributions of politically committed science especially in ecology, agriculture, and epidemiology all of which were central to Levins' career. An analysis of these will be left for another occasion. Suffice it here to note that it is simply a mistake to regard this work as somehow being politically debauched science in the sense of the work of Jensen or, later, in Herrnstein and Murray's (1994) less than successful attempt to revive scientific racism. Intellectual standards were never compromised. Rather, commitment guided the choice of problems for analysis. It is hard to imagine a worthier approach to science even though I do not intend to disparage the work of those who prefer the safety of the ivory tower.

PERSONAL RECOLLECTIONS

I first met Lewontin in 1982, through our mutual connection with Bill Wimsatt of the University of Chicago. Wimsatt had been a post-doc with Lewontin in the early 1970s at the university; in the early 1980s he was one of my graduate advisers. In 1982 Lewontin had visited the University of Chicago to speak at an event to mark the centenary of Darwin's death. Tellingly, while this was a lavish occasion at that university, the historians of science there (some of whom, such as Robert Richards, were notoriously unsympathetic to progressive causes) did nothing to mark the perhaps more important occasion a year later, the centenary of Marx's death. In later years, Lewontin and I were bemused by that fact though neither of us was particularly surprised.

In the early 1990s I spent two years partly in Lewontin's lab at Harvard while being on the faculty at Boston University and then a fellow at the Dibner Institute at MIT. Technically I was a post-doc at Harvard. The noted

historian of eugenics, Diane Paul, and I shared an office where I had inherited a desk from the eminent geneticist and historian of biology, Raphael Falk, who has also recently died (Sarkar 2021b). Of the other lab members, I had scintillating conversations with Lloyd Demetrius. When nothing else interfered I went over to Steve Gould's office close by typically to discuss baseball. Paul introduced me to Ute Deichmann who had written a brilliant history of German biologists under Hitler. Short-term visitors to the lab who had once worked with Lewontin included Philip Kitcher and Bill Wimsatt. Both Wimsatt and I encountered Dan Hartl in Lewontin's office during the period he was being recruited to Harvard. We were encouraged to work on three-locus models of selection; neither of us followed through.

Lewontin only came in about once a week, typically on the day that the lab had a seminar (which was often Wednesday), and those were the occasions for most of my interactions with him. The seminars had a university-wide reputation. On one later occasion when I was speaking on heritability (in 1995), even Ernst Mayr, who had few intellectual sympathies with either Lewontin or me, showed up for the seminar (Sarkar 2005). Mayr did not say a word which was rare for him. Later he was surprised that Lewontin had not disagreed in spite of my deviation from the work on heritability with Feldman (Feldman and Lewontin 1975). However, Lewontin sometimes attended events organized by the Boston Center for the Philosophy of Science, including its once-famous Colloquium, and those were occasions for more personal conversations. At the Boston Colloquium, Gould and Lewontin were both commentators on my presentations (in 1990 and 1991, respectively). Levins was occasionally present at those events.

Lewontin provided me an introduction to another geneticist, Jon Beckwith, who was one of the organizers of a genetic discrimination study group that had been spawned by the Science for the People movement. Discussions in that group helped develop the critiques of the Human Genome Project (HGP) that Fred Tauber and I published early in the 1990s (Sarkar and Tauber 1991; Tauber and Sarkar 1992; 1993). Because he then lived in Vermont, Lewontin did not attend meetings of that group. Though he was equally critical of the HGP, he would not be drawn into discussions about whether it was a waste of money pointing out that any money spent on science was preferable to the other uses it was likely to be put by the United States government.

My most vivid intellectual memories of Lewontin come from a graduate seminar in the philosophy of biology organized in Spring 1991 by Harvard philosophy faculty, Amartya Sen and Robert Nozick. The participants included Gould, Falk, and Lewontin besides me. Faculty sat in an inner circle with the organizers; students were relegated to an outer circle. Faculty talked interminably and disagreements were severe; I don't recall any student ever saying anything. It was undoubtedly a peculiar way to teach a seminar. But there were bright moments. Sen took joy in pointing out how often Nozick, a committed libertarian, inadvertently invoked Marx. One occasion was particularly telling. At stake were properties of groups that could not be reduced to those of its individual members. The example being discussed was the cardinality of a set, say, n (Sarkar 2008). Nozick countered that an individual could have the property of being a member of a set with cardinality n . Sen pointed out that the observation went back to Marx in the *Grundrisse*.

Lewontin dominated that seminar and Falk and I often met later over coffee to mull over his remarks. Arguing with Lewontin about the units of selection during that seminar led to my perspective that genes versus organisms was a false dichotomy in disputes over the units of selection. In his influential 1970 paper on the units of selection Lewontin (1970c) had pointed out the potential conflicts between levels of selection. But, within the organism, he had not mentioned genes; rather he had mentioned gametes. From my perspective, genes and gametes belonged to different hierarchies of life (Sarkar 1994, 1998). Genes were abstract entities; gametes were physical components of organism.

I am not sure that I ever convinced him of a view that I associate with Williams (1985): that the organism could be the unit of selection *and* that selection could favor one gene (allele) at the same time. But he listened to what I had to say, and that is the part of him that made him such a positive influence on the philosophy of biology. He was also silent in response to my claims and that alone gave me confidence that I was not entirely wrong. In later years our views diverged even more. I had always been sympathetic to the neutral theory of evolution, but I eventually endorsed a much more radical rejection of natural selection as a major cause of evolution (Sarkar 2015) than Lewontin ever accepted. But he always listened.

OF ENGELS AND MARXISM

Lewontin and Levins were publicly committed Marxists; in my view Gould was, at most, a fellow traveler. Lewontin and Levins implicitly suggested that they were also committed dialectical materialists almost in the old-fashioned Soviet doctrinaire sense. But close examination of their work reveals much more subtlety, in fact, more subtlety than, say, in Haldane's Marxist writings. They also succumbed to the allure of Mao's Cultural Revolution but that infatuation did not last. All three figures were explicit of their debt to Engels. Of them, again in my view, Gould used Engels' arguments in more detail than Lewontin and Levins but that is also a discussion that will be left for another occasion.

For Lewontin and Levins, the primary source for their theoretical framework is the 1985 book, *The Dialectical Biologist*, which is dedicated to Engels (Lewontin and Levins 1985). The book is a collection of articles published earlier elsewhere, mostly coauthored by them. However, there is a concluding chapter explicitly on dialectics that will be my focus here. Another important source is a much later compilation, *Biology under the Influence* (Lewontin and Levins 2007).

In this work we do not find any doctrinaire invocation of *diamat* laws even though the transformation of quantity into quality is taken for granted in their work. More importantly, and this comes out very vividly in their discussions of agriculture and epidemiology, they show convincingly the social roots of problems. If they were active today, they would emphasize the social causes of pandemics. There is an obvious sense that our ongoing pandemic is the result of the SARS-CoV-2 virus. But this obvious sense is also trivial.

It is a mistake to call SARS-CoV-2 the *cause* of the Covid-19 pandemic. SARS-CoV-2 has probably existed for generations without a pandemic. Rather, at the very least, we must invoke the volume, intensity, and particularities of travel to explain why there is a *pandemic*, the spread of infectious disease across the world. Globalization was already predicted and criticized by Marx and Engels in *The Communist Manifesto*. It is the most important outcome of late capitalism in the pandemic context; without it, there would be no pandemic. Only because China's state capitalism has successfully made it the world's factory could an infection introduced to humans, most likely in Wuhan, spread as rapidly as it did to the farthest corners of Earth. The volume of travel from and through Wuhan has been of critical importance to the emergence of Covid-19; travels volumes elsewhere generated its explosive spread. Patterns of trade in a globalized world explained this volume, not the biology of SARS-CoV-2. Similarly,

the containment of the pandemic requires social choices, most importantly, isolation measures and social vaccine mandates, all in turn more dependent on politics than on biology. (Here, I am indulging in some Levins-style reasoning found in *Biology under the Influence*.)

The social determination of disease emergence underscores the complexity of what we now call social-ecological systems, a theme that goes back to Lewontin and Levins (and especially the latter) in the 1980s. In the chapter on dialectics in *The Dialectical Biologist*, they emphasize the limitations of reductionism in biology in spite of its apparent success in molecular biology. (This was also a major theme of Lewontin's 1992 lecture at the University of Chicago when I first heard him speak). With Engels they seemed to accept that matter exhibits novel phenomena at each succeeding level of organization. While I know of no source in which Lewontin and Levins explicitly invoke Engels in this way, its consequent critique of reductionism was a pervasive theme of their view of dialectics. Here they followed a tradition introduced several generations earlier, most notably by Haldane (1939) in *The Marxist Philosophy and the Sciences*.

Though I have defended reductionism *within* molecular biology, there is no question that Lewontin and Levins' dialectical point is correct: there is much more to biology than molecular biology as, for instance, our singular failure to cure diseases at the molecular level indicates. (Lewontin made this point multiple times in the essays collected in *Biology under the Influence*.) As Lewontin showed in the 1960s, it is possible to both accept and exploit the power of molecular biology and remain open to complexity and dialectics in the study of organism and environment (Gilbert and Sarkar 2000).

FINAL REMARKS

As we move forward we will miss Lewontin's towering intellect in biology. But, even more than that, we will miss his understanding of science as an ideological construct reflecting social relations, as much part of the superstructure as forming the base. Keeping that understanding alive, reminding ourselves that science is valuable primarily as a potential tool for liberation would be the best way to honor Lewontin. Science for the People, which had become defunct in the 1980s, was revived in 2014 and that is one place where his legacy, as also in the pages of this journal, will continue to be extended. Science and society will both be better for it.

REFERENCES

- Charlesworth, Brian, Deborah Charlesworth, Jerry A. Coyne, and Charles H. Langley. 2016. "Hubby and Lewontin on Protein Variation in Natural Populations: When Molecular Genetics Came to the Rescue of Population Genetics." *Genetics* 203: 1497–1503.
- Feldman, M. W. and R. C. Lewontin. 1975. "The Heritability Hang-Up." *Science* 190: 1163–1168.
- Gilbert, Scott F. and Sahotra Sarkar. 2000. "Embracing Complexity: Organicism for the 21st Century." *Developmental Dynamics* 219: 1–9.
- Gould, S. J. and R. C. Lewontin. 1979. "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme." *Proceedings of the Royal Society of London B* 205: 581–598.
- Haldane, J. B. S. 1939. *The Marxist Philosophy and the Sciences*. New York: Random House.
- Harris, Harry. 1966. "Enzyme Polymorphisms in Man." *Proceedings of the Royal Society of London B* 164: 298–310.
- Hartl, Daniel L. and Richard C. Lewontin. 1993. "DNA Fingerprinting Report." *Science* 260: 473–474.
- Herrnstein, Richard J. and Charles Murray. 1994. *The Bell Curve: Intelligence and Class Structure in American Life*. New York: Free Press.
- Hubby, J. L. and R. C. Lewontin. 1966. "A Molecular Approach to the Study of Genic Heterozygosity in Natural Populations." *Genetics* 54: 577–609.
- Jacquard, A. 1983. "Heritability: One Word, Three Concepts." *Biometrics* 39: 465–477.
- Jensen, Arthur R. 1969. "How much can We Boost IQ and Scholastic Achievement?" *Harvard Educational Review* 39: 1–123.
- Kempthorne, Oscar. 1978. "Logical, Epistemological and Statistical Aspects of Nature-Nurture Data Interpretation." *Biometrics* 34: 1–23.
- Kimura, Motoo. 1968. "Evolutionary Rate at the Molecular Level." *Nature* 217: 624–626.
- Layzer, David. 1974. "Heritability: Science or Numerology?" *Science* 183: 1259–1266.
- Lewontin, Richard C. 1970a. "Race and intelligence." *Bulletin of the Atomic Scientists* 26(3): 2–8.
- . 1970b. "Further Remarks on Race and Intelligence." *Bulletin of the Atomic Scientists* 26(5): 23–25.
- . 1970c. "The Units of Selection." *Annual Review of Ecology and Systematics* 1: 1–18.
- . 1972. "The Apportionment of Human Diversity." *Evolutionary Biology* 6: 381–398
- . 1974a. "The Analysis of Variance and the Analysis of Causes." *American Journal of Human Genetics* 26: 400–411.
- . 1974b. *The Genetic Basis of Evolutionary Change*. New York: Columbia University Press.
- . 1982. *Human Diversity*. New York: Scientific American Books.
- . 1995. *Human Diversity*. 2nd. ed. New York: Scientific American Books.
- Lewontin, R. C. and Ken-Ichi Kojima, 1960. "The Evolutionary Dynamics of Complex Polymorphisms." *Evolution* 14: 458–472.
- Lewontin, Richard C. and Richard Levins. 1985. *The Dialectical Biologist*. Cambridge, MA: Harvard University Press.
- . 2007. *Biology under the Influence: Dialectical Essays on Ecology, Agriculture, and Health*. New York: Monthly Review Press.

- Plomin, R. and Sophie von Stumm, 2018. "The New Genetics of Intelligence." *Nature Reviews Genetics* 19: 148–159.
- Provine, William B. 1986. "Geneticists and Race." *American Zoologist* 26: 857–888.
- Sarkar, Sahotra. 1994. "The Selection of Alleles and the Additivity of Variance." In *PSA 1994: Proceedings of the 1994 Meeting of the Philosophy of Science Association* vol. 1, edited by David Hull, Micky Forbes, and Richard M. Burian, 3–12. East Lansing: Philosophy of Science Association
- . 1998. *Genetics and Reductionism*. New York: Cambridge University Press.
- . 2005. "In Memoriam: Ernst Mayr, 1904–2005." *Journal of Biosciences* 30: 415–418.
- . 2008. "A Note on Frequency-Dependence and the Levels/ Units of Selection." *Biology and Philosophy* 23: 217–228.
- . 2015. "The Genomic Challenge to Adaptationism." *British Journal for the Philosophy of Science* 66: 505–536.
- . 2021a. *Cut-and-Paste Genetics: A CRISPR Revolution*. Lanham: Rowman and Littlefield Publishers.
- . 2021b. "In Memoriam: Raphael Falk, 1929–2019." *Biological Theory* 19: 1–4.
- Sarkar, Sahotra and Alfred I. Tauber. 1991. "Fallacious Claims for HGP." *Nature* 353: 691.
- Tauber, Alfred I. and Sahotra Sarkar. 1992. "The Human Genome Project: Has Blind Reductionism Gone Too Far?" *Perspectives in Biology and Medicine* 35: 220–235.
- . 1993. "The Ideology of the Human Genome Project." *Journal of the Royal Society of Medicine* 86: 537–540.
- Williams, George Christopher. 1985. "A Defense of Reductionism in Evolutionary Biology." *Oxford Surveys in Evolutionary Biology* 2: 1–27.
- Wilson, Edward O. 1975. *Sociobiology: The New Synthesis*. Cambridge: Harvard University Press.

Engels' Fourfold Revenge: On the Implications of Neglecting Engelsian Dialectics in Science, Philosophy, Ecology, and Revolutionary Practice

Rogney Piedra Arencibia

ABSTRACT: This paper confronts the familiar prejudice in Western Marxism that Engels' thought, as articulated in *Anti-Duhring* and the *Dialectics of Nature*, is of marginal interest and should be excised from Marxist theory. I argue that this view is mistaken. If we do not take seriously his insights about science, philosophy, nature, and history, his insights will take a fourfold revenge upon us. Natural science takes its revenge by unleashing technology that subjugates us in ways we cannot anticipate, understand or control. Philosophy, in turn, takes revenge on science for neglecting the philosophical presuppositions of its own worldview. Nature itself takes its revenge upon those who consider it to be some formless and passive matter, deprived of history and negativity, responding to our productive activity in surprising ways that, without a rational form of regulation, could lead to our own extinction. Lastly, history takes revenge on those 'well intentioned' actors who try to impose their will upon it without a scientific knowledge of its internal, necessary, and objective forces.

KEYWORDS: Engels, Marx, Marxist philosophy, ecology, natural sciences, history.

A FEW WORDS ON THE 'ENGELS' AFFAIR'

In my book *Marxismo y dialéctica de la naturaleza* (Marxism and Dialectics of Nature) (2019), I show the inconsistency of the anti-Engelsian tendencies common among Western Marxists, such as the young Lukács (1970), Avineri (1970), Schmidt (1977), Merleau-Ponty (1974), J.-P. Sartre (1963a),¹ Colletti (1973) and Kohan (1998). Usually, such tendencies attempt to separate the historical founders of Marxism and then set them

1. "The debate on the dialectics of nature in France [...] began in 1948, when Jean-Paul Sartre, in his article Materialism and Revolution, advanced a number of objections [...] against [...] the dialectics of nature" (Gretskii 1966, 57–58).

against one another.² According to Norman Levine, two opposed schools of thought emerged from this supposed contraposition: “one called Marxism and the other labeled Engelsism” (2006, XI). The first of the two, i.e., the (authentic) ‘Marx’s Marxism’—who would have guessed?—was to be considered Marxism proper, while the second (Engels’), we are told, was to become Soviet orthodox Marxism, a worthless, primitive, and naïve philosophy.³

As if that were not enough, these authors often accuse Engels of the worse kind of *political* crimes: guilty of the reactionary defects of the 2nd and 3rd Internationals (Kohan 1998, 24–37), of the intellectual poverty of German social-democracy and the cruelty of bolshevism (Avineri 1970, 144), responsible for the doctrinaire ‘monologue’ of the communist parties toward the masses (Holloway 2005, 131), and even for the collapse of the USSR (Levine 2006, 6). With such monstrous effects, it seems that *Anti-Dühring* and *Dialectics of Nature* must be sealed under 7 locks and the keys thrown to the bottom of the sea.

The crux of the matter when it comes to anti-Engelsianism is the rejection of dialectics in nature; since, according to the young Lukács (1971, xvi), “only a knowledge of society and the men who live in it is of relevance to philosophy.” Accordingly, “Marxism does not have to try to talk about the laws of nature. Marxism, if a science, is a science of society” (Kohan 2003, 46). Hence the simplistic idea that nature, and the sciences that study it, are alien to Marxism; and those who intrude on such forbidden topics will end up like Lysenko, “who kept cutting rats’ tails hoping that in the long run, they were going to be born without tails” (Kohan 2003, 30).⁴

2. “[...] the difference between Marx and Engels is significant and striking” (Avineri 1970, 153). Usually, these supposed ‘fundamental’ differences are presented as differences in their philosophical background (e.g. Jones 2017).

3. “The polemical work *Anti-Dühring*, in particular, became immensely influential [...]. It is a fact of major tragicomical proportions that a third of mankind professes these naive, amateurish speculations as its official philosophy” (Elster 1999, 11).

4. Leaving his faults aside, it was not Lysenko, nor any other Lamarckist, but Weismann—that is, precisely the anti-Lamarckist par excellence—who proposed such an experiment (to refute Lamarckism). The truth is that Lysenko never proposed such an absurd experiment to demonstrate the inheritance of acquired characteristics. It is a widely known fact that mutilations, scars, and many other direct effects of the environment on the body are not inherited. Any layperson in the field could cite dozens of examples of this (burns, tattoos, amputations, extraction of molars, circumcision, etc.). So that Weismann’s experiment would simply confirm a trivial fact but would not refute Lamarckism. On this topic, Olarieta Alberdi 2012, 130; Lewontin and Levins 2009, 163–196.

THE REVENGE OF NATURAL SCIENCE

A neo-Kantian dualism becomes evident in these anti-Engelsian trends, i.e., that between the sciences of nature and 'the sciences of the spirit.' Resembling Dilthey's (1949, 13–28) dichotomy, they present an incompatibility between (deterministic) natural phenomena with the (free) human realm. Far from the synthesis wanted by Marx (1988, 111) of social and natural sciences into 'a single science,' Engels' detractors seem determined to open a chasm between them, a sort of cleavage of culture into two great 'autonomous fields,' into two cultures (cf. Snow 2012).

In Kohan's opinion, since "capitalism is not going to fall in virtue of the ineluctable mandate seeds and trees or by the grace of the boiling water that performs a leap from quantity to quality. [Marxism] can only strike with all its strength once deprived of its naturalist cosmology" (1998, 73). In short: Marxists should exclusively focus on social and political problems, that is, "what interest us the most" (Kohan 1998, 75). As for the natural sciences, "let the natural scientists deal with them as they please" (Kohan 2003, 46). It is not hard to see that authors like Kohan share a positivist conception on natural science as an ideologically 'neutral' field: it does not matter if our political ideals are liberal, communist, or fascist, "in the natural sciences we all agree" (Kohan 2003, 30). Furthermore, we are expected to believe that such narrow-minded 'professional cretinism'⁵ is Marx's position (see Kohan 2003, 46; Marcuse 1961, 137–138).

Kohan and his like forget that the natural sciences had been playing—and will continue to play—essential social, political, and ideological functions: "Darwin's natural selection, [for instance], was to be used in turn to justify ruthless exploitation and race subjection under the banner of the survival of the fittest" (Bernal 1969, 56). Neoliberalism worships the market as a quasi-biological order of competition,⁶ ideologically reflected in the morality of 'laws of the jungle.'⁷ This social (market) Darwinism appears as the *natural order* that guarantees efficiency and economic

5. I draw this term from Ilyenkov (2007, 52) and Mikhailov (2006, 23).

6. "In growing market competition small firms always face major threats from large companies as the latter possess more resources (physical, financial, human, and technological). Hence most smaller firms develop a cocooning attitude and confine themselves to a niche as they could not continue their struggle for existence in the marketplace." (Rajagopal 2015, 145–146)

7. "[T]he absence of human relations and solidarity [...] is deliberately fostered in a society that proudly proclaims the laws of the jungle and the so-called survival of the fittest (read: wealthiest)." (Grant and Woods 2002, 5)

development, as some natural law before which there is no rational alternative.

Hence the relevance of Lenin's warning: "modern pseudoscience actually serves as a vehicle for the grossest and most infamous reactionary views" (1966, 234). Natural sciences do not exist in an innocuous bubble inhabited by impartial beings who indifferently observe the world from their ivory towers. Nobody can divest themselves of their ideals merely by entering a laboratory and assume them back on their way out, as the (positivist) Nestor Kohan (2005, 30) seems to believe. Natural science is a *social* activity. Even scientists of great talent quite often participate *with their science* in the most reactionary ideologies and practices. Indeed, not only in the social but also the natural sciences, the evaluative aspects of human activity are *internal* to theory. In acknowledging this internal nexus lies the core of Marxist conception on the relation between science and value (see Piedra Arencibia 2018).

To disregard natural science by favoring a supposedly exclusively social 'philosophy of praxis,' means to surrender to reactionary forces a crucial field of ideological struggle. This was summarised by Lenin as follows:

[...] it must be realised that no natural science and no materialism can hold its own in the struggle against the onslaught of bourgeois ideas and the restoration of the bourgeois world outlook unless it stands on a solid philosophical ground. (Lenin 1966, 233)

Such are the consequences of separating a supposed revolutionary philosophy from nature and the sciences that study it.

In the history of Marxism, there is a clear example of this which Soviet philosopher E.V. Ilyenkov thoroughly analyzed. At the beginning of the twentieth-century, in the context of the great discoveries taking place in physics, several Russian socialists uncritically accepted the predominant subjectivist interpretation about them. They thought that the workers' philosophy should be no longer Marx and Engels' materialist dialectics, but the idealist positivism professed by E. Mach:

It was precisely as a result of an uncritical attitude toward what was said at the beginning of the century in the name of modern natural science and in the name of the 'new physics,' that Bogdanov and his philosophical friends fell into the most primitive subjective idealism. (Ilyenkov 2009, 374)

Plekhanov, the first Russian Marxist, proved that Machism was, in fact, Berkeley's doctrine presented in new terminology. However, Plekhanov proceeded using *purely philosophical* arguments. He did not realize that the

crux of the matter was that Machists legitimated their claims by entrenching themselves in the terrain of contemporary natural sciences. “And as long as they held on to this beachhead, no ‘philosophical’ argumentation had any effect upon them” (Ilyenkov 2009, 350). Hence, all of Plekhanov’s arguments were easily disposed of by his rivals as antiquated ‘Hegelian jargon.’

The main deficiency in Plekhanov’s position was that he ignored what was actually the central question raised by the Machists: the relationship of the philosophy of Marxism—dialectical materialism, materialist dialectics—to the events which had taken place in natural science, i.e., to the improvements which had been made in the logic of the thinking of natural scientists. This was the central point of the question, and only Lenin understood at that time the full significance of this fact for the philosophy of Marxism. (Ilyenkov 2009, 351–352)

Certainly, “we cannot *a priori* renounce a comprehensive understanding of the natural world” (Monal 1995, 10). Ever since, “each scientific judgment, when unraveling an aspect of objective reality, reproduces something that intimately and internally concerns man” (Rodríguez Ugidos 1985, 41). This is so not only—and not so much—because of humanity’s interest in nature from an ideological point of view, but also—and mainly—from a *practical* one. The fact is that the natural sciences, through their practical applications, have provided humanity with great power over nature. (What was that famous line from *Spiderman*, again?) In Marx’s words:

[...] natural science has invaded and transformed human life all the more practically through the medium of Industry; and has prepared human emancipation, however directly and much it had to consummate dehumanization. Industry is the actual, historical relation of nature, and therefore of natural science, to man. (Marx 1988, 110)

To ignore this fundamental fact leads to a complete (idealist) failure to comprehend the *social* realm. An incomprehension especially unacceptable in our twenty-first-century, when natural sciences are more than ever an “immediate productive force” (Marx 1972, 143) that progressively and irreversibly penetrates, through technology, in our everyday life. Here lies the practical aspect of natural sciences’ revenge upon those who separate “history from natural science and industry and sees the origin of history not in coarse material production on the earth but in vaporous clouds in the heavens” (Marx and Engels 1956, 201).

PHILOSOPHY'S (POSTHUMOUS) REVENGE

Interestingly, a fundamental idea of Engels was overlooked both by the majority of Soviet pro-Engelsian philosophy textbooks and his detractors in the West. Indeed, it is an idea “that Marxism itself has commonly avoided and even today provokes interpretations of all kinds, avoiding a literal reading” (Plá León 2009, 21). Nevertheless, such an idea appears in *each one* of the philosophical works of Engels (1976b, 131; 1987a, 35; 1976a, 362; 1987b, 486, 491). I am referring to the daring Engelsian thesis of the ‘death’ of philosophy: “if we deduce principles of being from what is, we need no philosophy for this purpose, but positive knowledge of the world and what happens in it” (Engels 1987a, 35).

Despite what may appear at first glance, this is not a positivistic renunciation of philosophy as such but an attempt to overcome *traditional* philosophy. Recall that, just like the first form of positivism (Comte’s) and continental irrationalism (Kierkegaard, Schopenhauer, and Nietzsche), Marx and Engels reacted to the bankruptcy of German (idealist) highly speculative philosophy. Marx and Engels expressed their reaction by formulating (and answering) the question of what philosophy is.

A curious process has taken place in the history of thought. Each time philosophy tries to delimit its field to a sector of reality, each time it tries to possess an *object*, it suffocates like a fish out of water and is replaced by specialized science in that sector. Thus, when it comes to the movements of bodies, mechanics proves to be the far more adapted ‘organism’ in that environment, and rather like natural selection, it displaces the misfit philosophy. The same story is repeated over and over in all the natural and human fields; there is always a better adapted ‘theoretical organism’ that is up to the task philosophy struggles with. To change the figure, philosophy is like an exorcised ghost that has been thrown out of everywhere he tries to haunt.

Moreover, having failed to find a specific sector of reality to study, philosophy does no better by casting itself as “generalizing” or “systematizing” knowledge provided by other sciences, or by pretending to be a science of the ‘world as a whole.’ Engels understood this perfectly. Hence his insistence that ‘particular’ sciences should become consciously dialectical in their methods. For the natural sciences, themselves—not philosophy—need to conform to a unique (dialectical and materialist) worldview to frame their objects. What is then philosophy’s element, its ‘natural habitat’—so to speak? Engels’ answer:

In [any case], modern materialism is essentially dialectic, and no longer needs any philosophy standing above the other sciences. As soon as each special science is bound to make clear its position in the great totality of things and our knowledge of things, a special science dealing with this totality is superfluous. That which survives, independently, of all earlier philosophy is the science of thought and its laws—formal logic and dialectics. (Engels 1987a, 26)

It is, therefore, false that “one of the main characteristics of Engelsian philosophy [is] the postulation of a necessary dependence and subordination of philosophy [to] the natural sciences and the reduction of philosophical tasks to the narrow horizon of the generalization of their results” (Kohan 1998, 299). In his work on Feuerbach, Engels clearly states:

To furnish this comprehensive view was formerly the task of so-called natural philosophy. [...] today, when one needs to comprehend the results of natural scientific investigation only dialectically, that is, in the sense of their own interconnection, in order to arrive at a ‘system of nature’ sufficient for our time; when the dialectical character of this interconnection is forcing itself against their will even into the metaphysically trained minds of the natural scientists, today natural philosophy is finally disposed of. Every attempt at resurrecting it would be not only superfluous but a *step backwards*. (Engels 1976a, 365)

Philosophy is not anymore to speculate on nature or society because it “is no longer a question anywhere of inventing interconnections from out of our brains, but of discovering them in the facts” (Engels 1976a, 375). Does this mean that philosophy has nothing to do with the rest of (social and natural) science and that, like Ouroboros, has interest only in itself? Could it be that positive sciences are perfectly fine on their own and need no philosophy making a nuisance of itself? No. Philosophy does have a ‘duty’ towards the sciences, and its interest in them is essentially epistemological. Its object is thought, and not, by the way, the individual’s thought—here lies its difference with psychology. Philosophy, understood as “theory of the laws of the thought process itself” (Engels 1976a, 365), as dialectical logic, does not deal with the thoughts of individuals, not even with that which all thinking individuals share, but concerns itself only with logically correct and cultivated thought, with thought as it *should be* when it adequately reflects its object, i.e., with *theoretical thought*.

In order to investigate any natural object (mechanical movement, biological inheritance, etc.), a social object (money, Christianity, the October Revolution, etc.), or an individual-psychological object (fear of spiders, shyness, etc.), we must convert it first into an object of thought. As far as theory goes, one cannot verify the correspondence of one’s representation

of the thing with the very thing without first transforming the very thing into a representation (cf. Ilyenkov 2009, 8–9). A theory's elaboration consists of converting the object-thing into an idea, i.e., the idealization of the thing; the inverse process, i.e., converting the ideal object into (another) thing, is the process of thought's objectivization. In this spiral cycle of subjectivation-objectivization, the ideal-real cycle of human activity, philosophy finds its element: theoretical thinking, i.e., thought when reflecting its object's objective and internal regularities. The objective forms of thought that philosophy studies are, above all, the appropriation, through human practical and theoretical activity, of such objective regularities (that exist outside and independently of thought which seeks to reflect them). For that reason, being the products of our activity, thought's determinations are at the same time, in virtue of their content, independent of our will and consciousness. For "all logical forms without exception were universal forms of the development of reality outside thought, reflected in human consciousness and tested in the course of millennia of practice" (Ilyenkov 2009, 102). Hence, it is not about two autonomous 'substances' (thought and being) distinct one from the other, but "two sets of laws which are identical in substance, but differ in their expression" (Engels 1976a, 362).

Practical activity, the concrete-universal synthesis of the ideal and the material, systematically shows "the logical categories are not external forms of thought, but laws that govern the development of material and spiritual things" (Rodríguez Ugidos 1985, 72). That's why Engels (1976a, 345) claims that "the great basic question of all philosophy" lies not in the forms of thought nor the forms of being, by themselves, not either in the forms of thought *and* being, but in "the *relation* of thinking and being" (emphasis added). This does not mean, of course, that philosophy ought to become just a 'generalization' of scientific discoveries, but that philosophical categories are *simultaneously* objective and subjective. They are objective in virtue of their *content* (the real regularities that they allow to represent in theory and transform in practice) and subjective by their *form* (the specificity that they acquire as the reflection in the subject's activity through concepts, judgments, and reasonings).

In that way, philosophy is not a 'science of science' but "the logic of the development of a world outlook" (Ilyenkov 2009, 214). As a theory of theoretical thought, philosophy becomes necessary for the sciences, even though many scientists think of it as something completely expendable.

Such contempt was already common in Engels' times. With great acuteness, Engels (1987b, 345–355) shows how it was because of the deprecation of philosophy and theoretical thought, manifest in the aspiration to analyze 'pure' facts from no philosophical point of view, that scientists of the stature of A.R. Wallace and W. Crookes fell into the mysticism of modern spiritualism, i.e., in the most *unscientific* philosophy. Victims of empiricist and positivist illusions did not realize that, whether they know it or not, naturalists “may adopt whatever attitude they please, they are still under the domination of philosophy” (Engels 1987b, 491).

Natural scientists believe that they free themselves from philosophy by ignoring it or abusing it. They cannot, however, make any headway without thought, and for thought they need thought determinations. But they take these categories unreflectingly from common consciousness [...] Hence they are no less in bondage to philosophy, but unfortunately in most cases to the worst philosophy, and those who abuse philosophy most are slaves to precisely the worst vulgarised relics of the worst philosophies. (Engels 1987b, 490–491)

In this way, “[p]hilosophy takes its revenge posthumously on natural science for the latter’s having deserted it” (Engels 1987b, 486). The mere accumulation of empirical data is not enough to make a science. Once we extract those data, we need to do something with them, i.e., to elaborate a theory to conquer more than plain appearances. “[A]ll science would be superfluous if the outward appearance and the essence of things directly coincided” (Marx 2010b, 804). The very selection of which facts to be considered or left out already presupposes a preceding theory. Therefore, whether she wants it or not, the natural scientist must engage in theoretical thinking. However, it turns out that “theoretical thinking is an innate quality only as regards natural capacity. This capacity must be developed, improved, and for its improvement, there is as yet no other means than the study of previous philosophy” (Engels 1987b, 338). Not every scientist, regardless of how talented, is consequently cultured in philosophical matters. Hence, the Engelsian idea of the *spontaneous* ‘dialectization’ of natural sciences⁸ requires of scientists an awareness of this spontaneous tendency

8. According to this idea of Engels, the discoveries of the natural sciences, despite the consciously adopted philosophical assumptions of their discoverers, tend little by little towards a dialectical conception, since this is imposed by the very characteristics of its object. “For the revolution which is being forced on theoretical natural science by the mere need to set in order the purely empirical discoveries, great masses of which have been piled up, is of such a kind that it must bring the dialectical character of natural processes more and more

through a conscientious study of dialectics “which rests on acquaintance with the history of thought and its achievements” (Engels 1987b, 491).

Only under this conception, philosophy no longer spreads its wings only with the falling of the dusk, i.e., after scientific discoveries have taken place; and becomes a conscious guide for the *development* of theories. This does not mean a subordination relationship between philosophy and the rest of the sciences but a necessary alliance, a fruitful collaboration to understand (and transform) this world.

NATURE’S REVENGE

The view that pretends to divorce Marxism from nature, moreover, prevents it from *theoretically* dealing with the ecological and environmental problems that have become a matter of grave concern in the last decades. Indeed, the topic of the dialectics of nature acquires today an immense significance, not only epistemological but also political and social, given the ecological crisis into which the capitalist mode of production has dragged us.

For the most part, the relationship between ecological thought and Marxism has not been cordial. As Hannah Holleman (2015, 1) asserts, “first stage eco-socialist thinkers often assumed Marx’s work had no basis in ecological understanding, or believed his positions were Promethean and productivist—anti-ecological in the end.” In general, this supposed ‘Promethean’ attitude in Marx is typified, according to L. Kołakowski (1978, 413), by “his lack of interest in the natural (as opposed to economic) conditions of human existence.” Then, we are told that Marx grants to productive activity an infinite creative capacity, not limited or conditioned by nature. In reality, this accusation fits well with the (subjectivist) reading of Marx shared by many anti-Engelsian authors—among whom we can count Kołakowski himself—, especially concerning the concept of ‘praxis’ which, as I have demonstrated (Piedra Arencibia 2019, 83–102), is mystified by these Marxists who make out of it a supernatural creative force.

Truth be told, Marx and Engels are, to a large extent, heirs of the modern conception of humanity as “agent and interpreter” (Bacon 2003, 33) or “lord and master” (Descartes 1998, 142–143) of nature, mainly, due to their emphasis on labour and the primary role they grant to the productive

to the consciousness even of those empiricists who are most opposed to it.” (Engels 1987a, 13)

forces in history. Here we could cite the well-known passages from the *Communist Manifesto* where Marx and Engels celebrate the bourgeoisie achievement of the “[s]ubjection of Nature’s forces to man” (1976, 113). Nonetheless, we should not forget that this ‘celebration’ is no more than their account of an undeniable historical *fact*. It is not in vain that for approximately two decades, several scientists (see, e.g., Crutzen and Brauch 2016) have used the term ‘Anthropocene’ to refer to our current geological epoch. Instead of the significant natural events (end of the last major ice age) that determined the transition from the Pleistocene to the Holocene, productive human activity is now the main force capable of changing the face of planet Earth.⁹ Paraphrasing the *Manifesto*, probably not even Marx or Engels would have guessed, when they wrote it, that such mighty productive forces slumbered in the lap of social labour. Nevertheless, it is vital to notice that the historical founders of Marxism turn away from the ‘Promethean’ trend that sees the human being as a sort of omnipotent God submitting nature at his will, when Engels states an important warning:

[A]t every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature—but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly. (Engels 1987b, 461)¹⁰

The fundamental notion that a human being is an intrinsically natural subject and, therefore, entirely dependent on the rest of nature, runs throughout the whole work of Marx and Engels. As early as his *Economic and Philosophic Manuscripts of 1844*, Marx categorically asserts the following: “[t]hat man’s physical and spiritual life is linked to nature means simply that nature is linked to itself, for man is a part of nature” (1988, 76). In *The German Ideology*, Marx and Engels declare,

The first premise of all human history is, of course, the existence of living human individuals. Thus the first fact to be established is the physical organisation

9. It is worth noticing, as Carles Soriano (2020, 10) puts it, that “[t]he crisis of the Anthropocene has dramatically changed the Neokantian traditional break between the natural and social sciences. The Anthropocene, as a concept that results from the human interaction with the planet under an historical mode of social organization, above all reveals the inadequacy of the traditional dualist approach based on the separation of natural and social sciences.”

10. “[The human being] opposes himself to Nature as one of her own forces.” (Marx 2010a, 187)

of these individuals and their consequent relation to the rest of nature. [...] All historical writing must set out from these natural bases and their modification in the course of history through the action of men” (Marx and Engels 1998, 37).

They always had in mind that, regardless of how much technological power we possess, “man himself is a product of nature” (Engels 1987a, 34) whose fundamental activity, that which sets us apart from the rest of living creatures, i.e., labour, is at the same time a special kind of natural process. For labour “can work only as nature does, that is by changing the form of matter. Nay more, in this work of changing the form, he is constantly helped by natural forces” (Marx 2010a, 53). Labour, the central concept of classical Marxist thought, is defined by Marx as “a process in which both man and Nature participate, and in which man of his own accord starts, regulates, and controls the material reactions between himself and Nature” (Marx 2010a, 187). It is, therefore, “a necessary condition, independent of all forms of society, for the existence of the human race; it is an eternal nature imposed necessity, without which there can be no material exchanges between man and nature, and therefore no life” (Marx 2010a, 53).

For these reasons, the idea of communism as “the genuine resolution of the conflict between man and nature” (Marx 1988, 2), or, in other words, the ecological ideal of classical Marxism’s notion of communism, should not be read in a Rousseau’s style, as a *return* to a supposed ‘natural state’ or a *romantic* reunion with the ‘Pachamama.’ Indeed, Marx dislikes Rousseau and the illusions of a return to pre-industrial life (see Heinz Holz 2004, 85). This naturalist romanticism implies the non-Marxist notion that human beings have become something distinct from nature to which we must ‘return.’ First, according to Marx, “[t]he nature which comes to be in human history—the genesis of human society—is man’s real nature; hence nature as it comes to be through industry, even though in an estranged form, is true anthropological nature” (1988, 110–111). Secondly, for Marx and Engels, “the celebrated ‘unity of man with nature’ has always existed in industry” (1998, 45). Finally, it is precisely this productive activity or ‘industry’ what “has prepared human emancipation” (Marx 1988, 110), for such an emancipation “is a historical and not a mental act, and it is brought about by historical conditions, the level of industry, commerce, agriculture, [and] intercourse” (Marx and Engels 1998, 44).

To deny the civilizing force of capitalism, due to an abstractly moral contempt for its—no less real—colonizing, predatory and bourgeois character, would be to bet on a merely local mode of production and a

primitivist idolatry of nature (see Marx 1972, 94). Furthermore, the 'solution' proposed by that naturalist sentimentalism consists of considering the human being as a sort of *excrement* (see Žižek 2012, 116) that 'mother nature' should expel from herself to regain her 'equilibrium'¹¹ and idyllic homeostasis that supposedly possessed before being profaned by the perverse civilized society.

Those who really consider the political-ecological problems know that it is not about cultivating the longing for previous stages that are supposedly happier or more balanced. The hypothesis that the animals that we anthropocentrically call superior, like ourselves, owe their conditions of existence to contamination is enough to avoid any aesthetic or nostalgic approach: we breathe because in the current state of the planet, there is enough oxygen in the atmosphere, and that oxygen was pollution from the point of view (so to speak) of the algae and other organisms that perhaps produced it: those organisms breathed carbon [dioxide]. (Sacristán 1984, 39)

Far from conceiving the human being as an unhappy and expendable accident, a sort of bastard child of mother nature, Engels (1987b, 331–32), following Spinoza (2006, 49), understands spirit, i.e., the universal (social) thought that takes place through humanity as an attribute (inalienable property) of nature as a whole.¹²

The bottom line here is that human power will never surpass nature's, for the simple fact that the first is nothing more than a consciously oriented *application* of the second. Hence, nature will always exceed (defeat) man, whose final defeat—both as an individual and as a species—will be to pay the debt we all owe to nature: death. Through humanity, through our activity—yet, of course, not only through us—nature destroys and creates (i.e., transforms) itself. From an ecological point of view, this means that men will never be able to destroy nature in its entirety, but, for decades now, we can destroy *our* nature, i.e., the material basis that supports our existence as living beings and, to be fair, of all living things on this planet. The prominent eco-socialist John Bellamy Foster (2000, 165–167; Foster and Burkett 2016, 1–50) rescues and develops the Marxian concept of 'metabolic rift' referring to such a real and dangerous possibility of exhausting the natural basis for the continuity of our compulsory exchange

11. On a similar magical treatment of the 'balance' notion by the Machists, see the critique of Evald V. Ilyenkov 2009, 327–328.

12. Notice how clueless is Sartre's critique that "the dialectics of nature is nature without men" (1963a, 173).

of substances with nature; a rift that can only result in the final extinction of the human species.

Faced with this increasingly real threat, the Engelsian dialectics of nature acquires a renewed importance. The principle that not only the human subject but all nature is historical and active —i.e., that it produces new historical-concrete forms of self-development through the resolution of its internal contradictions—is crucial for correctly understanding the current ecological crisis. From the positivist interpretation of nature, secretly shared by Engels’ critics,¹³ the natural world is a chaos without any history and inner structure, an amorphous and passive (deprived of self-negation) substratum waiting to be shaped by language (as in some neopositivists) or by miraculous human ‘praxis.’¹⁴ Indeed, this is the ontological picture that lies under the technocratic ‘Prometheanism.’ According to Engels, instead, nature is also active and therefore capable of counterattacking, or in his terms, taking its ‘revenge.’ Therefore, after highlighting labour as the teleologically oriented material activity that allows man to effectively control natural forces as its essential feature, Engels warns us:

Let us not, however, flatter ourselves overmuch on account of our human victories over nature. For each such victory, nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only too often cancel the first. (Engels 1987b, 460–461)

This profound and visionary idea of Engels follows directly from the natural-dialectical principles of his worldview. Firstly, as we have seen, he starts from the conception of nature as an active and historical reality. Secondly, Engels acknowledges the part played by chance in dialectical interactions and transformations (of cause-effect relations) in natural phenomena. As Barbagallo (2005, 99) has pointed out, such a dialectical view, in which all organisms and natural conditions are mutually dependent, in which causes transform themselves into effects and vice versa, is crucial

13. Sartre, who thinks that “it is through human reality that there is a world” (1993, 307), believes that nature or—using his jargon—‘being-in-itself’ “can not even be what it is not; we have seen indeed that it can encompass no negation. It is full positivity. It knows no otherness; it never posits itself as other-than-another-being. It can support no connection with the other. It is itself indefinitely and it exhausts itself in being. From this point of view we shall see later that it is not subject to temporality.” (1963a, xvi). Thus, according to this metaphysical idealism only consciousness is temporal, time (let alone historical change) does not exist in nature.

14. “Nature for itself is devoid of any negativity. Negativity only emerges in nature with the working Subject.” (Schmidt 1971, 195)

for the very concept of ecosystem (see also, Foster 2020, ch. 6). Furthermore, because nature is capable of producing the new, the qualitative diverse, it can *surprise us*.

In his famous paper, *The Part Played by Labour in the Transition from Ape to Man*, Engels notices that our scientific discoveries and technological achievements have not only natural but also unforeseen *social* consequences. The latter are, in fact, much more difficult to predict and can acquire dramatic dimensions. Thus, “afterward Columbus discovered America, he did not know that by doing so he was giving a new lease of life to slavery, which in Europe had long ago been done away with, and laying the basis for the Negro slave trade” (Engels 1987b, 462).

The Marxist biologists Richard Levins and Richard Lewontin (2007, 106, 149, 182, 298) observed how failure to understand this dialectical character of nature lead the pharmaceutical-medical establishment fifty years ago, confident after the initial success of antibiotics, to the illusion that infectious diseases would have disappeared forever by now. However, today not only are we witnessing how old pathogens become more resistant which each generation of antibiotics, but even how new diseases emerge despite—and sometimes even because of—their extensive usage. Sure enough, pharmaceutical companies within the capitalist mode of production, in their frenzy for short-term profit, cannot afford to acknowledge such a dialectical picture that considers not only the immediate effects of our acts but tries to disclose the mediate repercussions and dialectical cause-effect links.

The Marxist analysis of these matters reveals the ideological dimension and the class character of the philosophical assumptions that consciously or unconsciously guide our activity. Thus, the positivist (i.e., reductionist, mechanist, and subjectivist) view of reality and the method of its study—usually despite the intentions of its users—turn into strong allies for capitalist practices in its logic and guide for action. Something similar, but on a conscious level, happens with materialist dialectics for those who fight for the practical emancipation of man and nature, for communism.

As one battles it out over any environmental problem, it becomes clear that the left demands a deeper understanding of the whole system, while the right wants the problem to be reduced to technical details. So the dialectical proposition—that the world is richly interconnected and that it must be seen as a systemic whole with contradictory aspects—becomes a hot political problem rather than a simple topic of debate in philosophical seminars. (Levins 2016, 158)

Henceforth, perhaps the greatest perspicacity of Engels' treatment of this issue lies in his awareness of the political (class) aspect of the ecological problem. The concrete character of his approach to this problem places at the center of critical attention, not the generically abstract 'human being,' but a historical-specific mode of production, i.e., capitalism. This mode of production not only implies a concrete-historical form of human (inter)relations but also, and simultaneously, a peculiar mode of relating to the rest of nature. Engels highlights the (harmful) ecological implications of the chaotic and spontaneous character of capitalism:

As individual capitalists are engaged in production and exchange for the sake of the immediate profit, only the nearest, most immediate results must first be taken into account. [...] The same thing applies to the natural effects of the same actions. What cared the Spanish planters in Cuba, who burned down the forest on the slopes of the mountains and obtained from the ashes sufficient fertilizer for *one* generation of very highly profitable coffee trees—what cared they that the heavy tropical rainfall afterwards washed away the unprotected upper stratum of the soil, leaving behind only the bare rock! (Engels 1987b, 463)

This lucid approach to the ecological problem, from a class struggle standpoint and not as an affair related with a supposed (greedy) 'human nature,' is what makes classical Marxism a fundamental theoretical precedent for current eco-socialist conceptions, such as that of Jason W. Moore (2015) who confronts the aforementioned concept of Anthropocene as part of an ideological diversionist strategy that tries to blame 'humanity' as a whole for all the problems caused by 1% of its population. Moore (2015, 173–196), therefore, proposes the concept of Capitalocene, as it is not the human being but capital, the actual agent responsible for the uncontrolled environmental effects that we have been witnessing. Capital, not man, has become the principal geological force. "Like Frankenstein's monster, capital is a human creation, which comes to dominate its makers. As our environment becomes more habitable for capital, it becomes less habitable for the human" (Levant 2017, 259).

THE REVENGE (IRONY) OF HISTORY

Indeed, the capitalist mode of production prevents us from fully deploying our (distinctive) rational ability to foresee and control the mediate effects of our actions. According to Engels, human history essentially differs from the history of nature in the fact that, in the latter:

[...] unconscious agencies [act] upon one another, out of whose interplay the general law comes into operation. Nothing of all that happens [...] as a consciously desired aim. In the history of society, on the contrary, the actors are all endowed with consciousness, are men acting with deliberation or passion, working towards definite goals; nothing happens without a conscious purpose, without an intended aim. (Engels 1976a, 365)

Nonetheless, it turns out that, still today, the historical outcomes of their actions often differ quite dramatically from the intended purposes of men. Here lies the well-known Marxist theme of 'alienation,' i.e., the fundamental ontological paradox of modern times: it has never been clearer that *human* history is the product of our activity, and, at the same time, it is clearer than ever that it is not us (human beings) who are controlling it. Man loses control over his own activity and its objects and finds himself under the control of one of his products, capital, an *extraneous and hostile* force that subjugates him.

It cannot be highlighted enough: 'alienation' is an *objective* domination relation and not just an illusion or mirage that we can dispel with a sort of moral self-nurturing or by arriving at some intellectual mind-changing illumination based on our goodwill to 'change the world without taking power' (cf. Holloway 2005). The conquest of the control over our social activity and its products, of the control over our lives and human history—as we have learned from Marx and Engels already—demands a real liberation, not just a mental one. Furthermore, such liberation requires a scientific understanding of the object from whose control we are trying to free ourselves, capital, *and* the necessary object of our practical activity, nature, serving as a guide for *correct* interventions in the course of history: knowledge (science) in unity with action (revolution), or revolutionary practice-oriented by revolutionary theory. As Engels put it:

[the regulation and effective control of the mediate effects of our activity], requires something more than mere knowledge. It requires a complete revolution in our hitherto existing mode of production, and simultaneously a revolution in our whole contemporary social order. (Engels 1987b, 462)

Those who try to separate revolutionary practice from science are, therefore, subject to what Engels (and Marx) called the 'irony of history:' "[t]hey will pay for the consequences of their own [absurd] actions—that is the law of history" (Engels 2001, 282). This is particularly true of the 'free praxis' creed that transforms the profound Marxist notion of revolutionary practice into a narrowly political revolt. These authors usually

reject the ‘determinist’ objective laws of history while claiming that Marxists are perfectly fine just with a political theory that dissipates the illusions of capitalism over the masses and presenting their *voluntarist* reading of Marxism as a supposedly radical “political theory of rebellion” (see, e.g., Kohan 1998, 78–79). This ‘revolutionary’ stance of ‘political revolt’ and the purely negative ‘scream’ of the oppressed that has nothing *positive* to tell us (i.e., discontented haters without concrete solutions, destroyers of the present while reckless of the future),¹⁵ often end up reinforcing that very order of things that oppresses them. As Engels puts it: “[m]en who have boasted of having *effected* a revolution have always found on the morrow that they didn’t know what they were doing; that once *effected*, the revolution has borne no resemblance at all to what they had intended. That is what Hegel calls the irony of history, an irony which few historical figures can escape” (Engels 1995, 281).

We could grant that such theories of ‘rebellion’ are made with good intentions, but so is the road to hell, as the saying goes. Let us illustrate this by using an example from the ‘Marxist’ Jean-Paul Sartre. A black worker of an airport in a racist country steals a plane as a protest against the “subjective impoverishment” (J.-P. Sartre 1963b, 95) that represents the prohibition against flying because of the color of his skin. With no experience as a pilot, he crashes and dies (most likely, killing quite a few innocent people in the process). Sartre sees in this “individual revolt of the ‘airplane thief’ [...] a particularization of the collective revolt of the colonized; at the same time, it is in addition, by its very incarnation, an emancipating act” (ibid., 109). How this “choice of a brief, dazzling freedom, of a freedom to die” (ibid.) that—as Sartre himself acknowledges—reflects the actual (*frustrated*) state of the colonized people’s rebellion, can be evaluated as an ‘emancipatory act’ is beyond my modest understanding. What is clear is that these *abstract* acts offer a valuable service to the oppressors. Would not such an ‘emancipatory act’ be the perfect justification and legitimization for the very injustice against it tried to protest? And what we could say about the (kind of pathetic) method of combating capitalism proposed by Holloway (2005, 188): the ‘revolt’ of “throwing the alarm clock at the wall, arriving late for ‘work,’ back pain and other forms

15. “Our scream is a refusal to accept. [...] A refusal to accept the inevitability of increasing inequality, misery, exploitation and violence. [...] Our scream is a scream to break windows, a refusal to be contained, an overflowing, a going beyond the pale, beyond the bounds of polite society. [...] Our refusal to accept tells us nothing of the future, nor does it depend for its validity on any particular outcome.” (Holloway 2005, iv)

of absenteeism [...].” Perhaps our ‘screamer’ does not know—or pretends not knowing, it does not matter—that the worker cannot *afford* to be fired and that, if he goes to work early, it is not because of deception over his subjectivity or an arbitrary sadomasochistic choice, but because he *objectively* depends on his salary to live. In practice, this lame ‘rebellion’ would only discover that workers *as individuals* are expendable for capital: for each one fired, there will always be ten more looking (competing) to fill the position. Such is the revenge that history takes on those who act without knowledge of the object.

This transformation into the opposite, this ultimate arrival at a point which represents the diametrical opposite of the point of departure, is the naturally ordained fate of all historical movements that are unaware of the reasons for and conditions of their existence and thus merely geared to illusory aims. They are mercilessly brought into line by the ‘irony of history.’ (Engels 1990, 21)

Abstract freedom turns out to be concrete slavery. Real (concrete) freedom “means nothing but the capacity to make decisions with knowledge of the subject” (Engels 1987a, 105). Such is the simple and yet profound Engels’ dialectics of freedom and necessity.

CONCLUSION

Under the capitalist mode of production, that is, under “a system of production which has grown up spontaneously and continues to grow behind the backs of the producers” (Marx 2010a, 116), human beings still lie in their ‘natural prehistory,’ for what distinguishes them from the rest of animals is their capacity to plan and control their productive activity. Hence, Marx and Engels saw communism as the appearance of man as the protagonist of his own history, as history’s true *humanization*, as the transformation of man from a subjected *actor* into a subject of his actions, an *author*. In Engels’ (1987b, 462) words: “All hitherto existing modes of production have aimed merely at achieving the most immediately and directly useful effect of labour.”

Only conscious organisation of social production, in which production and distribution are carried on in a planned way, can lift mankind above the rest of the animal world as regards the social aspect, in the same way that production, in general, has done this for mankind in the specifically biological aspect. Historical development makes such an organisation daily more indispensable, but also with every day more possible. From it will date a new epoch of history, in which mankind itself, and with mankind, all branches of its activity, and particularly

natural science, will experience an advance that will put everything preceding in the deepest shade. (Engels 1987b, 331)

Therefore, this conscious and intelligent form of organizing human social life, in which those “extraneous objective forces that have hitherto governed history pass under the control of man himself,” is regarded by Engels as “the humanity’s leap from the kingdom of necessity to the kingdom of freedom” (Engels 1987a, 270). That is why the ecological problem demands not only a ‘mindset change’ or a ‘new paradigm,’ but a practical historical revolution based on the scientific knowledge of (social *and* natural) reality, in order to surpass that mode of production that “while upsetting the naturally grown conditions for the maintenance of that circulation of matter, it imperiously calls for its restoration as a system, as a regulating law of social production, and under a form appropriate to the full development of the human race” (Marx 2010a, 507). Indeed, this is a life-or-death challenge. Communism, “the reconciliation of mankind with nature and with itself” (Engels 1975, 424), the “fully-developed naturalism, equals humanism, and as fully developed humanism equals naturalism” (Marx 1988, 102), the rational form of relating with nature and with itself that humanity can and must construct, is, therefore, *not* an automatic and inevitable result of some laws of nature’s development, but an absolute condition for the survival of all human beings that live in it. Let us fight for that this geological epoch turns out to be the only one with a future for humanity, not Capitalocene but ‘Communocene.’

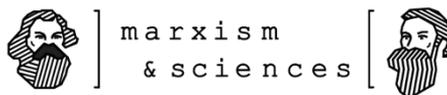
REFERENCES

- Avineri, Shlomo. 1970. *The Social & Political Thought of Karl Marx*. New York: Cambridge University Press.
- Bacon, Francis. 2003. *The New Organon*. Cambridge: Cambridge University Press.
- Barbagallo, Antonio. 2005. “Dialéctica engelsiana y recuperación del marxismo.” *Marx Ahora* 19: 97–109.
- Bernal, John Desmond. 1969. *Science in History. Vol. 1: The Emergence of Science*. Harmondsworth: Pelican Books.
- Colletti, Lucio. 1973. *Marxism and Hegel*. London: NLB.
- Crutzen, Paul J., and Hans Günter Brauch. 2016. *Paul J. Crutzen: A Pioneer on Atmospheric Chemistry and Climate Change in the Anthropocene*. Vol. 50. Zürich: Springer.
- Descartes, René. 1998. “Discourse on Method.” In *The Philosophical Writings of Descartes*, vol. I, 111–151. Indianapolis: Hackett Publishing Company.
- Dilthey, Wilhelm. 1949. *Introducción a las ciencias del espíritu*. México: Fondo de Cultura Económica.
- Elster, John. 1999. *An Introduction to Marx*. New York: Cambridge University Press.

- Engels, Frederick. 1975. "Outlines of a Critique of Political Economy." In *Marx and Engels Collected Works*, Vol. 3. 418–443. New York: International Publishers.
- . 1990. "The Foreign Policy of Russian Tsardom." In *Marx and Engels Collected Works*, Vol. 27. 11–49. New York: International Publishers.
- . 1995. "Letter to Vera Zasulich, 23 April 1885." In *Marx and Engels Collected Works*, Vol. 47. 279–281. London: Lawrence & Wishart.
- . 2001. "Letter to Paul Lafargue, 25 March 1889." In *Marx and Engels Collected Works*, Vol. 48. 282–283. London: Lawrence & Wishart.
- . 1976a. "Ludwig Feuerbach and the End of German Classical Philosophy." In *Marx and Engels Selected Works in Three Volumes*, Vol. 3. 335–376. Progress: Moscow.
- . 1976b. "Socialism: Utopian and Scientific." In *Marx and Engels Selected Works in Three Volumes*, Vol. 3. 93–151. Moscow: Progress Publisher.
- . 1987a. "Anti-Dühring." In *Marx and Engels Collected Works*, Vol. 25. New York: International Publishers.
- . 1987b. "Dialectics of Nature." In *Marx and Engels Collected Works*, Vol. 25. New York: International Publishers.
- Foster, John Bellamy. 2000. *Marx's Ecology: Materialism & Nature*. New York: Monthly Review Press.
- . 2020. *The Return of Nature: Socialism and Ecology*. New York: Monthly Review Press.
- Foster, John Bellamy, and Paul Burkett. 2016. *Marx and the Earth*. Leiden: Brill.
- Grant, Ted, and Alan Woods. 2002. *Reason in Revolt: Dialectical Philosophy and Modern Science*. Vol. 1. New York: Algora Publishing.
- Gretskii, M. N. 1966. "Does Dialectics Exist in Nature?" *Soviet Studies in Philosophy* 4(4): 56–62.
- Heinz Holz, Hans. 2004. *Reflexión y Praxis. Estudios para la teoría marxista hoy*. La Habana: Editorial de Ciencias Sociales.
- Holleman, Hannah. 2015. "Method in Ecological Marxism: Science and the Struggle for Change." *Monthly Review* 67(5): 1–10.
- Holloway, John. 2005. *Change the World Without Taking Power*. London: Pluto Press.
- Ilyenkov, Evald V. 2009. *The Ideal in Human Activity*. Pacifica, CA: Marxists Internet Archive.
- . 2007. "A Contribution to the Discussion on School Education." *Journal of Russian and East European Psychology* 45(4): 50–55.
- Jones, Gareth Stedman. 2017. "History and Nature in Karl Marx: Marx's Debt to German Idealism." *History Workshop Journal* 83(1): 98–117.
<https://doi.org/10.1093/hwj/dbx008>. <https://doi.org/10.1093/hwj/dbx008>.
- Kohan, Néstor. 1998. *Marx en su (Tercer) Mundo*. Buenos Aires: Biblos.
- . 2003. *El capital. Historia y método*. Buenos Aires: Universidad Popular Madres de Plaza de Mayo.
- . 2005. *El capital. Historia y método*. La Habana: Editorial de Ciencias Sociales.
- Kołakowski, Leszek. 1978. *Main Currents of Marxism: Its Rise, Growth, and Dissolution. Vol. 1. The Founders*. Oxford: Clarendon Press.
- Lenin, Vladimir I. 1966. "On the Significance of the Militant Materialism." In *Collected Works*, Vol. 33. August 1921–March 1923, 227–236. Moscow: Progress.
- Levant, Alex. 2017. "Smart Matter and the Thinking Body: Activity Theory and the Turn to Matter in Contemporary Philosophy." *Stasis* 5(2): 248–264.
- Levine, Norman. 2006. *Divergent Paths. Hegel in Marxism and Engelsism*. New York: Lexington Books.
- Levins, Richard. 2016. "La ciencia clasista y la verdad científica." *Marx Ahora* 42: 149–162.

- Lewontin, Richard, and Richard Levins. 2007. *Biology Under the Influence*. New York: Monthly Review Press.
- . 2009. *The Dialectical Biologist*. Delhi: Aakar Books.
- Lukács, Geörg. 1970. *Historia y conciencia de clase*. La Habana: Editorial de Ciencias Sociales.
- . 1971. *History and Class Consciousness*. Cambridge, MA: The MIT Press.
- Marcuse, Herbert. 1961. *Soviet Marxism: A Critical Analysis*. Vol. 726. Columbia University Press.
- Marx, Karl. 1972. *The Grundrisse*. New York: Harper & Row.
- . 1988. *Economic and Philosophic Manuscripts of 1844*. New York: Prometheus Books.
- . 2010a. "Capital. Volume I." In *Marx and Engels Collected Works*, Vol. 35. London: Lawrence & Wishart.
- . 2010b. "Capital. Volume III." In *Marx and Engels Collected Works*, Vol. 37. London: Lawrence & Wishart.
- Marx, Karl, and Frederick Engels. 1956. *The Holy Family or Critique of Critical Critique*. Moscow: Foreign Languages Publishing House.
- . 1976. "Manifesto of the Communist Party." In *Marx and Engels Selected Works in Three Volumes*, Vol. 1, 108–137. Moscow: Progress Publisher.
- . 1998. *The German Ideology*. New York: Prometheus Books.
- Merleau-Ponty, Maurice. 1974. *Las aventuras de la dialéctica*. Buenos Aires: La Pléyade.
- Mikhailov, Felix T. 2006. "Problems of the Method of Cultural-Historical Psychology." *Journal of Russian & East European Psychology* 44(1): 21–54.
- Monal, Isabel. 1995. "La huella y la fragua: el marxismo, Cuba y el fin de siglo." *Temas* 3: 5–15.
- Moore, Jason W. 2015. *Capitalism in the Web of Life: Ecology and the Accumulation of Capital*. London: Verso.
- Marx, Karl, and Friedrich Engels, ed. 2016. *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*. Michigan: PM Press.
- Olarieta Alberdi, Juan Manuel. 2012. "Lysenko. La teoría materialista de la evolución." *Nómadas* 33: 1–519.
- Piedra Arencibia, Rogney. 2018. "Un enfoque marxista de la relación entre lo cognoscitivo y lo valorativo." *Estudios del Desarrollo Social: Cuba y América Latina* 6(2): 221–239.
- . 2019. *Marxismo y dialéctica de la naturaleza*. 2nd edition ed. Quito: Edithor.
- Plá León, Rafael. 2009. "El cuerpo teórico del marxismo. Ideas para una definición general." In *Filosofía marxista*, Vol. I, edited by AA.VV. La Habana: Felix Varela.
- Rajagopal. 2015. *The Butterfly Effect in Competitive Markets: Driving Small Changes for Large Differences*. London: Palgrave Macmillan UK.
- Rodríguez Ugidos, Zaira. 1985. *Filosofía, ciencia y valor*. La Habana: Editorial de Ciencias Sociales.
- Sacristán, Manuel. 1984. "Algunos atisbos político-ecológicos de Marx." *Mientras Tanto* 21: 39–49.
- Sartre, Jean-Paul. 1963a. *Crítica de la razón dialéctica*. Buenos Aires: Losada.
- . 1963b. *Search for a Method*. New York: Alfred A. Knopf, Inc.
- . 1993. *Being and Nothingness*. Washington: Washington Square Press.
- Schmidt, Alfred. 1971. *The Concept of Nature in Marx*. London: NLB.
- . 1977. *El concepto de naturaleza en Marx*. Madrid: Siglo XXI.
- Snow, C. P. 2012. *The Two Cultures*. New York: Cambridge University Press
- Soriano, Carles. 2020. "Epistemological Limitations of Earth System Science to Confront the Anthropocene Crisis." *The Anthropocene Review* 1–15.
- Spinoza, B. 2006. *Ética*. La Habana: Editorial de Ciencias Sociales.

Žižek, Slavoj. 2012. *Less Than Nothing: Hegel & the Shadow of Dialectical Materialism*. London: Verso.



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ESSAY

Friedrich Engels' Importance for Contemporary Materialist Epistemology*

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ABSTRACT: In this contribution for Friedrich Engels' bicentennial birthday, we investigate to what extent the epistemological ideas of F. Engels, based in nineteenth-century science, can serve as stepping stones towards a novel materialistic epistemology given the contemporary state of the sciences. I look at Engels as an historical figure in his nineteenth-century context with strong and pertinent emancipatory ideas, who understood the need of a materialistic epistemology for the emancipatory project he and Karl Marx envisioned. In this contribution I will focus especially on his *Anti-Dühring* and his *Dialectics of Nature*, in their nineteenth-century context. Secondly, I will use his intentions in writing these inspirational works as a basis for further reflections on the sciences and their possible contribution to human emancipation. In particular, I will touch upon the issue of to what extent scientific theories represent the known world and to what extent theories in the natural sciences and biology can serve as a model for the humanities and sociology. In other words, if we consider the world materialistically, that is to say, it exists independently of what the human race as offspring of this world makes of it, how can the early inroads of Engels and Marx in making this world intelligible, help us today in rescuing humankind from self-inflicted disaster.

KEYWORDS: F. Engels, materialism, science, biology, human nature.

Nowadays it is no longer a question of combating an idealism that denies science, but rather of combating an idealism within modern science. This struggle entails: upholding a materialist epistemology as against either Platonist-theoreticist or empiricist-agnostic conceptions of science prevailing today; rejecting the antithesis science-history (something not done with sufficient clarity by the anti-historicists), and placing the historical sciences of nature and their consolidation with the human sciences at the centre of the discussion; and, finally, elaborating on the link between materialism and hedonism, with all the consequences it has for the model of the socialism we envisage for ourselves. Anti-Engelsism represents a rejection of that outlook. (Timpanaro 1975a, 128)

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1. THE CHALLENGE

A commemoration of a hero like Friedrich Engels should be more than a review of all his words and deeds. Many biographies have been written, hagiographical as well as hateful. Unfortunately, both literary genres are of limited value if we want to address Engels' merits in stimulating us, here and now, to develop a contemporary materialistic epistemology, void of the semi-religious overtones that could be observed during the Stalinist cult.

The time seems to be right for a new approach to Engels, which does away with old mystifications. Such an approach can build on the excellent edition of Engels' writings in the *Marx-Engels Gesamtausgabe* (MEGA²) and their excellent introductory essays which explain the works and situate them in their nineteenth-century context (Engels 1985; Engels 1988).

Engels was often caricatured. This might have been grounded in the perceived unilinear succession of Marx, Engels, Lenin, Stalin and Mao. Critics of this suggestion often work backwards and in 'rescuing' Marx make Engels the culprit. He has often been depicted as a great simplifier who distorted Marx's subtle and brilliant ideas (Levine 1975; Carver 1983). In the mid-1970s, Sebastiano Timpanaro forcefully attacked the artificial and unsubstantiated role of Engels as the bad guy: "During the twentieth century, each time that a particular intellectual current has taken the upper hand in bourgeois culture [...] certain Marxists have attempted to 'interpret' Marx's thought in such a way as to make it as homogeneous as possible with the predominant philosophy" (Timpanaro 1975a, 73). "Thus, whereas Engels is loaded down with materialist ballast, Marx can take on that physiognomy of a profound and subtle (and still uncomprehended) great intellectual which is *de rigueur* in our cultural world" (ibid. 74).

In the same vein, two more recent books stand out. Elmar Altvater (2015) stresses the unity of nature and society and critically discusses Engels' critics and emphasises his anticipation of much of present day discussion of ecology. Michael Krätke (2020) emphasises the intimate intellectual and practical collaboration between Engels and Karl Marx as well as Engels' role as initiator of novel ideas and concepts. We find a timely critique of "Engels Bashing" as Krätke refers to it. Historical distortions can only be avoided if we situate a thinker in his or her historical context. We can never define a person's strivings and quests as improper, divergent, or even false without taking the whole historical societal context and its contingences (e.g., religion, political oppressive culture, morals, etc.) into account. The only thing we can declare is that any theory is provisional and

is always up for review and surpassing. Sometimes its lifespan is short (as in the case of the phlogiston theory in chemistry), and sometimes it lasts for a very long time (such as the notion of absolute space). The historicity of theory is by and in itself dialectical, and dialectics means transcending stages. Historical materialism intrinsically means self-reflection; the productive forces change society and *vice versa*: the history of Marxist theory has to be written in a Marxist way. The notion of historical contingencies is still ill-defined in its broad economic, political, biological and physio-chemical sense. Historical materialism is an analytic approach with its own dynamics and can certainly not be reduced to supposedly more fundamental notions such as dialectic-materialism (Diamat), as posited in the Stalinist school, nor as unmediated superstructural “reflections” of the materialist base (as in vulgar materialism).

Historical materialistic self-reflection is an expression of human labour and as Karl Marx wrote in his second thesis on Feuerbach:

The question whether objective truth can be attributed to human thinking is not a question of theory but is a practical question. Man must prove the truth, i.e., the reality and power, the this-worldliness of his thinking in practice. The dispute over the reality or non-reality of thinking which is isolated from practice is a purely scholastic question. (Marx 1976b, 3)

This is a clear call for serious scientific investigations on all aspects of humankind.

Engels therefore has to be situated in *his* context with its related contingencies. In line with new developments in the historiography of science, it may be helpful to analyse Engels as a *persona*. Lorraine Daston and Otto Sibum, who develop this concept in the context of social studies of science, wrote: “Intermediate between the individual biography and the social institution lies the persona: a cultural identity that simultaneously shapes the individual in body and mind and creates a collective with a shared and recognizable physiognomy” (Daston and Sibum 2003, 2), and “[...], the interaction between the society that must grant significance to a persona and the individuals who must embody it occupies center stage, underlining the hybrid character of the persona concept between individual and society. Symbols, values, and meanings—the stuff of culture—are essential components in this interaction”. (ibid., 7).

I will try to advance the discussion on Engels, on why, whence, and what he wrote, and moreover on the question of how, today, we can pursue Engels’ fundamental quests, in the context of our present understanding of humanity as part of nature. I will attempt two things.

First, I will try to develop the foundations for a historical-materialist interpretation of Engels' historical materialism, focusing especially on his *Anti-Dühring* and his *Dialectics of Nature*. Secondly, I will use these inspirational works as a basis for further reflection on the sciences and their possible contribution to human emancipation in the contemporary world.

2. ENGELS IN PERSPECTIVE

Four Necessary Questions

With the hindsight of two centuries we have to address at least four issues.

First: what was Engels' political and moral motivation? Why did he try to develop a theory and practice for the emancipation of humankind—from the abolition of the various forms of oppression to a novel form of society in which everybody works (with pleasure!) according to his/her capacities and receives goods and shelter according to her/his needs? And, how did Engels express this motivation in his cultural context and the concrete societal contingencies of his time?

Secondly: to what extent was the way in which Engels framed his emancipatory political project influenced by the hegemonic culture of mechanistic thinking and by the phenomenal explosion of biological, chemical, agricultural, geological, and physical theories, as well as their applications in technology? To what extent did this hegemonic culture shape his view on social movements as emancipatory projects?

Thirdly: How do we, today, incorporate new scientific insights and new models into the emancipatory project without trying to mould all novel knowledge and understanding into old schemes? Essential here is: how we can peek better—even if it is only a tiny bit—into the future. In other words, how are twenty and twenty-first-century scientific accomplishments inducing changes in our vision of a possible future? Karl Marx took as a fundamental human feature the uniqueness of the human species in its capability of teleology:

Man not only effects a change of form in the materials of nature; he also realizes [*verwirklicht*] his own purpose in those materials. And this is a purpose he is conscious of, it determines the mode of his activity with the rigidity of a law, and he must subordinate his will to it. (Marx 1976a, 284)

Marx here expresses also a typical nineteenth-century belief in everlasting laws, with predictable outcome, a notion which must be left behind. However, a better world is not a fixed object in itself. We simply have no idea what the societal tensions will be in a post-capitalistic society, even with

deep knowledge of failed experiments in the USSR, China, Cuba and many minor other projects.

Fourthly: how can we, on the basis of preliminary answers to the first three questions, consciously advance the better future Engels was striving for—not only through a struggle against capitalist exploitation and other forms of oppression, but also by clarifying possible roads to be taken? Such a project must be framed in terms of the tension between hopes for the future and the concrete potentialities of the present. An epistemology for the Anthropocene, forcefully demanded by Jürgen Renn, is an integration and transcendence of older phases of human culture and knowledge (Renn 2020).

The present contribution is restricted to Engels' (and Marx's!) tacit assumption that modern science could be a model and engine for emancipation. After all, in their fight against the utopians they coined the term scientific socialism in a period of explosive developments in all natural sciences. What did the limits of nineteenth-century thinking mean for their project? What do recent theories and models reveal about the (im)possibility of defining our point on the horizon? In other words, how is the historical contingency changing? Equality for all human beings within the notion of “according to capacities and needs” does not mean that people are equal as atoms as rational choice theory in neoclassical economics claims, which is based on nineteenth-century thermodynamics (Mirowski 1991). We know people are all different and now even economists accept that.¹

The Anti-Dühring Context

The successes of the nineteenth-century sciences as: thermodynamics, electromagnetism, organic chemistry, geology, and emerging genetics in the form of evolution and heredity, filled the world with optimism and the idea emerged that, if “correctly” applied, humanity would overcome war and misery. This scientific optimism was a strong impetus for the idea that socialism must be based on solid theory and henceforward socialism will be able to overcome, in an organized way, the Hobbesian war of all against all. Whilst Marx and Engels tried to create a scientific socialism, it

1. Interestingly, even two Sveriges Riksbank Prizes in Economic Sciences in Memory of Alfred Nobel are bestowed to people who gently prod rational choice theory; Daniel Kahneman (2002): “for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty”: and Richard H. Thaler (2017): “for his contributions to behavioural economics.”

was also a common and firmly-held belief that the organisation of society must be based on a conscious plan and that such a plan could be hammered out by proper use of science and technology.²

As Griese and Pawelzig, both members of the editorial team of the Mega² publication of *Dialectics of Nature*, point out, in the early workers' movement the necessity of a broad education (*Bildung*) was an important aspect of political activity. Engels' extensive comments on Dühring are in line with that view. The authors argue also that Engels' notes that became *Dialectics of Nature* must be seen in that context. Engels' ambition was not so much a new theory, such as Marx's project on economy, but to offer a wide ranging overview proving the need for a "scientific" social theory, contra forms of simplistic materialism *a la* Ludwig Büchner (Griese and Pawelzig 1995).

Eugen Karl Dühring was a brilliant ideologue, anti-Semite and precursor of National Socialism (Kaltenbrunner 1970), with a substantial influence in the young German social democratic movement. He published within a very short time span a series of books ranging from titles such as *Kapital und Arbeit* (1865), and ultimately his pre-fascist book *Die Judenfrage als Racen-, Sitten- und Culturfrage mit einer weltgeschichtlichen Antwort* (1881) (Muller 2004).

Against opportunism and romantic pipe-dreams in the early workers' movement, Engels set out to define "scientific socialism" as a way to systematically develop socialist theory. Dühring's works became a pretext to systematise socialist thinking; "On the one hand it gave me, in connection with the very diverse subjects to be touched on here, the opportunity of setting forth in a positive form my views on controversial issues which are today of quite general scientific or practical interest" (Engels 2010a, 6).

Engels, with Marx's active assistance, wrote a monumental *tour d'horizon* in a very short period of time. As he explains in the preface of the 1st edition "The following work is by no means the fruit of any 'inner urge'. On the contrary" (*ibid.*, 5), which indicates that the work is not structured as an independent treatise on socialism. However, its polemical attack on Dühring had a distinct educational purpose.

Engels' *Herr Eugen Dührings Umwälzung der Wissenschaft* or *Herr Eugen Dühring's Revolution in Science* (often shorted to *Anti-Dühring*) became after its third edition of 1894, a foundational and central textbook on historical

2. Interestingly, in the anthology *K. Marx, F. Engels, V. I. Lenin, On scientific Communism*, not one reference to any science is mentioned in the 500 plus pages (Marx, Engels, and Lenin 1967).

materialism and dialectics for generations of socialists worldwide. Obviously, it is quite easy to attack this book on the bases of later political experiences and accumulated knowledge.

The real issue is not *Anti-Dühring's* many hand-waving examples or insufficiently well-researched technical subjects, but the fact that such a strong polemic and historical contextual educational book became a bible for the social democratic movement and even a holy scripture in the Stalinist cult. This in complete contradistinction to Engels' emphasis on self-organization and self-emancipation. Engels' many arguments by example, instead of being built-up from underlying dynamics, served an educational role. However, in later years, and in particular in Diamat (the Stalinist nickname for Dialectical Materialism), an inversion took place from examples revealing dynamics, to laws determining dynamics. Similarly, mathematical or logical laws became leading forms of thought. The three so-called dialectal laws (the unity of oppositions, the negation of the negation, and the quantity-quality transition) abstracted from (historical) empirical investigations, became grounding concepts considered as ultimate truths, like the idea of Euclidian geometry.³ We read in *Anti-Dühring* and *Dialectics of Nature* an attempt to concretise Hegel's not always exact formulations: e.g., Hegel never stipulated 'laws' but more tendencies. As Marx said:

The mystification which the dialectic suffers in Hegel's hands by no means prevents him from being the first to present its general forms of motion in a comprehensive and conscious manner. With him it is standing on its head. It must be inverted, in order to discover the rational kernel within the mystical shell. (Marx 1976a, 103)

In other words: we have to make the dialectics operational.

Interpenetrating objects, forces, movements and concepts will because of their historical dynamics always be re-expressed in novel models. Laws, phrased in human (sign) language, are human expressions of experience and knowledge and hence never trans-historical. This in contradistinction with human inventions, which emerge in a historical setting but remain (not necessarily in use) with us, such as the bike, the atomic bomb, or a mathematical theory (*pace* the Platonists).

The very fact that the nickname of the book is *Anti-Dühring*, is already a strong warning that the book is an attack, and not the first instalment of a book series under the title *Pro-Socialism*. It would honour Dr. Dühring too

3. It goes without saying that putting laws as primary, opens the gates for structuralism.

much to take his works as a starting point for an *ex negative* definition of socialism.⁴

Experimental Knowledge

So what does this mean for a fresh approach? Not that we have to start at the dawn of human civilisation, no more than Marx's analysis of say the economy of the Babylonians is crucial for his critique of the dynamics of modern capitalism. We should not try to press a "law" onto history which consequently must lead to a well-defined future. The nineteenth-century notion of physical law became a model for "natural" societal laws, and such a powerful one that it needed Rosa Luxemburg's revelation (instead of an obvious conclusion) that the capitalist mode of production does not have to end in socialism, but may as well end in barbarism: the total destruction of nature's evolutionary experiment with humanity (Luxemburg 1915).⁵

Engels' attack in *Anti-Dühring*, and his notes in *Dialectics of Nature* are embryonic pieces for a larger and different work on how we understand nature and the methods and technical devices for interacting with nature. For a contemporary reader it is important to read through the polemics and try to understand the deeper reasoning. Engels had a remarkably broad knowledge of the sciences and biology of his time. But we have to take into account that this knowledge was not always the latest and hottest, and was sometimes even severely lagging behind, as in the case of mathematics, as the erstwhile secretary of Trotsky and later famous mathematician Jean van Heijenoort angrily wrote (Van Heijenoort 1985). Furthermore, just because *Anti-Dühring* is polemical, its arguments are often grounded in examples and not based (yet) on a consistent theory.⁶

The notes that Engels penned, beginning even before writing *Anti-Dühring*, contain interesting considerations but are certainly not worked-out thoughts. We can safely quote Albert Einstein, who as requested by

4. It always strikes me as a typical Germanophobe Anglo-Saxonism that the German title Herr, which simply means mister or Sir, is never translated. Just watch any UK film or (TV) play in which an unpleasant German citizen appears, it is always Herr X and not mister or Sir X.

5. For an interesting discussion on the true Kautskyan origin of the slogan 'socialism or barbarism' see Angus 2014.

6. The same we witness in many political tracts: "we see (examples of) the misery, the oppression and the devastation, for which capitalism is to blame, hence we have to topple the system and build a new one". However, unfortunately, most of the time with less marching routes than moral calls for solidarity and action.

Eduard Bernstein, in reviewing part of the notes which became *Dialectics of Nature* wrote:

[...] the content is of no particular interest either from the point of view of contemporary physics or for the history of physics. On the other hand, I can imagine that this text might be considered for publication insofar as it makes an interesting contribution illuminating Engels' intellectual personality. (Engels 1985, 597)⁷

The real discussion then and now is not about the examples that inductively prove a worldview (*Weltanschauung*), but about how we can understand the historicity of nature and the fact that the planet is one whole, one totality. We now deal with a catalogue of mutually exclusive theories and their regulatory laws,⁸ but progressively we must reach an encompassing understanding of the dynamics of nature and the role of humankind therein.⁹ The crux is: how the human body as biological matter is able to reflect all her experiences in ever newer theories, spanning ever more fields of investigation. It is in the nineteenth century that we see the monumental steps forward in all sciences. This is why Engels gives considerable attention to these new developments.

Philosophical respectively dialectical thinking was for Engels—and here he agreed with Hegel and not with Schelling—thinking based on concepts, conclusions and proofs. It is in this sense scientific thinking. Only on this premise, philosophical thinking may claim the knowledge process of the natural sciences. (Griese et al. 1985, 32*)

“A large part of the present manuscript [*Dialectics of Nature* - JK] is devoted to the questions of how far the objective dialectic of nature is reflected in the natural sciences, and how far they have a dialectical content” (ibid., 49*). Here, the problem is well posed. If we start with the notion that Nature is a dynamic system in which temporal structures and forces mutually interact, then we realise that we are confronted with a temporal development. In our present (earth-bound) case, we reach the limits of traditional thinking and models. Engels, just like many philosophers, takes the latest

7. A full history of the publication of *Dialectics of Nature* is given in (Engels 1985).

8. Such as Newtonian mechanics, Quantum mechanics, and General relativity theory, which have three distinctly different notions of space, time and space-time.

9. This general idea of unification is not particular to Engels, but an age old longing, at least in physical sciences. In a way, this aspiration for a unifying theory, and preferred semantics, can be seen on a par with monotheistic thinking.

versions of “natural” laws as the starting point for projections into the future.¹⁰

Engels is “scientific” as he stresses that nature intrinsically expresses herself in, what we call, dialectics, which is a good working hypothesis. Just as Euclidean geometry is an excellent hypothesis, as long as we have no other intuition for interpenetrating mutually determining phenomena, other than renaming it as say non-linear behaviour. The transcendence of limits in our thinking and modelling is expressed in the fact that we witness regular overhauls of scientific theories.

Engels spends a lot of pages on the simple example of chemistry. Dialectics in chemistry, which comprises a big chunk of the notes, is relatively easy to grasp. As soon as it became clear that we can consider chemical molecules as being composed of a number of more elementary chemical atoms, this decomposition of the molecule demanded a theory of the various forms of chemical binding. Combinations of individual entities, be it atoms or molecules, cannot exist without the notion of binding. In superficial language one might say that the particle (an atom, molecule, or subatomic entity) and its binding forces are a composite totality, as the new, bounded, particle is again a self-contained unit. Thinking that way, one might call the intertwined opposition of chemical atoms and binding forces a dialectical unit, as chemical molecules are thought of as being objects with a limited spatial extension and binding forces are considered as fields which reach over long distances compared to the size of the atoms, this whilst they only exist together.

It goes without saying that the theory of chemical binding turned out to be tremendously successful and found equivalents in theories about the composition of elementary particles, the constituents of atoms. They all fit the notion of a world composed of particles and fields, to be later transcended into the idea that also particles can be described by (matter) fields. The opposition between particle and force fields is then “solved” by quantum field theory. The quantity-quality law in chemistry can easily be illustrated in the case of the homological chain of organic molecules where adding one carbon atom to the chain, changes the character of the molecule fundamentally.

10. Look at, for instance, the New Age and later post-modern interpretations of quantum mechanics. It is beyond the present work to expand on the once-heated discussions on the so-called “Sokal hoax” and the subsequent “Science wars” in the 1990s, as the antagonism between the scientist and post-modernists are not that simple and straight forward.

However, the question is to what extent this picture is an expression of an innate dialectics of nature or only a human approximation of the supposed dialectics of nature? Is dialectics our way of understanding the fact that “objects” are never isolated?

Formalized Knowledge

The situation becomes different if we don't start with experimental knowledge, but with theoretical models, such as in mathematics.

Mathematics is the art of thinking that has only two rules: rigour and consistency. Everybody is free to define any mathematical object and any mathematical rule, as long as the resulting theoretical construction based on these well-defined starting points is internally consistent. The fantastic fact is that some mathematical approaches turn out to be excellent tools for describing e.g., physical phenomena and physics applications. But the pertinent and often posed question; why mathematics is so effective, is fundamentally a-historical and undialectical (Wigner 1960). Over the centuries, effective modelling emerged as a result of social collective labour. If a model works it looks (for the moment) like a miracle. Human mental labour created the tin-opener as well as set and manifold theory and if we forget this, indeed by opening the tin, the resulting sardines in tomato sauce looks like coming from heaven.

In mathematics only rigour and consistency count and we are allowed to build any theoretical skyscraper we like, as long as the basic notions and the rules are well defined. Therefore, the claim that mathematics fits perfectly into Diamat is questionable. For example, the eminent Soviet mathematician Aleksandr Danilovich Aleksandrov, Lenin order and Stalin premium prize winner, has argued that differential geometry transcends the opposition between discrete entities and a continuum. The caveat of the intrinsic dialectical demand that the new situation can be negated again is not addressed. Aleksandrov's writings are a defence of, what he sees as an intrinsic dialectics of mathematics, in a highly political philosophical debate, (Aleksandrov 1970, 1971, 1980).

Coming back to Engels, we experience his weakness in mathematics in his discussions on the square root of minus one: $\sqrt{-1}$, or $\sqrt{-1}$, which is defined as the sign “i”, which means i squared equals minus one. Engels simply did not understand the importance of complex numbers (numbers including a so-called “imaginary” part: a multitude of “i”), which got full currency in the nineteenth century. Instead of depicting a number on a one

dimensional line, a two dimensional coordinate system turns out productive to represent complex numbers. Nowadays also quaternions (four axes) and octonions (eight axes) are used.

In a formal language one might define a negation as putting a minus sign in front of a sign. However, there is little meaning to it. Minus seven (say a commercial loss of €7) added to seven (say a profit of €7) does not give us any dynamical insight, the totality adds up to zero, whose positive negation is ill-defined. In other words, to square axiomatic mathematics with dialectics is trying to apply formal logic in a non-formal logical environment. As an example: Engels writes:

In a given problem, for example, I have two variables, x and y , [...] I differentiate x and y [...] And now, what have I done but negate x and y [...]? In place of x and y ; therefore, I have their negation, dx and dy , in the formulas or equations before me. I continue then to operate with these formulas, treating dx and dy as quantities which are real, though subject to certain exceptional laws, and at a certain point I negate the negation, i.e., I integrate the differential formula, and in place of dx and dy again get the real quantities x and y , and am then not where I was at the beginning, but by using this method I have solved the problem on which ordinary geometry and algebra might perhaps have broken their jaws in vain. (Engels 2010a, 127–128)

Van Heijenoort comments:

In these two [the first is on Engels' dealing with the sqr of minus one -JK] examples 'to negate' means four different operations: (1) to multiply by -1, (2) to square a negative number, (3) to differentiate, (4) to integrate. What is the common feature of these operations that would allow Engels to subsume them under the concept of negation? A few pages later he tells us that 'in the infinitesimal calculus it is negated otherwise than in the formation of positive powers from negative roots'. But he never gives us the slightest hint as to what distinguishes the four 'negating' operations from other mathematical operations. Or can any mathematical operation be considered as a 'negation'? Then, what does the 'negation of the negation' mean? It is both impossible and useless to criticize Engels' use of this formless notion in the field of mathematics. (Van Heijenoort 1985)

It would go too far in this paper to enter the discussion on Marx's mathematical manuscripts, which Engels so highly praised. It suffices to say that Marx hit the nail on its head in his not unique critique of the calculus of his time. Interesting works have been written about this, but most of them discuss Marx's mathematics in relation to Hegel, which is also Engels' approach. But after the total re-establishment of the calculus at the second

half of the nineteenth century, discussing Marx's critique became an historical exercise and did not lead to a new inroad in mathematics.¹¹ This does not mean at all that the discussion is over, as in the modern approach no continuum exists, all is discrete (Bell 2019). In other words, some worries of Marx and Engels vis a vis the calculus remain. An interesting aspect is Engels' strong emphasis on the discrete, explicated in his ideas about counting:

The ten fingers on which men learnt to count, that is, to perform the first arithmetical operation, are anything but a free creation of the mind. Counting requires not only objects that can be counted, but also the ability to exclude all properties of the objects considered except their number—and this ability is the product of a long historical development based on experience. Like the idea of number, so the idea of figure is borrowed exclusively from the external world, and does not arise in the mind out of pure thought. There must have been things which had shape and whose shapes were compared before anyone could arrive at the idea of figure. Pure mathematics deals with the space forms and quantity relations of the real world—that is, with material which is very real indeed. (Engels 2010a, 36–37)

This dovetails with his problems with complex numbers.¹²

It is important to note that Engels is mixing up physical laws and their expression in mathematics. Here, Engels forgets that all laws are human constructs as is evident in his notorious 'mirror image' (*Abbildung, Widerspiegelung*), the idea that human thoughts, and hence mathematics, are more or less one-to-one representations of the material reality outside our skull. Engels writes: "Pure mathematics deals with the space forms and quantity relations of the real world—that is, with material which is very real indeed. The fact that this material appears in an extremely abstract form can only superficially conceal its origin from the external world" (Engels 2010a, 37).

11. As the Mega² publication of *Marx Mathematical Manuscripts* is still in limbo, there are three publications with appendices and introductions worth to scrutinizing: Sofya A. Yanovskaya and Ersnt (Arnost) Kolman ed: *Mathematical manuscripts of Karl Marx*, first published in German and Russian, Nauka Press, 1968. For an English Translations (Marx 1983) and (Marx 1994). In French (Marx 1985) and German (Marx 1974). For the history of the calculus see Boyer 1959.

12. The idea of an innate number capability is also a tenet of the works of the cognitive scientists Lakoff and Núñez (Lakoff, and Núñez 2000). Recent anthropological research shows that counting and numbers are not innate but are product of culture, like writing (Everett 2017).

On the other hand, Engels struggles with the fact that abstracted ‘laws’ phrased in sign (mathematical) language might not be correct and become (platonian) truisms by themselves:

But, as in every department of thought, at a certain stage of development the laws, which were abstracted from the real world, become divorced from the real world, and are set up against it as something independent, as laws coming from outside, to which the world has to conform. That is how things happened in society and in the state, and in this way, and not otherwise, pure mathematics was subsequently applied to the world, although it is borrowed from this same world and represents only one part of its forms of interconnection—and it is only just because of this that it can be applied at all. (Engels 2010a, 37)

3. NATURE AS EXAMPLE AND INSPIRATION

There is a remarkable aspect in the discussions on materialism and dialectics. Engels “puts on its feet” the idealist construction which Hegel built in order to grasp interpenetrating notions and historical development from simple notions to ever increasing complexity, like the state as an ordering concept in human society. In simple shorthand, Engels is saying that the idea is a human mental and hence material object which results from a material progression from elementary chemical stuff towards what and where we are.¹³ The underlying issue is: to what extent can Hegelian categories like quality, quantity, causality, and essence serve as scaffolding for a societal analysis based on a materialistic worldview. As often with scientific theories based on our experiences, we invent an analytical method and by reaching its limits we keep part of the method in a novel context. In the hand of its creator the Hegelian system did not lead to the emancipation of humankind and intrinsically has authoritarian aspects, but essential parts of Hegel’s thinking remain.

We need new analytical methods that will help us to understand why the present capitalist system came into being and how it can be transcended. Fully in line with the explosive developments in theoretical and applied sciences and their expression in tempestuous industrialisation, Engels and Marx took up this challenge to research the dynamics in the developments in the economy and its dependence on nature. In so doing, they try to use Hegel’s teaching as methodological model, against simple formal logic. Models for the intrinsic metabolism of nature must enable

13. In this respect it is important for further research to scrutinize Evald Ilyenkov’s elaborations on the materiality of the Idea (Ilyenkov 2014).

humankind to advance social life in a historically unprecedented way. Prime examples are the investigations in agriculture and hence ground rent. Where is value coming from and how does value be (re)created in a market which in the nineteenth-century mode of production became fully capitalist? Breakthroughs in chemistry exemplified in Liebig's invention of artificial fertilisers changed agriculture for ever. The unavoidable consequences of this innovation for the national and international trade in agricultural products and for the ecological situation of the earth can easily be seen as an example of a "dialectics," a non-linear and non mono-causal next step in human life.¹⁴

Materialist notions of dialectics became unavoidable, given the tremendously fast developments in fields like geology, cosmology, and heredity (genetics was not yet on the podium) where the historicity of the present became obvious, and the vast expansion in knowledge and models such as electromagnetism and thermodynamics in physics.

There is a real world of which we are part, and we have to take this materialistic starting point to advance our species. In the political struggle it is therefore necessary to strongly oppose lapses back into religion or solipsism. With Engels we see an overjoyed eagerness to show by example that all modern sciences try to understand the world through models of interpenetrating and mutually determining "forces."

Dialectics of Nature seen this way is a collection of examples and attempts to use these examples as building blocks for a more comprehensive argument. It rephrases our human way of thinking within a new "epistemic" framework and results in studies like his famous: *The part played by labour in the transition from ape to man* (Engels 1976, 452). Engels creates a framework that allows historicity—hence change, also in its basic notions—, and a certain level of fluidity in its expressions.

4. ENGELS THE INSPIRER

This bicentennial is a good starting point to hark back to what Engels and Marx wanted to accomplish and to ask ourselves to what extent their inroads into the problem of reaching human emancipation, from misery and oppression, are more than just nineteenth-century first attempts. Their whole *oeuvre* can be seen as a set of attempts to understand the dynamics of social reality as a function of human nature (Geras 1983), and the limits

14. For Marx and Engels inroads into ecology see, e.g., Grundmann 1991; Foster 2000; Altwater 2015; Foster and Burkett 2016; Saito 2017.

and potentialities offered by nature as determinants for life and humanity as an evolutionary species based in planetary evolution (Gould 1988). Human nature, the result of the evolutionary birth of social relations, is firmly grounded in the non- (or not yet) natural pre-human environment. The issue is how our biological substrate (from feet via liver to brain) determines our thinking and a social relation, as well as that our capacity for teleological thinking induces changes to our natural habitat in a ‘non-linear’ interaction. (for an interesting discussion see Pagel 2012)

To make the notions of motion, change and progress operational, deep inroads have to be made into the study of those fields of human knowledge that enable more or less stable definitions in order to make the step from historical analyses to forecasting. Obviously, astronomy, physics and mathematics then become prime fields of investigation. Engels often expressed enthusiasm for Immanuel Kant’s youthful theory (forty years later augmented by Pierre-Simon Laplace) that the planets are products of the condensing, due to gravity, of interstellar dust, which now is known under the name of Kant Laplace Nebular Hypothesis (Kant 2012), and his long discussions on the then new conservation of energy principle, which allows for the dynamic exchange of various physical, chemical, and biological forms of energy (Harman 1982), clearly indicate his striving for a scientific socialism, void of pipe dreams, that accords with the limits as well as intrinsic dynamics of human life as part of nature. As is clear from the correspondences and excerpts of books, Engels and Marx were voracious readers of scientific works.¹⁵

The nineteenth-century maturation of the sciences served as an example for the creation of a scientific approach to economy and sociology. Although it remains a highly contested hope to productively import natural science methods, lock, stock and barrel into research in sociology and the humanities. The lack of exact definitions leads to the explosion of statistical methods, including the now popular co-called artificial intelligence. It goes without saying that the humanities face the up-hill battle to develop own methodologies.

Epistemologies come and go with every new discovery (think about Quantum Mechanics). Depending on increasingly better experimental methods and consequently data analyses, we witness a sharpening in the debates, as well as a widening of their scope, e.g., as exemplified by the

15. Evidence of their wide reading is given in the many volumes of Mega2 related to the Marx-Engels correspondence, (Marx and Engels 1999), and (Marx 1982).

impressive new insights in paleozoology and paleontology and the search for human ancestors. Discussions in the natural sciences demand rigour, based on well-defined notions. This induces the same type of demands on fields with less well-defined notions (e.g., the concept of the working class in the social sciences) and hence the unfortunate tendency in the humanities and social sciences to lean too heavily on formal logical, mathematising, and statistical data grinding, which may lead to false expectations of what statistical methods can accomplish. Engels' inroads in natural science certainly signal a hope to transfer "scientific" methods to economy and sociology, but he never achieved this—and neither do we at the moment.

The problem of motion is a fundamental one, as motion (of an object, or a timeline expressed in brain-based or non-human such as fossils memories) always expresses a relation between one object and another, or to e.g., a perceived fixed coordinate system—then seen as an absolute object—in Newtonian physics.

We are still left with some pertinent questions Engels raised: the historicity of knowledge; the materiality of the world; objectivity and realism in epistemology; and the notions of the real, objectivity, reflection, and modelling.

Historicity of Knowledge

The history and sociology of science are quite recent disciplines. They originated in a descriptive literary tradition, of following the presumed linear advancement of ever more encompassing and deeper knowledge. Nowadays, sociologists and historians of science dig deeper into the social context and the historic-economic contingencies of why and how certain advances were made.

Within the historical materialist tradition the famous contribution of Boris Hessen in (Hessen 1931), which was the spark for a strong communist, in particular in the UK, tradition in the field, started with people like Needham, Bernal,¹⁶ etc.

Slowly, this type of simplified, sometimes almost mono-causal, approach (Bernal 1969), gave way to deeper studies in which cultural, philosophical, and religious contexts were becoming part of the understanding. Important works are the early 1935 work of Ludwig Fleck (1979)

16. J.D. Bernal, name giver to so-called Bernalism, remained all his life a missionary for Engels, "[...]there is no doubt that he would be remembered chiefly as one of the foremost scientist-philosophers of the century" (Bernal 1935).

and later Thomas Kuhn (1962), who suggest the existence of clear epistemological communities, as well breaks and shifts in outlook (aka *Paradigms*).

The Materiality of the World

Engels and Marx poke fun at Spiritism (Engels 2010, 352; Marx 1976a), a popular pastime in their time, and combat the idealists. Their materialism was heavily influence by eighteenth-century materialism, according to which materialism was equated with matter: stuff. Engels' enthusiasm for Hermann von Helmholtz, then the most important scientist in Germany, is well expressed in *Anti-Dühring* as well as in *Dialectics of Nature*:

Modern natural science has had to take over from philosophy the principle of the indestructibility of motion; it cannot any longer exist without this principle. But the motion of matter is not merely crude mechanical motion, mere change of place, it is heat and light, electric and magnetic tension, chemical combination and dissociation, life and, finally, consciousness. (Engels 2010b, 332)

At the turn of the century the notion of electric and magnetic fields matured and “fields” became, along with “stuff,” part of the materiality of the world. This introduced theories suggesting the end of matter, such as the energetics concept of Wilhelm Ostwald who, like Ernst Mach, refused to accept the existence of chemical atoms. The next attack on the concept of matter happened with the discovery of radioactive decay, discovered in 1896.

But Engels and certainly Vladimir Lenin put things in a clear perspective. Materialism cannot be tied to the limited human knowledge of a certain period:

Engels says explicitly that ‘with each epoch-making discovery even in the sphere of natural science [‘not to speak of the history of mankind’], materialism has to change its form’ (Lenin cites: Ludwig Feuerbach, German edition, p. 19). Hence, a revision of the “form” of Engels’ materialism, a revision of his natural-philosophical propositions, is not only not “revisionism,” in the accepted meaning of the term, but, on the contrary, is an essential requirement of Marxism. (Lenin 1968, 251)

And:

The great successes achieved by natural science, the approach to elements of matter so homogeneous and simple that their laws of motion can be treated mathematically, caused the mathematicians to overlook matter. ‘Matter disappears’, only equations remain. At a new stage of development and apparently

in a new manner, we get the old Kantian idea: reason prescribes laws to nature. (Lenin 1968, 308)

Lenin's battle against the new positivist philosophy that eliminates all unobservables, is phrased as:

The 'essence' of things, or 'substance', is also relative; it expresses only the degree of profundity of man's knowledge of objects; and while yesterday the profundity of this knowledge did not go beyond the atom, and today does not go beyond the electron and ether, dialectical materialism insists on the temporary, relative, approximate character of all these *milestones* in the knowledge of nature gained by the progressing science of man. The electron is as *inexhaustible* as the atom, nature is infinite, but it infinitely exists. And it is this sole categorical, this sole unconditional recognition of nature's *existence* outside the mind and perception of man that distinguishes dialectical materialism from relativist agnosticism and idealism. (Lenin 1968, 262)

The problem with unobservables is still the key question in quantum mechanics, but this certainly also has to do with the physical limits of the human senses. As Abraham Pais, one of Albert Einstein's biographers' recalls: "I recall that during one walk Einstein suddenly stopped, turned to me and asked whether I really believed that the moon exists only when I look at it. The rest of this walk was devoted to a discussion of what a physicist should mean by the term 'to exist'" (Pais 1979, 907).

Objectivity and Realism in the Discussion on Epistemology

Having stipulated that the world exists prior to humanity (as proven by geology and Darwinism) and presumably also after humanity (depending on the power of the nuclear bomb stock), we reach next the issue of "reflection" as a source for theory construction and modelling. It should be emphasised that materiality is explicitly an important concept in the context of the human body and its disorders.

As Timpanaro (1975b, 67) writes: "If the eighteenth-century theme 'of pleasure and of pain' was too much neglected by Marxism, that was a result of the fact that Marx and Engels had early on identified hedonism with bourgeois individualism in too summary a fashion." Bodily experiences are the only gateways for knowledge and hence science and politics, even if these experiences are elevated to abstract mathematical modelling. But this does not mean that these gateways prove positivistic philosophy. Today, old-fashioned vulgar materialism finds an expression in neurology and brain-research; synapses and neurons are taken as elementary—material—

objects. Moreover, this type of research models brain activity using the basically most primitive, but highly versatile, binary models as expressed in computer science and so-called artificial intelligence. It is based on the success story of the digital computer; their development *pace* claims that in the future quantum computers will create a breakthrough. Interestingly, research on analogue computers fizzled out in the 1970s, with the advance of digital computers, as the latter allowed for ever increasing numerical precision. Again, a cultural shift to the discrete, to the detriment of the analogue continuum.

The Real, Objectivity, Reflection, Modelling

Engels is permanently struggling with the notion of motion or change. After all, history is an expression of change. In his *Dialectics of Nature* essay: 'Basic forms of motion', he explicitly says: "We are compelled to restrict ourselves-in accordance with the state of science-to the forms of motion of non-living nature" (Engels 2010b, 362).

He then continues with the notion of motion in mechanics and the opposite forces of attraction and repulsion, which are related to the energy and momentum conservation laws. The conservation of energy, established by Helmholtz, can be interpreted as an example of a unity of oppositions, together creating motion:

It is expressly to be noted that attraction and repulsion are not regarded here as so-called "*forces*" but as *simple forms of motion*, just as Kant had already conceived matter as the unity of attraction and repulsion. What is to be understood by "*forces*" will be shown in due course. (Engels 2010b, 364)

Here we have to understand that with Helmholtz, we have reached the pinnacle of nineteenth-century science based on then obvious truisms such as already formulated by Kant. We have objects, but our knowledge might be incomplete, we traverse a three-dimensional Euclidian space in time and as we advance forward, the notion of causality is unavoidable. Kant's *a priori* assumptions about time and space can easily be understood. How do we approach motion, which is defined in terms of time and place? These notions are still up for review, but nineteenth-century modelling could not do without them.

With the invention of the theory of electro-magnetism as an integrated theory for electricity and magnetism, the limitations of mechanical models were reached, as electro-magnetic fields had then to be understood as based in matter, or in other words expressions of waves in an ether, a carrier such as water for water waves (Harman 1982; Born 1965). The final

blow to nineteenth-century physics struck when new perceptions of space and time were becoming established in special relativity as from 1905 and general relativity (gravitation theory) in 1915; perceiving time and space as dynamic entities.¹⁷ On top of that, quantum mechanics became as from the 1920s the most successful descriptive theory for matter (void of gravity), however without a clue for *Anschauung*. It remains a purely mathematical abstract theory, without popularised pictures such as the rubber sheet as a model for gravitation.¹⁸

All meaning of human notions changes throughout history. The notion of an atom was seen by the Greeks as the smallest particle of which matter was made. Atoms are now, apart from their metaphorical meaning, only the smallest entity of a chemical element. Nowadays we have experiments demonstrating that such atoms can show interference just like waves, or can cluster in a further unique whole, as in the case of Boson condensation of Rubidium atoms. The endless to and fro between ideas and models looks like walking in a funhouse. But against both the overoptimistic idea of an asymptotical reaching of a final destination (the exit of the funhouse) and Feyerabendian agnosticism (Feyerabend 1989), we have to start with the deep materialist notion that the world is real and so are we as part of nature. The ever increasing amount of knowledge leaves us with the political/moral obligation to apply existing knowledge and advance novel experimental data and their models to fight for a world in which a novel concept of society is established, in which 'everybody works (with pleasure!) according to his/her capacities and receives goods and shelter according to her/his needs'. Saving our species means keeping the globe in situations that allow our species to live. The now imminent ecological crisis proves that our epistemology is a dynamic morphing of phenomena (experimental data) and theories. Both are expressions of human ingenuity.

The necessity to reconsider present-day science in a new way implies that we have to rethink reflections and modelling in the mind (Kircz 2015, 2016).

17. For a more technical book on the history of space see Jammer 1993; for a more wide ranging treatise on space see Schemmel 2016; for a deep more technical work on time see Jammer 2006.

18. This is not the place to review the foggy discussion on quantum mechanics and the almost religious claim that the present hegemonic interpretation is closed and complete, including the idea of Niels Bohr that ultimately we only can think in classical mechanical terms (see Beller 1999).

This whole theme boils down to the eternal quest of to what extent the human brain, as part of the human body, is able to “picture” the objects around and in the human body. This quest has much to do with the unique human capacity of externalising sensorial impressions in formal languages. In other words, do we reflect “reality out there”? Is the mental image a homomorphism (a structure preserving one to one mapping of out-there onto in-here)? As our brain activities such as memory and thinking are constantly in development during our lifetime (until death or dementia strikes), the reflection is clearly in a dynamic laughing mirror. With the advent of positivism by Ernst Mach and William James’ pragmatic school, the problem was (dis)solved by positing that in practical life we only have to deal with what can be experienced with our (enhanced) senses. To quote James: “Grant an idea or belief to be true,” he says, “what concrete differences will its being true make in any one’s actual life? How will the truth be realized? What experiences will be different from those which would obtain if the belief were false? What, in short, is the truth’s cash-value in experiential terms?” (James 1987a, 573).

“Truth lives, in fact, for the most part on a credit system. Our thoughts and beliefs ‘pass,’ so long as nothing challenges them, just as bank-notes pass so long as nobody refuses them. But this all points to direct face-to-face verifications somewhere, without which the fabric of truth collapses like a financial system with no cash-basis whatever” (James 1987a, 576; James 1987b, 821).¹⁹ James’ shop keeper metaphor of cash value is a gem for simple historical materialism (Novack 1975).

Engels and subsequently Lenin took the search for a materialistic worldview, or ontology, seriously. This search for the “real” is a sailing between the Scylla of the rocks of pragmatism and the Kantian Charybdis of the never-ending asymptotic whirlpool down to the thing in itself. But like sailing on the high seas, the course is forever morphing between theory and experience.

Lenin himself clearly struggled with this when he wrote the following notorious sentences:

From Engels’ point of view, the only immutability is the reflection by the human mind (when there is a human mind) of an external world existing and developing independently of the mind. No other “immutability,” no other “essence,” no other “absolute substance,” in the sense in which these concepts

19. Obviously James lived in a period that money was related to a gold standard. Presently, even that security is gone.

were depicted by the empty professorial philosophy, exist for Marx and Engels. The “essence” of things, or “substance,” is also relative; it expresses only the degree of profundity of man’s knowledge of objects [...] (Lenin 1968, 262) (see above for the remainder of this quote on the infinity of nature).

In this passage Lenin argues, on the one hand, against the positivists for “immutability,” in line with Engels, and on the other hand states that essence is relative, as nature is infinite. In my view, we can construe this as saying that the physical fact of a blue nail as a result of repairing your home can be seen in a plethora of models, from Nail Bar culture to Sub-ungual Hematoma research. All experiences are theory laden, a notion which was developed later in the twentieth century.

This crucial observation often disappears from view, in particular when we are dealing with modern science (in particular, in quantum mechanics, which is completely formulated in mathematical sign language), in which closed mathematical models disguise clear material experience, e.g., positron-electron collisions giving a flash of light.

The issue of changing models, sometimes phrased as scientific revolutions or paradigm shifts, is a pertinent problem. Neither Engels nor Lenin could grasp it at their time, the period of pinnacle of materialist thinking in Engels’ case or challenged materialism in the case of Lenin. The many studies that describe such epistemological changes too often rely on taking the new science as a new truism and frame it in the social context of its birth.

Within the context of this paper, three remarks can be made.

1) There is much new knowledge on non-human perceptions. After Franz Anton Mesmer in the late eighteenth century made inroads with animal magnetism as healing power, which turned out to be hypnosis or group psychology, the idea of animal magnetism in humans became anathema. However, with newer technologies, human biomagnetism (obviously it demanded a new name) has been a fully developed field since the 1970s. It just shows that the traditional five human senses are only a sub-set of what the human body experiences. We simply do not yet have a full overview of how material “impressions” are or can be mentally modelled in new theories about human life as a part of nature (with the help of instruments such as glasses or “SQUIDS” to measure the magnetoencephalogram of the human brain). The elimination of unobservables becomes a lost war. Unfortunately much of the research on other animals than humans is dealing with re-creating animal features for direct human (often military) use, including “living machines”— man-made devices with

capabilities shared by creatures that evolved in nature” (Prescott, Lepora, and Verschure 2018).

This fantastic field is a step in the direction of “enhancing” humanity with novel, not innate, capabilities to survive, by analysing and mimicking non-human perceptions and structures. It not only proves that “nature is infinite,” but also makes us wonder about the “worldview” of other animals. The frame rate of the human eye is low, and in motion pictures the rate is now standardised to 24 frames per second and in that way we perceive continuous motion. To play safe, the rate of our PC screens is 50 to 60 frames per second. But what about flies? So difficult to catch, and raptors, who see even much faster, till more than 100 frames /second (Potier et al. 2020).

And let us not forget the electric eel, who sees by electric pulses, and whose notion of perspective is very different from ours. In his extreme utilitarian introduction to a popular natural historical book William J. Turkel states:

The central argument of this book is that our treatment of electric fish as apparatus enabled us to feel our way into electric worlds of our own and, eventually, to inhabit them. More generally, our evolutionary success is due in large part to the fact that we have the ability, perhaps unique, to treat our own bodies and those of other people and other animals as equipment. (Turkel 2013, 3)

This productivist approach, the same as in the afore-mentioned “Living Machines” handbook, does not address the much more interesting question of how these ‘strange’ animal senses might help us to see nature, beyond our evolutionary-driven diversity. We rounded one corner in evolutionary history, because it fitted best, but that says more about us than about nature.

[...] this detour in sensory perception in our discourse is that it shows that in nature there exists a manifold of different ways of interpreting the same physical reality, which certainly leads to different social behaviour. Our understanding of the world is an interplay between our analog sensory perceptions and our digital mental cognitive abstractions. The implicate now is, that with the knowledge of different sensory representation schemes, we can simulate them in an electronic publishing environment and can therewith expand the human outlooks on reality which after all is the basis for its desire to change the world. (Kircz 1998)

What if we become able to program the electric eel in an Artificial Reality bodysuit? Will that change our worldview?

2) After leaving the dogma of positivism, and accepting that sense impressions can be hidden from our simplest sensory acuity, the next anti-materialist step was taken by the logical-positivists, in finding the limits of the truth of reality in the search for a perfect (mathematical) language. Although out of fashion now, it is hidden in the surge of mathematical modelling proving so incredible productive in cash terms for e.g., financial capital. The pertinent and oft-posed question why mathematics is so effective is fundamentally ahistorical and undialectical, as argued above. Over the centuries, effective modelling came to the fore as a result of social collective labour.

This brings us to the conclusion, not explicated but suggested by Engels that novel scientific vistas and models will come to the fore in new societal settings. Proof of this suggestion is given in the early days of the USSR when collective labour and culture was the “norm.” Let me give two examples. Alexei Kojevnikov shows how the notion of “collective motion” by communist physicists created novel science (Kojevnikov 1999, 2002). This is independent of the bromide that maybe the actors themselves were not staunch communists (Gorelik, 2005). It is about the hegemonic culture.

As these novel ideas about plasmas and quasi-particles, such as phonons (quantized waves in condensed matter), quickly became part of “standard” physics, it is also a proof that material reality is “out there,” but that socially-contingent human ingenuity is needed to model the material world as function of its social context. In the same vein Ludmila Hyman, when discussing the difference between the psychologists Piaget and Vygotsky, concludes:

Piaget worked in a capitalist society in which the individuation of the person was taken for granted, and the individual needed to be socialized. By contrast, Vygotsky worked in a communist society that took the collectivist situation of the person for granted. In Vygotsky’s thinking, thus, it was individuation that the person had to develop. (Hyman 2017, 636–637)

3) Epistemology based on the combination and integration of the great variety of different experiences and sense impressions, calls for the notion of an atlas as a kind of encyclopaedic work, which is mostly known from geographical cartography (Kraak and Ormeling 1998), where overlapping two-dimensional projections of patches of the earth allow the human reader to get a sensuous feeling for the real three-dimensional world. At present 3D simulation, also used by e.g., architects, allows the viewer to ‘experience’ space on a flat 2D screen. At the same time GPS devices, which

instruct drivers where to drive, demolish the remnants of a sense of direction the modern human retained from its hunting and gathering ancestors.

In mathematics and in particular in differential geometry the notion of an atlas is used to allow the understanding of higher-dimensional space. A function (track) in a higher-dimensional space can be analysed in the collection of projections (mappings) onto lower—one (a line) or two (a plane)—dimensional representations. As a matter of fact, humans are used to the two-dimensional plane of the visual retina. Everybody understands that such projections are not the real thing. In a recent major study Daston and Galison (Daston and Galison 2010) dig into the history of the scientific genre of the Atlas, as a large picture book presenting an inventory of e.g. birds, flowers, radiological recordings, etc. In this case the atlas is considered as a genuine representation. The authors propose three types of objectivity that follow each other in historical time, each with their own epistemology. The first phase was the *truth to nature* style in which the scientist works in close collaboration with the artists who draw or paint the object and the printer who multiplies those pictures. The second phase *mechanical reproduction*, exemplified by photography, suggested a more complete objectivity. Epistemologically, however, the discussion is more complicated and both phases developed into what Daston and Galison call *Structural Objectivity*, an expression of the idea that not objects but laws (or models) are representing the real world. A final stage is what the authors call *trained Judgement*, which is exactly what we hope that our medical students are trained in. In medical textbooks, pictorial instructions of e.g., an ulcer or a serious fracture are more of an enhanced *truth to nature* than a photographic representation.

Again we are confronted with the tension between clean modelling in formal theory and the muddy world we are living in.

5. CONCLUSION

In celebrating Friedrich Engels 200th anniversary it does not make sense to list all his mistakes, poor examples and lack of knowledge. Science goes on and we have to hark back to Engels as a formidably inquisitive, widely cultured, social, and enormously productive intellectual. Engels and his lifelong collaborator Marx wanted to know in order to change society.

Earlier we mentioned Karl Marx's second thesis on the German philosopher Ludwig Feuerbach. Thesis eleven reads: "The philosophers have only interpreted the world in various ways; the point is to change it" (Marx

1976b). This slogan is battle cry for socialist action. This aphorism, like all battle cries, demands more flesh on the bones. Marx was right, it is not only about interpretation, that is to say, to try and explain where we are and how we arrived at this temporal place. The issue is: where do we go as human society? The goal of our exercise is to steer the world into a new direction, hence, to change the world, based on the best knowledge of the present and our ever-changing understanding of its dynamics. Continuing this march will be the best way to remember Engels.

The slogan, *a concrete analysis of a concrete situation* is a well-known quip of Lenin. Lenin uses this phrase only once; in a review of the journal *Kommunismus*, in which he criticises the Hungarians Georg Lukács and Bela Kuhn, the full sentence reads:

Comrade B. K. criticises on the basis of quotations from Marx, which refer to a situation unlike the present one, he wholly rejects the tactics of the German Communist Party's Central Committee and absolutely evades what is most important, that which constitutes the very gist, the living soul, of Marxism—a concrete analysis of a concrete situation. (Lenin, 1974, 166)

Translated to our times (Kircz 2020): Stop quoting Engels, try to advance his example! Take the latest knowledge in all areas seriously and then based on that develop a dynamic emancipatory theory.

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REFERENCES

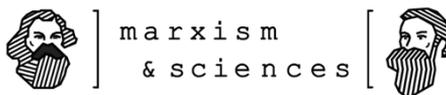
- Aleksandrov, A.D. 1970. "On the One Hundredth Anniversary of the Birth of VI Lenin: Mathematics and Dialectics." *Siberian Mathematical Journal* 11(2): 243–63.
- . 1971. "Mathematik und dialektik." *Ideen des exacten wissens* 4: 251–257.
- . 1980. "Mathematics Its Essential Nature and Objective Laws of Development." *Science and Nature: A Journal of Marxist Philosophy for Natural Scientists* 3: 22–42. <http://www.massline.org/Philosophy/Math/Mathematics-CensoredMarxistPhilosophy.pdf>.
- Altvater, Elmar. 2015. *Engels neu entdecken: Das hellblaue Bändchen zur einföhrung in die 'Dialektik der Natur' und die kritik von akkumulation und wachstum*. Hamburg: VSA: Verlag.
- Angus, Ian. 2014. "The Origin of Rosa Luxemburg's Slogan 'Socialism or Barbarism'." *Climate & Capitalism* October 22. <https://climateandcapitalism.com/2014/10/22/origin-rosa-luxemburgs-slogan-socialism-barbarism/>

- Bell, John L. 2019. *The Continuous, the Discrete and the Infinitesimal in Philosophy and Mathematics*. Springer International Publishing.
- Beller, Mara. 1999. *Quantum Dialogue: The Making of a Revolution*. University of Chicago Press.
- Bernal, John Desmond. 1935. "Engels and Science." *Labour Montly Pamflets* 1935.
- . 1969. *Science in History*. Harmondsworth: Penguin Books Ltd.
- Born, Max. 1965. *Einstein's Theory of Relativity*. Rev. ed. New York: Dover Publications.
- Boyer, Carl B. 1959. *The History of the Calculus and Its Conceptual Development*. Reprint [d. Ausg.] 1949. Dover Books in Advanced Mathematics. New York: Dover Publ.
- Carver, Terrell. 1983. *Marx and Engels: The Intellectual Relationship*. Brighton: Wheatsheaf.
- Daston, Lorraine, and Peter Galison. 2010. *Objectivity*. Paperback ed. New York, NY: Zone Books.
- Daston, Lorraine, and H. Otto Sibum. 2003. "Introduction: Scientific Personae and Their Histories." *Science in Context* 16(1–2): 1–8.
- Engels, Friedrich. 1976. "The Part Played by Labour in the Transition from Ape to Man (1876)." In *Dialectics of Nature, Marx and Engels Collected Works*, Vol.25, 452–464. London: Lawrence & Wishart.
- . 1985. "Dialektik der Natur (1873–1882)." In *Die Marx - Engels-Gesamtausgabe (MEGA²)* Apt. I/26, 313–622. Berlin: Dietz.
- . 1988. "Herrn Eugen Dührings umwälzung der wissenschaft (Anti-Dühring)." In *Die Marx - Engels-Gesamtausgabe (MEGA²)* Apt. I/27. Berlin: Dietz.
- . 2010a. "Anti-Dühring: Herr Eugen Dühring's Revolution in Science." In *Marx and Engels Collected Works*, Vol. 25. London: Lawrence & Wishart.
- . 2010b. "Dialectics of Nature." In *Marx and Engels Collected Works*, Vol. 25, 313–734. London: Lawrence & Wishart.
- Everett, Caleb. 2017. *Numbers and the Making of Us: Counting and the Course of Human Cultures*. Harvard University Press.
- Feyerabend, Paul. 1989. "Realism and the Historicity of Knowledge." *The Journal of Philosophy* 86(8): 393–406.
- Fleck, Ludwik. 1979. *Genesis and Development of a Scientific Fact*. University of Chicago Press. First German edition 1935.
- Forman, Paul, Cathryn Carson, A. B. Kozhevnikov, and Helmuth Trischler, eds. 2011. *Weimar Culture and Quantum Mechanics: Selected Papers by Paul Forman and Contemporary Perspectives on the Forman Thesis*. London : Hackensack, NJ: Imperial College Press ; World Scientific.
- Foster, John Bellamy. 2000. *Marx's Ecology: Materialism and Nature*. Monthly Review Press.
- Foster, John Bellamy, and Paul Burkett. 2016. *Marx and the Earth: An Anti-Critique*. Vol. 115. Historical Materialism Series. Brill.
- Geras, Norman. 1983. *Marx and Human Nature: Refutation of a Legend*. Verso Editions and NLB.
- Gorelik, Gennady, 2005, *Review of Stalin's Great Science: The Times and Adventures of Soviet Physicists*, By Alexei B Kojevnikov. *Physics World*, November.
- Gould, Stephen Jay. 1988. *Time's Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time*. Penguin Books.
- Griese, Anneliese, and Gerd Pawelzig. 1995. "Friedrich Engels' 'Dialektik Der Natur': Eine Vergleichende Studie Der Editions-geschichte." *MEGA-Studien* 1: 33–60.
- Griese, Anneliese, Friederun Fesse, Hella Hahn, Karl Heinig, Martin Koch and Gerd Pawelzig. 1985. *Einleitung*. In *Dialektik der Natur (1873–1882)*. Edited by Anneliese et al. Gesamtausgabe (MEGA): Abt.I: Werke, Artikel, Entwürfe / Karl Marx, Friedrich Engels ; Vol. I/26. Marx Engels Gesamtausgabe: MEGA2. Berlin: Dietz.
- Grundmann, Reiner. 1991. *Marxism and Ecology* Clarendon Press. Oxford New York.

- Harman, Peter M. 1982. *Energy, Force and Matter: The Conceptual Development of Nineteenth-Century Physics*. Cambridge University Press.
- Hessen, Boris. 1931. "The Social and Economic Roots of Newton's Principia." In *Science at the Cross Roads*. KNIGA Ltd.
- Hyman, Ludmila. 2017. "The Soviet Psychologists and the Path to International Psychology." In *The Globalization of Knowledge in History: Based on the 97th Dahlem Workshop*, edited by Jürgen Renn, Reprint of the 2012 edition, 643–668. Max Planck Research Library for the History and Development of Knowledge Studies 1. Berlin: Edition Open Access.
- Ilyenkov, Evald V. 2014. "Dialectics of the Ideal." In *Dialectics of the Ideal: Evald Ilyenkov and Creative Soviet Marxism*, edited by Alex Levant and Vesa Oittinen, 25–78. Leiden: Brill.
- James, William. 1987a. "Lecture VI Pragmatism's Concept of Truth: Pragmatism, A New Name for Some Old Ways of Thinking. Popular Lectures on Philosophy (1907)." In *William James: Writings 1902–1910*, 572–90. Library of America.
- . 1987b. "The Meaning of Truth, a Sequel to 'Pragmatism'". In *William James, Writings 1902–1910*, 821–978. Library of America.
- Jammer, Max. 1993. *Concepts of Space: The History of Theories of Space in Physics*. 3rd enl. ed. New York: Dover Publications.
- . 2006. *Concepts of Simultaneity, from Antiquity to Einstein and Beyond*. The John Hopkins University Press.
- Kaltenbrunner, Gerd-Klaus. 1970. "Eugen Dühring." *Zeitschrift Für Religions-Und Geistesgeschichte* 22(1): 58–79.
- Kant, Immanuel. 2012. "Universal Natural History and Theory of the Heavens or Essay on the Constitution and the Mechanical Origin of the Whole Universe According to Newtonian Principles (1755)." In *Kant: Natural Science*, edited by Eric Watkins, 182–308. Cambridge: Cambridge University Press.
- Kircz, Joost. 1998. "Nouvelle présentation! Nouvelle Science?" *L'écrit de la science, Alliage*, 37–38: 14–24. (English translation: <http://www.kra.nl/Website/Artikelen/Nice98.htm>)
- . 2015. "Reality, Knowledge and Forecasting." *International Institute of Research & Education, Working Paper* 41: 27. http://fileserv.iire.org/working_papers/WP41.pdf
- . 2016. "Elements of an Essay on Human Change." In *Return of Marxism. Marxist Theory in a Time of Crisis.*, edited by Sara R. Farris, 163–92. IIRE and Haymarket Books. <http://www.kra.nl/Website/ArtkelenSP/wewt-soc12a.pdf>
- . 2020. "Socialist Strategies and the Role of Science." *Stichting Socialistisch Onderzoekscollectief*. <https://soc21.nl/wp-content/uploads/2020/04/Intro1-v5a-What-is-this-work-about-kort.pdf>.
- Kojevnikov, Alexei. 1999. "Freedom, Collectivism, and Quasiparticles: Social Metaphors in Quantum Physics." *Historical Studies in the Physical and Biological Sciences* 29(2): 295–331.
- . 2002. "David Bohm and Collective Movement." *Historical Studies in the Physical & Biological Sciences* 33(1): 161–92.
- Kraak, Menno-Jan, and Ferjan Ormeling. 1998. *Cartography: Visualization of Spatial Data*. Reprinted. Harlow: Longman.
- Krätke, Michael. 2020. "Friedrich Engels, Der Erste Marxist." In *Friedrich Engels Oder: Wie Ein 'cotton-lord' den Marxismus erfand.*, editd by Michael Krätke, 6–68. Verlag Dietz-Berlin.
- Kuhn, Thomas S. 1962. *The Structure of Scientific Revolutions*. University of Chicago Press.
- Lakoff, George, and Rafael E. Núñez. 2000. *Where Mathematics Comes from—How the Embodied Mind Brings Mathematics into Being*. Basic Books.

- Lenin, Vladimir Il'ich. 1968. "Materialism and Empirio-Criticim; Critical Comments on a Reactionary Philosophy." In *V.I. Lenin Collected Works*, Vol. 14. 14:17–388. V.I. Lenin Collected Works. Progress Publishers Moscow.
- Lenin, Vladimir Il'ich. 1974. "Kommunismus Journal of the Communist International for the Countries of South-Eastern Europe (in German), Vienna, No. 1–2 (February 1, 1920) to No. 18 (May 8, 1920)." In *V.I. Lenin Collected Works*, 31:165–167. Progress Publishers Moscow.
- Levine, Norman. 1975. *The Tragic Deception: Marx Contra Engels*. Twentieth Century Series 8. Oxford: Clio Books.
- Luxemburg, Rosa. 1915. "The Junius Pamphlet,;The Crisis of German Social Democracy." April 1915. <https://www.marxists.org/archive/luxemburg/1915/junius/>.
- Marx, Karl. 1974. *Mathematische Manuskripte*. Edited by Wolfgang Endemann. Scriptor Taschenbücher : Sozialwissenschaften ; S 10. Kronberg Ts: Scriptor.
- . 1976a. *Capital Vol 1. 1867-1886*. Translated by Ben Fowles. Penguin Books Ltd.
- . 1976b. "Theses on Feuerbach." In *Marx and Engels Collected Works*, Vol. 5. New York: International Publishers.
- . 1982. *Die technologisch-historischen exzerpte: historisch-kritische ausgabe*. Edited by Hans-Peter Müller. Originalausg. Ullstein-Buch Ullstein-Materialien. Frankfurt/M.: Ullstein.
- . 1983. *Mathematical Manuscripts of Karl Marx*. Edited by Sofya A. Yanavskaya and Ernst Arnost Kolman. New Park Publications.
- . 1985. *Les manuscrits mathématiques de Marx*. Edited by Alain Alcouffe. Paris: Économica.
- . 1994. *Karl Marx Mathematical Manuscripts: Together with a Special Supplement*. Edited by Pradip Baksi. Calcutta: Viswakos Parisad.
- Marx, Karl, and Friedrich Engels. 1999. *Naturwissenschaftliche exzerpte und notizen, Mitte 1877 bis anfang 1883: Apparat*. Edited by Anneliese Griese, Friederun Fessen, Gerd Pawelzig, and Peter Jäckel. Gesamtausgabe Exzerpte, Notizen, Marginalien, MEGA ; 31.[2] 4. Berlin: Dietz.
- Marx, Karl, Friedrich Engels, and Vladimir Il'ich Lenin. 1967. *K. Marx, F. Engels, VI Lenin: On Scientific Communism*. Moscow: Progress Publishers.
- Mirowski, Philip. 1991. *More Heat than Light: Economics as Social Physics, Physics as Nature's Economics*. Cambridge University Press.
- Muller, Karl. 2004. "Zur Entstehung Und Wirkung von Engels 'Anti-Dühring'." *Trend Onlinezeitung* 09–04. <http://www.trend.infopartisan.net/trd0904/t010904.html>.
- Novack, George Edward. 1975. *Pragmatism versus Marxism: An Appraisal of John Dewey's Philosophy*. New York, NY.: Pathfinder.
- Pagel, Mark. *Wired for Culture, The Natural History of Human Cooperation*. Penguin Books Ltd., 2012.
- Pais, A. 1979. "Einstein and the Quantum Theory." *Rev. Mod. Phys.* 51(4): 863–914.
- Potier, Simon, Margaux Lieuvin, Michael Pfaff, and Almut Kelber. 2020. "How Fast Can Rap-tors See?" *The Journal of Experimental Biology* 223(1): jeb209031. <https://doi.org/10.1242/jeb.209031>.
- Prescott, Tony J., Nathan Lepora, and Paul F.M.J Verschure, eds. 2018. *Living Machines: A Handbook of Research in Biomimetics*. New York, NY: Oxford University Press.
- Renn, Jürgen. 2020. *The Evolution of Knowledge: Rethinking Science for the Anthropocene*. Princeton University Press.
- Saito, Kohei. 2017. *Karl Marx's Ecosocialism*. Monthly Review Press.

- Schemmel, Matthias. 2016. *Historical Epistemology of Space: From Primate Cognition to Spacetime Physics*. 1st ed. 2016. SpringerBriefs in History of Science and Technology. Cham: Springer International Publishing: Imprint: Springer.
<https://doi.org/10.1007/978-3-319-25241-4>.
- Timpanaro, Sebastiano. 1975a. "Engels, Materialism and 'Free Will'." In *On Materialism*, 73–134. London: New Left Books.
- . 1975b. "Praxis and Materialism." In *On Materialism*, 55–72. London: New Left Books.
- Turkel, William J. 2013. *Spark from the Deep: How Shocking Experiments with Strongly Electric Fish Powered Scientific Discovery*. (Animals, History, Culture). Baltimore: The Johns Hopkins University Press.
- Van Heijenoort, Jean. 1985. "Friedrich Engels and Mathematics." In *Selected Essays*, 123–151. Napoli: Bibliopolis.
<https://www.marxists.org/history/etol/writers/heijen/1948/xx/math.htm>
- Wigner, Eugene P. 1960. "The Unreasonable Effectiveness of Mathematics in the Natural Sciences." *Communications on Pure and Applied Mathematics* 13(1): 1–14.
<https://doi.org/10.1002/cpa.3160130102>.



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ARTICLE

Engels' Dialectics of—Human Activity in—Nature

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ABSTRACT: Several Marxist theorists criticize Engels for his supposed non-dialectical and non-philosophical conceptualization of “praxis,” which, according to Lukacs, amounts to Engels’ alleged misunderstanding of Kantian “thing-in-itself.” I argue that such “criticisms” of Engels is based on a dualistic understanding of practical vs. theoretical. Contrary to the critiques’ allegations, Engels provides an account of praxis/labour as a philosophical category that is truthful to Marx’s and his own earlier efforts for constituting a materialist dialectics—one that anticipates the concept of “human activity” elaborated particularly in philosophical works of Evald Ilyenkov and psychological studies of Lev Vygotsky. According to Engels, the so-called laws of dialectics are historical thus depending on human activity as it is “with man [that] we enter history.” Furthermore, it is through labour (the highest form of human activity) that not only the human hands but also social humanity and human consciousness have been constituted. Thus, laws of dialectics are the most general laws of human activity in social nature. Engels, truthful to Marx’s materialist method, prioritizes action over substance.

KEYWORDS: Dialectics, praxis, activity, labour, substance.

INTRODUCTION

In *History and Class Consciousness* (1971), Lukacs quotes Engels defining dialectics as the science of the most general laws of motion both in society and nature. Interpreting this definition, Lukacs criticizes Engels for extending the method of dialectics to be applied to nature, whereas, this is not allowable. He criticizes Engels for his conceptualizing “praxis” not dialectically and philosophically which amounts to the latter’s alleged misunderstanding of Kantian “thing-in-itself” (Lukacs 1971, 132). Several others in Western Marxism tradition have made Engels’ conceptualization of nature, human being, and praxis/activity subject of their criticism.

Alfred Schmidt (1971, 55), who is critical of Lukacs as well, for instance, criticizes Engels for not conceiving of human being and nature as united through historical practice but “as product of evolution and a passive reflection of the process of nature, not however as a productive force.”

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He further accuses Engels of getting involved in the scholastic debate concerning the dialectical or non-dialectical structure of nature, whereas accordingly and in contrast to Lukacs's position that forms the basis of the latter's criticism of Engels, "the concept of nature cannot be separated, *either in philosophy or in natural science*, from the degree of power exercised by social practice over nature at any given time" (ibid., 60, emphases added). Unlike Lukacs, Schmidt does not reject the concept of "dialectic of nature" *in toto*. Accordingly, "the Marxist theory itself already contains the dialectic of nature" (ibid.). Further he states, "Nature becomes dialectical by producing man as transforming, consciously acting Subjects confronting nature itself as forces of nature. Man forms the connecting link between instrument of labour and the object of labour. Nature is the Subject-Object of labour" (ibid., 61). Schmidt accuses Engels of demanding a dialectics of nature independent of forms of human (productive) activity; such dialectics are possible only if one assumes a Hegelian idealist stance. Hegel assumes a "logic of being" to be later mediated through logic of essence to be followed by its mediation through logic of Concept. "Nature passes over into Spirit, objectivity passes over entirely into subjectivity, transactions which are naturally denied to the materialism of Engels" (ibid., 59). In other words, according to Schmidt, Engels assumes a position that is self-contradictory as it leaves out human activity, the middle term that brings in nature and its laws into the realm of the "for-us," and which is historically limited. Dialectics of nature is relevant only to the extent that human interacts with nature (or acts in nature): if human is absent then "there can be no question of a dialectic of external nature, because all the essential moments of a dialectic would in that case be absent" (ibid.). In other words, such a notion of "dialectic of nature," that is attributed to Engels, is incompatible with a materialist stance because allegedly in Engels' breed of materialism there is no Spirit or a subject as the active agent of history, However, Schmidt does not provide any convincing argument in favour of his criticism and as I will further argue in this paper with reference to some of Engels' earlier and later writings, Engels does attribute a central role to human agency and human activity (labour) in relation to nature and the concept of dialectic of nature. Vesa Oittinen (2016, 35), in a similar vein, states that the young Marx and the old Engels conceive of "praxis" or "practice" quite differently and thus "Marx's ideas on *Praxis* in the 'Theses

on Feuerbach' of 1845 must be read in a context other than Engels's 'practical' critique of Kant in his *Ludwig Feuerbach* of 1886."¹

Reasoning along similar lines, Avineri (1968, 65) accuses Engels of being a mechanistic materialist as, accordingly, Engels, "by applying dialectics to nature divorces it from the mediation of consciousness." Avineri provides no proper argument for his claim; why the alleged "application of dialectics to nature" amounts to removal of mediation of consciousness but application of dialectics to society does not? The reason seems to be that in contrast to Hegel for whom the inanimate nature could be included in dialectics because accordingly "nature is spirit in self-estrangement" (ibid.) in Engels' view it is "only opaque matter" that historically precedes spirit and "is the cause and source of evolution of consciousness" (ibid., 66). That matter or material world precedes consciousness and is the cause and source of human activity and the consequent emergence of consciousness is a view that is also shared by Marx; interestingly, Avineri (1968, 68) maintains this point (and contradicts himself) stating that according to Marx "there always exists a 'natural substratum'² which is a necessary condition for the activity of human consciousness" although Marx, contrary to Avineri's contention, never stops at the limit of "consciousness" as for him, just as is for Engels, the basis upon which human consciousness emerges is human beings' activity in nature. All in all, it is not consciousness that acts in nature but it is the living human beings who act with their bodily organs as much as with their consciousness, which itself emerges through this interaction.

1. I should admit that previously I had uncritically endorsed similar allegations against Engels. I have come to realize that I had not suggested a logically strong argument in order to adequately support such a "critique" of Engels' materialism and simply appropriated such attacks by a faulty appeal to authority. See Azeri 2019, 598–599.

2. For Marx material existence, i.e., nature, is far more than a "substratum;" rather it is a constituent, a necessary element of human beings' productive activity, which permit their existence as much as their activity. In *Capital* we read "The labour process [...] is purposeful activity aimed at the production of use-values. It is an appropriation of what exists in nature for the requirements of man. It is the universal condition for the metabolic interaction [*Stoffwechsel*] between man and nature, the everlasting nature-imposed condition of human existence, and it is therefore independent of every form of that existence, or rather it is common to all forms of society in which human beings live [...] therefore [...] it was enough to present man and his labour on one side, nature and its materials on the other." (1992, 290)

Contrary to these critiques³, I intend to show that Engels, particularly in his *Dialectics of Nature*, provides an account of praxis as a philosophical category that is truthful to the spirit of Marx's and his own earlier efforts for constituting a materialist dialectics—one that anticipates the concept of “human activity” elaborated particularly in philosophical works of Evald Ilyenkov. To put it in a nutshell, dialectics of nature is the dialectics of human's historically specific activity *in nature*⁴. According to Engels (1975, 338–339), the so-called laws of dialectics are historical thus depending on human activity as it is “with man [that] we enter history” (ibid., 330). Furthermore, it is through labour (the highest form of human activity) that not only the human hands but also social humanity and human consciousness have been constituted (Engels 1975, 453–454, 456, 458). Thus, laws of dialectics are the most general laws of human activity in social nature. Engels, truthful to Marx's materialist dialectics, prioritizes action over body-substance.⁵

In order to demonstrate the implausibility of Engels' “critiques,” a conceptual reinterpretation of Marx's and Engels' conceptualization of key concepts such as history, praxis, human activity and dialectics is required. To this end initially the concept of history in Marx's and Engels' writings

3. The literature for and against Engels' conceptualization of materialism and dialectics (and his relation to Marx's “authentic” position) is far larger than what has been addressed in this article. I have chosen these particular authors because, in my view, their different and at times apparently contrasting approaches to Engels are based on common presuppositions. For an almost exhaustive list see Kangal 2020, particularly chapter 2.

4. “Knowledge is not a set of propositions... sentences, propositions ... scientific concepts and conceptual machines ... are means for relaying the rules, methods, and laws of human activity of manipulating the social world” (Azeri 2019, 598).

5. In his recently published article Rogney P. Arencibia (2021) elaborates on the relation between Engels' concept of dialectic of nature and Ilyenkov's concept of the “ideal.”

Arencibia sets a two-fold task before himself: 1. Critique of “Western Marxism's” negative attitude towards Engels (particularly his *Dialectic of Nature*); 2. Ilyenkov's endorsement of Engels' view of dialectics (of nature) and philosophy and thus the incompatibility or the incommensurability of Ilyenkov's philosophical stance with “Western Marxism.” He provides solid counter-arguments against the “cultish rejection of dialectics of nature” by “Western Marxism” which amounts to “a blind idolatry towards positivistic views” about philosophy, its subject matter and its relation to (natural) sciences. My account diverges from Arencibia's in emphasizing the role that the concept of “activity” (praxis) plays in Ilyenkov's view of philosophy and dialectics and the role this concept (practice) plays in Engels' conceptualization of dialectics. It is the alleged dismissal of the concept of activity/praxis (as a philosophical category) and the consequent dismissal of the “active side” (which was left to be developed by idealism) by “Engels” that forms the core of some interpreters' “criticisms”—a view which I set to challenge in this article.

will be analyzed. It will be argued that the concept of praxis (human activity) and its historically specific forms are central to Marx's and Engels' understanding of history. Furthermore, Marx's and Engels' concept of "practical materialism" will be evaluated and reconstructed; it will be argued that Marx's and Engels' practical materialism, in contradistinction to mechanical materialisms and idealism, prioritizes activity over substance. In the third section, Engels' critique of metaphysical views that consider philosophy as a "science of sciences" will be considered. It will be argued that this position is not "anti-philosophical;" rather it demarcates the subject matter of philosophy, that is, laws of thinking and theory of knowledge, and its methodology—dialectics. In the fourth section, the role of labour (productive human activity) in history and constitution of human species as a social being and emergence of human consciousness will be considered. It will be shown how through the concept of activity, Engels, truthful to the spirit of Marx's and his own practical materialism, overcomes the subject-object or mind-matter dualisms dear to metaphysical and mainstream viewpoints. In conclusion the historicity of human knowledge, the mutual mediated interdependence of thinking and reality (thought and matter) will be considered and it will be argued that like other laws of nature, dialectic of nature is dialectic of human activity in nature.

THE CONCEPT OF HISTORY

In *The German Ideology* Marx and Engels (1976b, 41) identify the first fundamental condition of history as human's physical existence: "men must be in a position to live in order to be able to make history." Similarly, they consider human beings' existence as the first premise of their materialist method: "The first premise of all human history is, of course, the existence of living human individuals" (ibid., 31). Thus, history is nothing other than human beings' historical activity in nature, which always attains a specific *social form*. Owing to human beings' historical activity nature too attains a historical existence as social nature⁶. Historicity of nature pertains to the

6. "Social nature" and "nature" are used interchangeably in this article. The reason for the use of the term "social nature" is emphasizing the role of human activity and its metabolic relation to nature that amounts to knowledge-production. "Nature for Marx appears only through social labour. Even time and space are social in their origin. [The] objective "in itself" is relevant only if it is made into a "for us;" in other words, it is relevant insofar as nature is drawn into the web of human social practice with the use of artefacts, and to the extent that it becomes a socially produced artefact" (Azeri 2020, 356).

interdependence of human and nature, which are united and divided through human activity. Marx and Engels consider nature as the primary source of all instruments and objects of labour; hence, in their account, nature should be primarily conceived of in relation to human activity. Former materialism, that of Feuerbach included, ignores the fundamental role of human activity and labour in process of manipulation and the consequent socialization of nature and in doing so it reproduces the idealist stance, for which abstract thinking is the only genuine activity. Accordingly, the state institute as well as the law and religion are “thought entities’ or products of “pure, abstract philosophical thinking” (Marx 1975, 331). Engels (1975, 330) resonates this very idea of interdependence and historicity of human and nature through the mediation of human activity when in the *Dialectics of Nature* he states that “with man we enter history.”

Human consciousness, as well as its knowing activity, are also determined by historical activity and emerges only as a social product.⁷ The Marxian conceptualization of knowing is in contrast to the age-old rationalist-empiricist one. Older materialist as much as empiricist conceptualization of cognitive activity is based on “observation-learn” dogma; for Marx, to the contrary, cognition is preceded by and is rooted in “activity-change.” For the former sciences work on or are about trans-historically given, immutable and atomic facts; furthermore, the subject of knowledge is considered a neutral, pure spirit whose quest for knowledge is triggered by natural curiosity. Contrarily, from a materialist dialectical stance, knowledge-producing activity is a specific type of the socio-historically determined activity aiming for manipulating nature and is inseparable from the historically-specific social needs, which are in-formed by this very activity, and the specific form of the social relations of production. Thus, criticizing Feuerbach’s contemplative materialism Marx and Engels, in *The German Ideology*, state:

Feuerbach speaks in particular of the perception of natural science; he mentions secrets which are disclosed only to the eyes of the physicist and chemist; but where would natural science be without industry and commerce? Even this “pure” natural science is provided with an aim, as with its material, only through trade and industry, through the sensuous activity of men. (Marx and Engels 1976b, 40)

7. This paragraph draws on Azeri (2017, 74, 77).

Engels recapitulates this very approach in his treatment of the historicity of logic and laws of thinking and dialectics. Laws of thinking as a peculiar form of human activity are subject to historical change owing to the change in the mode and form of human activity in nature. Thus in *Dialectics of Nature* Engels states:

In every epoch, and therefore also in ours, theoretical thought is a historical product, which at different times assumes very different forms and, therewith, very different contents. The science of thought is therefore, like every other, a historical science, the science of the historical development of human thought. And this is of importance also for the practical application of thought in empirical fields. Because in the first place the theory of the laws of thought is by no means an “eternal truth” established once and for all, as philistine reasoning imagines to be the case with the word “logic.” (Engels 1975, 338–339)

Engels (1975, 356) further defines dialectics as “the science of interconnections, in contrast to metaphysics.” Dialectics, which is abstracted from *history of nature and human society* expresses the most general laws of these two facets of *historical* development as well as those of development of human activity and thinking. Laws of dialectics are deduced from history (of nature and society) that is actual only in relation to human activity. The match between the laws of dialectic of thinking and that of nature appears mystical to one that rigidly reproduces the age-old subject-object dualism, which separates thinking and reality categorically and feigns the existence of an unsurmountable gap between them. Hegel’s idealist conceptualization of dialectics suffers exactly from such a dualism which amounts to supposing that dialectical laws, as those belonging to pure thought, are imposed on nature.

This is the source of the whole forced and often outrageous treatment; the universe, willy-nilly, has to conform to a system of thought which itself is only the product of a definite stage of development of human thought. If we turn the thing round, then everything becomes simple, and the dialectical laws that look so extremely mysterious in idealist philosophy at once become simple and clear as noonday. (Engels 1975, 356)

Interestingly, such dualism and the consequent mystification of dialectics, at least to the extent that scientific knowledge of nature is concerned, is recapitulated by Lukacs in his attempt to criticize Engels. Lukacs (1971, 132) retreats to a Feuerbachian substance materialism in conceiving of scientific knowledge as “contemplation at its purest” and dismisses the “active side” in the process of production of scientific knowledge; he claims that dialectical method of investigation “is limited to the realms of history

and society” because “the crucial determinants of dialectics—the interaction of subject and object, the unity of theory and practice, the historical changes in the reality underlying the categories as the root cause of changes in thought, etc.—are absent from our knowledge of nature” (Lukacs 1971, 24, n. 6). Lukacs, like “[Feuerbach] does not see how the sensuous world around him is, not a thing given direct from all eternity, remaining ever the same, but the product of industry and of the state of society” (Marx and Engels, 1975, 19). Lukacs fails to see that concepts and conceptual systems employed in sciences are specific historical tools that have been produced through the accumulated historical human activity; he fails to see that “[science] is not dependent upon sensory perception” (Vygotsky 1997b, 273).

Under capitalism “pure” theoretical knowledge has become an actuality; however, such theoretical knowledge is as much material as an axe or a hammer is; what needs to be explained is the emergence of “theory” as a material force and not an uncritical affirmation of the phenomenon of appearance of pure knowledge—knowledge, which pragmatically is not related to any particular individual bodily action. The historical actuality of pure theoretical knowledge has been made possible by capitalist division of labour and its corresponding form of cooperation; thus, in the final analysis, it cannot be conceived of separated from labour and human activity and their specific form. Contrarily it may seem, the emergence of pure theoretical knowledge signifies the dialectical unity of theory and practice. Engels formulates this interdependence of theory and practice as follows:

The new tendency, which recognised that the key to the understanding of the whole history of society lies in the history of the development of labour, from the outset addressed itself preferentially to the working class and here found the response which it neither sought nor expected from official science. The German working-class movement is the heir to German classical philosophy. (Engels 1990, 398)

Metaphysical materialism identifies activity with mere individual action and reduces the motives behind it to personal ones—it treats activity and history pragmatically (see Engels 1990, 388). Thus, in the face of its own *necessary* failure in discovering an “immediate” link between personal motives and actions and particular epistemic-theoretical developments (because there does not have to be any such immediate bond) it becomes bewildered and is pushed to recapitulate the ideologists’ stance in attributing independence to the theoretical by considering it as purely mental, severe it from the material (human activity) which is to be followed and

complemented by accusing Engels for his alleged reductionism and “economic determinism.”

Such is, for instance, Shlomo Avineri's consideration of the history of development of Marx's ideas and methodology: he considers Marx's materialism a *Weltanschauung* rooted in Hegel's speculative philosophy; accordingly, the core of Marxian materialism is not prioritizing activity or praxis over substance, but legitimizing matter “through a transforming contemplation of the principles of German idealist philosophy itself” (Avineri 1968, 6). All Marx's development is thus reduced to “theoretical” or “intellectual” development, a movement initiated by a mere clash of ideas. Avineri's theoreticist stance is also evident in his consideration of the relation between the political and the epistemological; according to Avineri, Marx's critical thought is rooted in classical German philosophical tradition whereas the later Engels mostly draws upon eighteenth-century French and English materialism. For Marx, as Avineri's argument goes, utopian socialism is an immediate outcome of Anglo-French materialist epistemology while Marx's own epistemology, which yields his political outlook, “is deeply imbedded in German idealist tradition” (ibid., 68). If Avineri's account concerning the priority of epistemology over politics were plausible, one could barely explain Hegel's ultra-conservative political siding despite the central role he attributes to labour and activity in his system.

Avineri (1968, 235–236), in criticizing what he labels as the “technological bent” in Engels' view, argues that Engels attributes autonomy to technology which is based on his understanding of material nature and objects as entities completely alien to human beings and of industry as something irreducible to “directable human action.” This alleged view is supposedly in contrast to Marx's stance that does not consider technology as an objective, external force. To support his view, he paraphrases Engels' argument in “On Authority” that “authoritarian discipline is an immanent ingredient of large-scale industry” independent from social relations of production, which, according to Avineri (ibid., 235), is in contrast to Marx's contention that production determines forms of organization. Avineri (1968, 236) further argues that in Marx's view, “future society will not require authoritarian industrial discipline,” whereas for Engels there exists a despotism in industrial production independent of the form of organization (ibid., 235).

However, it can be argued that Engels' position in the “On Authority” is the continuation of Marx's analysis of machines in *Capital*; there Engels

(1988, 423) states that “All these workers, men, women and children, are obliged to begin and finish their work at the hours fixed by the authority of the steam, which cares nothing for individual autonomy[...] The automatic machinery of the big factory is much more despotic than the small capitalists who employ workers ever have been.” Here, on a different level of abstraction, Engels explains that every tool, every object that is produced by human beings, is “ideal” also in the sense that it dictates a particular form upon human activity. This *form*, it is true, is not independent from the historically specific mode of human activity; it is the mode of subjective activity objectified. Under capitalism, tools of production are basically machines which Marx defines as means of exploitation of surplus value from workers. It is clear that with the triumph of a socialist revolution such an aspect would not disappear by itself over a night since as much as the relations of production, means of production too should be revolutionized. Thus, Engels is quite right in two senses: on a trans-historical level he emphasizes a general rule that tools dictate forms of activity; on a historically specific level these rules will be of disciplinary nature peculiar to capitalism. These views complement Marx’s understanding of machines not as complicated tools but as revolutionary means of production. Ironically, Avineri’s own account is reductionist and simplistic, which separates the mode of administering tools from their specific existence; from such a viewpoint machines, means of production etc. are transhistorical entities the relations of which to the mode of production and the historically specific mode of activity is accidental.

In a similar vein, Lichtheim argues that there is an element of industrial technocraticism in Engels so that he is mainly concerned with the role of proletariat in *industrial* revolution; his consequent understanding of socialism, thus, is the liberation of “productive forces;” and this aspect is so strong that also echoed in the *Manifesto* in emphasizing the revolutionary role of capitalism in doing away with “pre-industrial forms of society.” This, however, is Lichtheim’s own understanding of the revolutionary role of capitalism and not Engels’. *Manifesto* declares capitalism revolutionary not only due to its technological advancement—although this is a by-product of capitalization of production relations—but because of the universal character of capitalist relations of production which is manifest in capital’s “creat[ing] a world after its own image” (Marx and Engels, 1976a, 488); Marx and Engels (1976b, 73) had already emphasized this aspect of capitalism in *The German Ideology*: “Industrial capital [...] [through] compete-

tion destroyed as far as possible ideology, religion, morality, etc [...] It produced world history for the first time.”

MARX'S AND ENGELS' PRACTICAL MATERIALISM

Engels (1990, 382), in his *Ludwig Feuerbach* notes that Marx represents a return to materialism, where the term refers not to prioritization of one substance (matter) to another (mind/soul) but to an effort to understand and thus necessarily change historical reality noting that social reality is a unity of nature and history merged through and within human being's historical activity. It is within this unity that “for the *practical* materialist, i.e., the *communist*” the question of human beings' relation to the world transforms into “a question of revolutionising the existing world, of practically coming into grips with and changing the things found in existence” (Marx & Engels, 1976b, 38–39). Materialism, thus, is the comprehension of facts on their own as they present themselves to every human being [the so-called] facts can “present themselves” to human beings in activity, not in contemplation but in the process of changing the world].

Engels criticizes Hegel for his “ideological perversion” i.e., for attributing a trans-social or trans-human independence to dialectics and its “laws,” as if it exists and is at work independent of human thinking: “According to Hegel ... *dialectical development appearing in nature and history* [...] is only a copy of the self-movement of the concept going on from eternity, no one knows where, but at all events *independently of any thinking human brain*” (1990, 383, emphases added). Hegel's perverse formulation of dialectics suffers from a dual fallacy: it attributes what is truly “material” to “mind/soul”; but most importantly, it simply converts the metaphysical materialist dogma in attributing “independence” (from human thinking) to dialectics and dialectical laws of development in society and nature. Once such mystification is done away with “dialectics reduced itself to the science of the general laws of motion, both of the external world and of human thinking—two sets of laws which are identical in substance, but differ in their expression in so far as the human mind can apply them consciously” (Engels 1990, 383). Dialectics of thinking, thus, is a “reflection” of the dialectics of the real motion of the world, where “world,” as indicated above, is historical nature—the historical world of historical human activity. Therefore, (Marx's and Engels') materialist conversion of Hegel does not simply refer to replacing a substance with another, it also emphasizes the attribution of active side to human being—to do away with the

mystical conceptualization of activity as that of mind or soul (which would be identical with mere inaction): the substance-subject of history, if any, is living human being and its historically specific mode of activity. Thus, concludes Engels, “In this way, however, the *revolutionary side* of Hegelian philosophy was again taken up and at the same time freed from the idealist trimmings which with Hegel had prevented its consistent execution” (1990, 384, emphases added). Reality, in contrast to age-old metaphysical dogma inherited uncritically by [Kant’s “critical” philosophy and] the sciences, consists not of “given,” “ready-made *things*” but of “processes” where the latter points to relentless human interaction with nature—a conception that in its turn dissipates the idea of ahistorical [thus absolute] knowledge (knowledge of the thing—*faits accomplis*) independent of and prior to changes and processes. All knowledge is historical not only in the sense that it reflects the transitory state of modes of reality but also, and more importantly, in that such changes and processes as much as their “laws” are revealed solely in human activity in nature. Hence, Engels states,

If, however, investigation always proceeds from this [Marxian materialist] standpoint, the demand for final solutions and eternal truth ceases once and for all; one is always conscious of the necessary limitation of all acquired knowledge, of the fact that it is conditioned by the circumstances in which it was acquired. On the other hand, one no longer permits oneself to be impressed by the antitheses, insuperable for the still common old metaphysics, between true and false, good and bad, identical and different, necessary and accidental. (Engels 1990, 384)

Lichtheim (1961, 15, n. 1) claims that Engels, like Feuerbach, is committed to a program of unification of sciences and philosophy, although not in a “vulgar materialist” style, reminiscent of a “positivist programme.” In the same note, he admits that the term “dialectical materialism” was coined by Plekhanov, yet, providing no further argument, he attributes *diamat* to Engels. Lichtheim’s discussion at this point reveals his traditional, uncritical conceptualization of science, which interestingly is inspired by positivists of whom Engels is considered an ally.

From a materialist dialectical point of view, the roles ascribed to philosophy and to sciences is related to how knowledge is defined and what is to be done with it; furthermore, it depends on the specific field within which a particular form of knowledge is produced (mathematics, physics, biology, philosophy). In this particular sense, there is nothing that philosophy may add to individual sciences; yet, to the extent that the question

concerning the nature of knowledge, its social form of production etc. are concerned, philosophy and no other “science” has a say.

Lichtheim implies that Engels has a more schematic understanding of development of history; that backwardness of Germany for him renders the anticipated revolution (if it was ever to come) necessarily a democratic-bourgeois one while Marx thought the backwardness of Germany necessitates a more radical revolution. It might look as if these are different views but if one accepts Lichtheim's interpretation one has to state that both Marx and Engels thought about history *deterministically* without leaving no room for the acting agent/subject. The only alleged difference is that while Marx emphasizes backwardness as a “positive” element Engels considers it a “negative” one (to the extent that a proletarian-communist revolution is at stake). However, even if we accept that Engels anticipated bourgeois democratic revolution vs. Marx's radical-communist revolution, this might be due to how they considered the capacities and capabilities of the working class and its organizations etc.

Emphasizing the alleged substantial difference between Marx's and Engels' methods, Lichtheim (1961, 235–236) states that “The *Theses on Feuerbach* (1845), with their proclamation of the need for thought to become ‘practical’ and ‘change the world,’ represent a pragmatic doctrine of revolutionary action which cannot by any stretch of language be called ‘scientific’.” If by science one understands a positivistically-conceived contemplative stance that supposedly “discovers” the allegedly “objective laws” in the phenomena under scrutiny, Lichtheim's interpretation might be plausible. Yet, a Marx– (and Engels–) inspired conceptualization of science considers it as a specific form of human activity in interaction and metabolic relation to social reality which amounts to production of knowledge, where the latter signifies manipulation of objective reality through tool-mediated and object oriented human activity. The produced knowledge itself, through and through, is social and thus ideal; it is itself a tool, an organ, which is actualisable only in action, in praxis, which means changing the world.

Lichtheim further continues his unfounded allegations against Engels in the face of counter-evidence. He considers Marx, in contrast to Engels' supposedly positivist program, a true heir to Hegel who, despite his differences with the latter, ultimately considers the identity between thought and reality, which also amounts to their rejection of the trivial discrepancy between the “is” and the “ought” (Lichtheim 1961, 238–239). Notwithstanding the fact that Engels, in his *Ludwig Feuerbach*, draws attention to

and emphasizes the relation between reason and reality as a revolutionary element in Hegel's philosophy, Lichtheim's interpretation of this relationship is still dualistic and ideological as he deals with reason and reality as pure metaphysical categories. The missing link in Hegel's interpretation that amounts to his speculative stance and which is criticized by Marx and Engels is the absence of real, historical activity of living human beings and the particular historical concrete *form* of their activities in his system. In Marx's and Engels' account it is not the reality that is rational; rationality is the reason appropriate to a particular *form* of socio-historical human activity. The absence of a true definition of "praxis," i.e., of human activity in Lichtheim's (1961, 241) account of Marx and Engels' standpoint eventually obliges him to consider "the core" of "Marxian vision, idealist." In the absence of such a category a materialist account of reality and objective existence of thinking/thought and the ideal becomes impossible and idealism inevitable. Engels' account is an attempt to show the materiality and objectivity of categories of human thinking, which is rooted in dialectics of human activity in nature.

Lichtheim's evaluation of Engels' position as "an amalgam of Hegelian and Darwinian concepts" that does not add to Marxian early critical stance of 1843–1845 (that of Engels' own included) is baseless and not evidenced and is rooted in anti-Engelsian assumptions. These allegations betray Lichtheim's own understanding of "philosophical" as speculative, "metaphysical" and thus non-scientific; accordingly, scientific means what scientism and positivism understand from the term. For Lichtheim dialectics cannot be materialistic and thus materialism cannot be dialectical; he continues to stay in the realm of substances and does not appreciate the specific and central role Engels (alongside Marx) attributes to human agency, praxis, and historically specific mode of human activity

PHILOSOPHY AND SCIENCE

Engels' position concerning the impossibility and undesirability of philosophy as a "science of sciences," which he also maintains in *Anti-Dühring* forms the ground upon which Ilyenkov (and Korovikov) will launch their attempt to reinstate Marxian practical materialism. Philosophy is *not* and *cannot assume* the role of a science of sciences. To the extent that production of knowledge is at stake, this is a task to be realized by individual sciences; as for philosophy, it is a theory of theoretical thinking, a theory of knowledge and of the laws of thinking, which are themselves subject to

historical determination and not separable from the historically specific form of human activity. To the extent that Engels' position and his rejection of such a role for philosophy is concerned, his position is anti-positivist—this latter conceives of philosophy as a parasite to feed itself upon sciences. It is not clear how, from such a point Lichtheim arrives at his evaluation of Engels' position as positivist and anti-philosophical: “Instead of the ‘realisation’ of philosophy through action which transforms a world that has philosophy for its necessary complement, we have here a differentiation of philosophy into ‘the positive sciences’; or rather its partial differentiation” (Lichtheim 1961, 245). This, however, is Lichtheim's own understanding of sciences as contemplative, purely “theoretical” endeavor that aims at forming a world-view. Knowledge-producing scientific activity is an action of manipulation the object/objective world. Lichtheim starts with positivistic-contemplative and commonsensical conceptualization of science and scientific knowledge as something separate from and in contrast to activity of the knowing subject in particular and the mode of social activity in general and then projects this image of knowledge and science onto Engels and presents this image as his—this, at best, is a straw man argument. No knowledge is possible without affecting the world and changing it as knowledge is activity in and upon objective social world—this was even known by Hegel's (2004, 65) animals as early as 1807).

Marx and Engels (1976b, 28) clearly consider knowledge of nature and that of history (what Lichtheim designates as “human nature”) as two phenomena or form of appearance of human activity in social nature. That is why Lichtheim's Lukacs-inspired criticism of Engels' “dialectics of nature” misses the point and betrays his own somatic materialist stance: “if nature is conceived in materialist terms it does not lend itself to the dialectical method, and if the dialectic is read back into nature, materialism goes by the board. Because he knew this, or sensed it, Marx wisely left nature (other than human nature) alone” (Lichtheim 1961, 247). Whereas, Marx and Engels, criticize Feuerbach for exactly a similar understanding of nature:

[Feuerbach's] error is not that he subordinates the flatly obvious, the sensuous *appearance* to the sensuous reality established by detailed investigation of the sensuous facts, but that he cannot in the last resort cope with the sensuous world except by looking at it with the “eyes”, i.e., through the “spectacles,” of the *philosopher*. (Marx and Engels 1976b, 39)

Any attempt at reviving a “philosophy of nature,” according to Engels (1990, 386), is redundant as much as it is reactionary. This idea goes hand

in hand with rejecting a conceptualization of philosophy as a meta-science. Engels' approach, rather than being rooted in some alleged inclination toward positivism and scientism is based on a materialist dialectical understanding of the nature of knowledge and knowing activity: knowledge is not a mere propositional bulk *about* things; it is not a, or an element of a "worldview." It is, first and foremost, the capacity of manipulating social nature; knowledge appears in activity at the line of contact between human being and social reality; not only is it bound to activity, but also, in its actuality it is unconceivable independent from the active subject of knowledge. As knowledge is object-oriented and tool-mediated, it bears the mark of the particular means (say, theories, set of questions invoked by this theoretical means/organs and objects of knowing activity) deployed for manipulation of objects; in this sense all knowledge is concrete as it is produced in the process of knowing concrete objects—there is no knowledge as such and thus any attempt at "synthesising" particular knowledges for arriving at a "general," "universal" Knowledge is futile and will necessarily fail. Ilyenkov and Korovikov (1954), following Marx and Engels, describe this situation in their "Theses on Philosophy" as follows: "positive knowledge" is itself able to reach, and is obliged to reach, that very final essence of the object of research, beneath, above and beyond which there is nothing to find for the reason that there is nothing more" (Thesis 12).

THE ROLE OF ACTIVITY (LABOUR)

In the section "The Part Played by Labour in the Transition from Ape to Man" Engels emphasizes the fundamental role of human activity, the height of which is labour, in the process of emergence of human species as a "social animal" in the true sense of the term. Engels (1975, 452) clearly states that it is "labour" that "created man himself." He further notes that hands are not only the organs of labour but also its products (*ibid.*, 453–454). Furthermore, labour has a socializing effect meaning that human is a truly social being because it labours and not vice-versa. Labour is an exclusively humanizing and socializing practice to the effect that the emergence of human society has been facilitated by labour. "This further development has been strongly urged forward, on the one hand, and guided along more definite directions, on the other, by a new element which came into play with the appearance of fully-fledged man, namely, *society*" (*ibid.*, 456).

Here Engels clearly resonates the ideas that formerly he and Marx had put forward in *The German Ideology* that the distinctive feature of human beings in comparison to animals is neither consciousness nor religion but is the production of their means of subsistence and the consequent production of their actual material life. What brings about the distinction between human and non-human animals is labour (Engels 1975, 460). Furthermore, Engels openly prioritizes action (labour) over body (substance) and in doing so he anticipates Ilyenkov's formulation "[in the *Dialectical Logic* that] the subject of thought [is] not body, but [is] action—the process of labour: 'Labour [...] is the "subject" to which thought as a "predicate" belongs'" (Maidansky 2016, 45).

As the "curvature of the social," i.e., as a social relation, human consciousness is also a product of labour (activity) which is actualized within specific social forms. Consciousness, both individual and social, is a function of the form of organization of society and productive activity—labour—which is reflected, say, in specific forms of consideration of the impact of productive activity on nature and environment. Hence, so far all modes of production have dealt only with the immediate and direct useful effects of labour, i.e., have considered it positively only and neglected the later effects of gradual repetition and accumulation of labour process. This is visible, for instance, in the science of political economy, "the social science of the bourgeoisie" that "in the main examines only social effects of human actions in the fields of production and exchange that are actually intended" (Engels, 1975, 462–463) and remains blind to the disastrous effects that the capitalist production has on the environment. "This fully corresponds to the social organisation of which it is the theoretical expression" (*ibid.*, 463).

Engels's elaborations on the concepts of necessity and causality further reveal his activity-based conception of knowledge and dialectics. He states, "the proof of necessity lies in human activity, in experiment, in work: if I am able to *make* the *post hoc*, it becomes identical with *proper hoc* (Engels 1975, 510). He further adds, "we can even produce motions which do not occur at all in nature (industry)... *In this way*, by the *activity of human beings*, the idea of *causality* becomes established" (*ibid.*). The proof of laws of nature is human activity because laws are realized in that activity; the law of nature is the law of human activity in nature. This is quite different, actually it is opposed to, the official diamat understanding of "practice as the criterion of truth" which is a quite verificationist formulation. Activity here is introduced not as verification of theory/thought but as its actuality, its

realization to the effect that the two become identical. Activity is theory-embodied just as theory is activity-universalized—activity as a concrete universal. Thus writes Engels:

Natural science, like philosophy, has hitherto entirely neglected the influence of men's activity on their thought; both know only nature on the one hand and thought on the other. But it is precisely the *alteration of nature by men*, not solely nature as such, which is the most essential and immediate basis of human thought, and it is in the measure that man has learned to change nature that his intelligence has increased. (Engels 1975, 511)

It is along the same lines that Engels rejects the Kantian notion of the “thing-in-itself” because in nature we find what we act on and thus the form of our activity carved in object or our activity objectivized in response to the form of object: “we can only know under the conditions of our epoch and *as far as these allow*” (Engels 1975, 521).

Lukacs's allegation that Engels conflates the Kantian notions of “in itself” and “for us” and thus misses the point in considering the “thing-in-itself” as a barrier to the expansion of knowledge is based on ignoring this relation between human activity, and its tools—be them physical or ideal-conceptual—and its objectification in nature. He states that contrary to Engels' contention, Kant's conceptualization of knowledge tailored in accordance to Newtonian paradigm allows a limitless expansion of knowledge. However, what Kant's critique implies is that knowledge of phenomena will never be more than knowledge of phenomena; furthermore, phenomenal knowledge is essentially unable to transcend the “structural limits of knowledge” (Lukacs 1971, 132). These structural limits are based on the antinomies of content and totality meaning that what we know are nothing other than our own concepts or conceptual projections onto nature.

Lukacs' criticism of Engels, however, is based on an old-age misunderstanding or dogma, which radically differentiates between concepts, conceptual systems or tools and the objects that are to be known and manipulated by deploying these tools. In this picture, concepts are nothing other than chimeras or subjective images that are created by or appear in individual minds (recall Marx's critique of Kant's rejection of the ontological proof by way of differentiating real dollars in one's pockets from those the person imagines them in one's pocket). As Vygotsky aptly put:

It would be as much a mistake to say that it [i.e., science—S. A.] studies concepts and not the reality reflected in these concepts, as it would to say of an

engineer who is studying a blueprint of a machine that he is studying a blueprint and not a machine, or of an anatomist studying an atlas that he studies a drawing and not the human skeleton. For concepts as well are no more than blueprints, snapshots, *schemas of reality* and in studying them we study models of reality, just as we study a foreign country or city on the plan or geographical map. (Vygotsky 1997b, 247–248, emphases added)

In the section on “historical materialism” of his *Main Currents of Marxism*, Lezek Kolakowski criticizes Marx and Engels for their alleged truism concerning the relation between the so-called “base” and “superstructure.” Accordingly, that superstructure elements (historical events), from wars to religious changes, are related to many factors including class struggle is a matter of common sense and there is nothing specifically Marxist about it. Kolakowski argues that Engels aims at explaining away this difficulty by simply stating that it is in the final analysis that the base (the relations of production) determine the superstructure (meaning that the former determine the latter indirectly); however, such a formulation, according to Kolakowski (1978, 364), is still deterministic notwithstanding that it does not explain which factors should be considered as the chief determining ones in each historical era. The fundamental problem with this interpretation is the way Kolakowski considers “objectivity” of laws governing social reality; it recapitulates the view that treats practical materialism of Marx and Engels as a form of empiricist realism that considers “laws” of nature and society as independent from human activity and its specific social form and conflates their independence from individual consciousness with their independence from social reality. The determining role of the “relations of production” is not something that follows immediately from the so-called “material” production in contrast to “non-material” or “ideal” production. Rather, it maintains that both physical and ideal production and products are products of human activity the height of which is labour. The important point is the specific social form these products attain owing to the historically specific form of human activity which is also manifest in forms of organization of production, forms of property relations, and forms of cooperation between members of the society.

Kolakowski (1978, 377) considers Marx’s supposed engagement with theoretical consistency rather than the relation between theory and facts and Engels’ concern with constituting a relationship between the theoretical and the factual as a major point of divergence between their methods. Accordingly, Engels views social sciences as a prolongation of natural sciences (and seeks for same basic methods underlying both). Still,

Kolakowski maintains that Engels does not aim at a mechanical reduction for the sake of such unity but intends to find dialectical laws appropriate for each field of inquiry. It is not clear why seeking a unity between sciences, by itself, should be considered not a praxis-based but a metaphysical doctrine, or not a re-appropriation of philosophical and theoretical tradition but “a doctrinal stereotype which, under the name of dialectical materialism, came to be officially regarded as the ‘Marxist ontology and theory of knowledge’ (Kolakowski 1978, 377). Engels cannot be held responsible for the notorious definitions of dialectical and historical materialism that would be provided in the *Short History*—this does not count a justified criticism. Furthermore, that Engels’ three major works, *Anti-Dühring*, *Ludwig Feuerbach*, and the unfinished *Dialectics of Nature*, “unlike those of Marx, deals with questions *traditionally* regarded as belonging to philosophy” (ibid., emphasis mine) is no evidence of Engels’ divergence from Marx’s and his own earlier practical materialism; it might seem so only if one disregards the whole body of works and polemics that have been proposed by Marx and Engels since 1840s and the consequent theoretical and conceptual advancement in materialist methodology and the sublation of philosophy, political economy and other fields of knowledge; this, in its turn, amounts to a fallacy of equivocation: equating Engels’ epistemological concerns with traditional epistemological questions is as much justified as equating Marx’s theory of value to Ricardo’s and contemporary physics’ notion of atom to that of Democritus.

The disregard for such conceptual transubstantiation in Marx’s and Engels’ activity materialism is also visible in Kolakowski’s treatment of Engels’ approach to the historical confrontation between philosophical materialism and idealism in his *Ludwig Feuerbach*. Accordingly, Engels considers the opposition between these two schools as the central question over which philosophical debates has hitherto turned. “In the last analysis it was, in his opinion, a debate concerning the creation of the world” in which idealists hold on to the idea of precedence of mind over matter and the materialists to the opposite. Kolakowski (1978, 378) then goes to say that not in every historical epoch such confrontation has been the central one: “There have been times, for example the Christian Middle Ages, when civilization knew nothing of materialism in the strict sense.”

However, Engels does not stop at such a substance-materialist stance; materialism, traditionally, has defined itself as a doctrine that defends the priority of material substance; this classical materialism might have formed the basis for the new “dialectical materialism” but Engels’ own version has

the category of praxis at its core. In *Ludwig Feuerbach* Engels (1990, 365) defines the most fundamental question of all philosophy as the relation between thinking and being. (This is a reformulation or recapitulation of Marx's second thesis on Feuerbach regarding the "this-worldliness" or "reality" of thinking.)

Engels argues that the question concerning the relation between thinking and being, which also takes the forms of the question of primacy of mind over matter or vice-versa, or the theological question of creation of the world is rooted "in the *narrow-minded and ignorant notions of savagery*" (1990, 366, *emphases added*). What is worth noting here is that the primary subject of criticism for Engels is not the answers provided by these two camps but the very question of the priority of one substance over another—it is this question, which is responsible for and is a manifestation of all religious and speculative illusions and absurdities.

Engels (1990, 367) further argues that there is another side to or other forms of formulation of this question: Is thinking capable of grasping the reality surrounds us? Can we know reality correctly? In language of (speculative?) philosophy, says Engels, this becomes the question whether thinking and reality are identical, to which the overwhelming majority of philosophers answer affirmatively; yet, the idea of the identity of thinking and reality, proposed idealistically or materialistically, takes substance as its fundamental category. Interestingly, Kolakowski himself admits that in Engels' view "the essential opposition in philosophy between nature and spirit ... expresses a kind of dualism" (Kolakowski 1978, 378) which regards these two categories as separate substances whereas Engels is inclined towards a monistic materialism. Though, such monism, Kolakowski (*ibid.*, 379) contends, is based on "rejecting the belief in any form of being that cannot be called material." In order not to fall back into the pitfall of substantialism, Engels, according to Kolakowski (*ibid.*), "takes a purely scientific or phenomenalist view and dispenses altogether with the category of substance." From this, Kolakowski (*ibid.*) concludes that "materialism as understood by Engels is not an ontology in the usual sense but an anti-philosophical scientism which sees no need to ask questions about 'substance' and is content with the bare facts of natural science" that equates "all philosophy [with] idealism, an imaginative embellishment of scientific knowledge."

These criticisms, however, largely disregard certain central features of Engels' activity materialism. First, Engels holds onto an emergentist view

of reality. For instance, in his critique of Cartesian substantialism and mechanical materialism he states that what the animal was to Descartes, man was to the materialism of eighteenth-century: a machine. Although humans consist of natural parts, of bodies that are at the most basic level material-chemical compounds, human being and human consciousness is irreducible to such particles and their fully mechanical relations—emergence. Thus, such fundamental laws, according to Engels, although at work even in human beings, “are pushed to the background by other, *higher laws*” (Engels 1990, 370, emphasis added).

The absence of an emergentist conceptualization of reality by mechanical materialism is also based on its understanding of nature as a static entity—accordingly, although nature is in perpetual movement, this motion is circular and repetitive; it does not yield higher material orders (Engels 1990, 370). Engels (1990, 371) also criticizes mechanical materialism for simply making itself a (radical?) theory of atheism and thus concludes that Feuerbach was right not to take the responsibility of such a metaphysical stance.

Furthermore, Engels provides two reasons in favour of Feuerbach’s protest against older materialism and his incapability to form his own radical theory: first, the wretched political and social situation in Germany of the time that amounted to his isolation; second, which is truly important, what may be called Feuerbach’s “anti-scientism”:

Feuerbach is quite correct in asserting that exclusively natural-scientific materialism is indeed “the foundation of the edifice of human knowledge, but not the edifice itself.” For we live not only in nature but also in human society, and this also has its evolution and its science no less than nature. It was therefore a question of bringing the science of society, that is, the sum total of the so-called historical and philosophical sciences, into harmony with the materialist foundation, and of reconstructing it thereupon. (Engels 1990, 372)

Clearly, the reason that Engels rejects the category of matter-as-such is because he aims at distancing himself from substance (“somatic”) materialism. Substance materialism, ironic as it may seem, like idealism, in its quest for substance looks for The Fruit, which is allegedly different than actual fruits. It is also not clear at all why one should accept Kolakowski’s account of Engels’ stance as “anti-philosophical phenomenalism/scientism”? The dichotomy between philosophy and scientism is a false one: nothing obliges one to either uncritically endorse philosophy of substance or reject all philosophy as idealism; this is clearly a straw-man argument; Engels’ is an activity materialism; part of his agenda (that he shares with

Marx) is to dissipate this uncritical appropriation of prejudices of history of philosophy. As Kolakowski (1978, 380) himself notices, Engels speaks of philosophy as “both abolished and preserved” and demarcated according to its new content and subject: a science of thoughts and its laws. Still, Kolakowski considers Engels' position as being in line with the positivism of his time, for which “philosophy is a superfluous adjunct to the individual sciences” (1978, 380).

Hence we arrive at the problem of reworking of the concept of praxis as a philosophical category and its possible resolution—the problem is not one of veracity of thinking but the “this-worldliness” of it: this world signifies the world of appearances; the world of social reality; the only world that we know; that is provided by industry and trade. Thus thinking is inevitably this-worldly first and foremost in this sense.

This first sense implies a second sense: thinking is already “true” as it is the thinking of this world; the offspring, the “reflection,” the conceptual reconstruction of this world; so there is no problem of verification of thinking in and against reality. In this sense, Hegel is right, though perversely, in defining the world as a moment of thinking; although he states only half the truth.

Materialistically put, the world is a moment of thinking because thinking is that of this world—hence no exceptional place can be attributed to thought-thinking; because “nature could not be unreasonable” (Engels 1975, 502); hence, no problem of the match, identity, duality etc. of thinking and reality, of theory and practice⁸. Hence follows the eternity, infinity, and essential absoluteness of the true knowledge of nature which is reflected in “an infinite number of finite human minds, working side by side and successively at this infinite knowledge, committing practical and theoretical blunders, setting out from erroneous, one-sided, and false premises, pursuing false, tortuous, and uncertain paths, and often not even finding what is right when they run their noses against it” (Engels 1975, 514).

BY WAY OF CONCLUSION

Engels' position is hardly compatible with any breed of positivism; even Kolakowski admits this although in a covert manner stating that in considering philosophy as an epistemology of general laws of nature, Engels'

8. For a detailed discussion of a particular form of appearance of the problem of this worldliness of thinking and the “match” between the “ideal” and material reality see Azeri 2021.

position is “less anti-philosophical than at first appeared” (Kolakowski 1978, 380). Contrary to Engels, positivism conceives of philosophy uncritically, just as Kolakowski does; it turns philosophy into a parasitic endeavour that feeds on propositions of sciences; and in doing this, it reconstitutes philosophy as a science of sciences. Engels’ point, if followed to its logical ends, is best explained by Ilyenkov and Korovikov in the “Theses on Philosophy,” in formulating the idealist tendency in history of thought as one that proclaims the inadequacy of scientific-theoretical inquiry in reaching the essence of phenomena. “Parasitizing on the historical immaturity and limitedness of knowledge of nature and society, idealism insists on the necessity of paths to knowledge of truth that are different in principle from the scientific-theoretical analysis of the phenomena of nature and society, namely religious or speculative-logical conceptions of the “essential,” of the “universal”” (Ilyenkov 2019, Thesis 6).

Of relevance to this point is the conception of knowledge: knowledge is manipulation of the objective world or the world of objects; it is not a propositional-theoretical bulk in need of application to reality. Once understood in this way, it becomes clear why there is no other knowledge than what the specific sciences produce—knowledge, as tool-mediated and object-oriented activity, by definition, is knowledge of objects and in no need of further “application.” Knowledge “is always of a particular object, for it is impossible to know ‘in general’, without knowing a particular system of phenomena” (Ilyenkov 1974; see also Ilyenkov 2007). It is in this sense that philosophy as science of sciences is impossible because such conception implies that philosophy adds to knowledge-as-manipulation; or it becomes manipulation of the methods of manipulation which is redundant. In the absence of such a materialist conceptualization of knowledge as a form of activity, Engels’ critique of the idea of philosophy as a science of sciences appears as a positivistic demand—an image that has nothing to do with Engels’ materialism and betrays the Kolakowski’s and other “critiques” uncritical appropriation of philosophical prejudices and dogma.

Both the so-called Western and official Marxisms share the view that Engels conceives of dialectics as the study of the most general forms of motion in nature, society, and thought and that his version of materialism is an heir to mechanical materialism and Feuerbach. Emphasis on the centrality of and reworking praxis in Engels’ account of materialism and human being’s metabolic relation to nature is the missing elements in

most of such defences as much in criticisms⁹. Accordingly, “there is an objective dialectic which governs nature and a subjective dialectic which is the *reflection* of the same laws in the human mind” (Kolakowski 1978, 388). Allegedly, Engels contends that human ability to think dialectically is a consequence of our minds obeying the same laws of motion in nature and society. Accordingly, Engels follows the naturalistic doctrines of his time in accepting a psychological view of logic and considering logical laws as “empirical regularities of the functioning of the nervous system” (Kolakowski, 1978, 388). Yet, the relation between human thinking and objective “natural” phenomena does not have to be conceived of as Kolakowski, alongside others, does. There is a match between the so-called dialectic of nature and that of thinking because thought has no independent existence from human beings who act, cognize, perceive, and think. These two dialectics coincide because human thinking is a particular mode of human action; human action is tool-mediated and object-oriented meaning that it conforms to *forms* of objectivity within which human activity is actualized while all objects, even if they are not objects of immediate bodily action (say, galaxies that are hundreds of thousands of light year afar), bear the mark of human activity. Of course, activity in this sense transcends the boundaries of individual’s actions (equating activity with such action is pragmatic); it is social activity or to put it differently, activity with a specific *social form*. In this latter sense dialectic of nature is dialectic of human activity—thinking included—in nature.

Engels confirms the ancient Greek wisdom that nature cannot be unreasonable; the question, however is that what does “reason” refers to? Whose reason is that? Were reason thought of as Objective Reason determining the course of the motions of the things independent of human activity in nature this statement would be, at best, a mere repetition of Hegelian idealism. However, reason is that which comes to the fore in form of concepts, as specific tools—human artefacts—the social significance of which is groping the essence of phenomena. Pertaining to Hegel, Engels

9. For instance, Rees (1994) is at pains to show that there is nothing wrong with the allegations that Engels considers human being a (passive) “product” of nature—because according to Rees, human is a “natural” being and nature is always historical (he gets this from Marx and Engels) but he considers the basis of this unity the “substance,” that is, matter, and in doing so, he, like the “critiques,” retreats to Feuerbachian materialism that is satisfied with a simple conversion of Hegelian identification of human and nature (or thinking and matter) in thought—thus he recapitulates the position of those he intends to criticize.

(1975, 502) states, “The development of a concept, or of a conceptual relation ... in the history of thought, is related to its development in the mind of individual dialectician.” In other words, the emergence of the law of nature is necessarily bound to its emergence, first and foremost, as the law of thinking; thinking in concept is positing “objective” chance as “subjective” necessity. In positing itself as necessity, the law of thinking thus emerges as the concrete universal (general) law of motion, of which concrete singular examples of motion appear as instantiations. As the expression of such (subjective) necessity, “the general law of change of form of motion is much more concrete than any single “concrete” example of it” (Engels, 1975, 502). Dialectical thinking, on the other hand, investigates the nature of concepts themselves, that is, it investigates the historical (phylogenesis and ontogenesis) development of “laws of thinking”—logic. It is in this sense that as the science of laws of human thinking dialectics emerges as the science of general laws of motion. Dialectics is the investigation of laws of the forms of human motion (activity/praxis) in nature; hence it is actualisable only in human activity: “dialectical thought—precisely because it presupposes investigation of the nature of concepts themselves—is only possible for man, and for him only at a comparatively high stage of development” (Engels, 1975, 502).

Contrary to what is implied by several critiques, Engels does not look down on philosophy but on idealism, which at his time, is identical to what philosophy was; but there is more to it: Engels might consider science as an important, even the most important and most successful means for producing knowledge, yet he considers science as a form of human social activity; his conception of knowledge is also different from positivist and also from those critiques who, ironically, adhere to positivist account of knowledge.

Engels’ dialectics of nature, contrary to Lukacs’s and other critiques’ claims, is not formulated as to relate “nature in itself.” As pointed out, it is Lukacs’s account of scientific knowledge and of natural scientific activity, which has been uncritically appropriated by other critiques from Kolakowski to Lichtheim that is positivistic and naturalistic. Contrary to Lukacs’s view of natural sciences that is inspired by scientism and Dilthey’s cultural vs. natural dualism, natural scientific knowledge-production should be considered first and foremost a particular form of labour and thus an interaction between human beings and nature, in which human itself appears as a natural force. As Vygotsky (1997b, 244) aptly put, “This process is determined in the first place by the properties of the nature

which is being transformed and the properties of the natural force which is transforming, i.e., in the present case, by the nature of the psychological phenomena and the epistemic conditions of man.” The coincidence between human being’s mental functions, psychological capacities and laws of thinking and natural processes is a consequence of such interaction.

Disregarding the Marxian conceptual theoretical transubstantiation parallels the mainstream history and philosophy of science’s blindness towards Marx’s criticism of positivism, of scientific activity and history, which goes hand in hand with his critique of political economy and capitalist society (Murray 1988, xiv).

Thinking is a property of matter, this is true but on an indeterminate level; neither Marx nor Engels stops at such a substantialist limit—and this is how they transcend Spinoza’s substantialist monistic materialism. Thinking for Marx and Engels, theoretically speaking, is an emergent form of human activity *in* and its metabolic relation *with* nature.

Matter does not yield thinking immediately: such formulation is a perverse image of an idealism that considers matter an immediate offspring of spirit. Thinking emerges only in activity of living organism and above all in its most sophisticated form in human abstractions which themselves are subject to socio-historical determinations; it is as human thinking that thought becomes capable of comprehending matter and only in conceptual thinking and with the use of conceptual organs¹⁰ and tools that it emerges as a truly objective, material force, an “ideal,” capable of manipulating objective reality and thus positing and actualizing reality socially as much human subjectivity. This latest form coincides with the emergence of capitalism and the consequent large-scale industrial production.¹¹ Engels’ contention that producing certain elements and aspects of reality through production and industry is a proof of correctness of human beings’ conception of natural phenomena (Engels 1990, 367) is an expression of this situation and the emergence of thinking as an independent force. This is in line with Marx’s formulation of the ideality of human being’s productive activity, which Vygotsky (1997a, 68) names the “doubling of experience”: “what distinguishes the worst architect from the best of bees is that the architect builds the cell in his mind before he constructs it in wax. At the end of every labour process, a result emerges which had already been conceived by the worker at the beginning, hence already existed ideally” (Marx

10. For an analysis of concepts and conceptual systems as “conceptual cognitive organs” see Azeri 2013.

11. For further elaboration on this point see Azeri 2016.

1992, 284). The study of reality through concepts as a specific form of activity in nature with the use of tools, involves not only the study of the facts, but also of concepts devised for such analyses. Thus, Lukacs is mistaken in his contention that “scientific experiment is contemplation at its purest,” a claim he bases on the alleged fact that “The experimenter creates an artificial, abstract milieu in order to be able to observe undisturbed the untrammelled workings of the laws under examination, eliminating all irrational factors both of the subject and the object” (Lukacs 1971, 132) because in utilizing concepts, as in utilizing any tools, we involve a study and mastery of concepts and tools as much the study and manipulation of the object of knowledge. As Vygotsky states, “Already in the very first stage of the scientific processing of empirical material *the use of a concept is a critique of the concept by the facts*, the comparison of concepts, their modification” (1997b, 251, emphases added). Once conceived of it this way the interdependence of matter and thinking, of concept and reality is properly understood and Kant’s thing-in-itself is dissipated as thinking emerges not only as a necessary consequence of matter but as much a condition for its existence (Ilyenkov 2017, 190).

REFERENCES

- Avineri, Shlomo. 1968. *The Social and Political Thought of Karl Marx*. Cambridge: Cambridge University Press.
- Azeri, Siyaveş. 2013. “Conceptual Cognitive Organs: Toward an Historical-Materialist Theory of scientific Knowledge.” *Philosophia: Philosophical Quarterly of Israel* 41(4): 1095–1123.
- . 2016. “Value and Production of Knowledge: How Science is Subsumed to Capital.” *Critique: Journal of Socialist Theory* 44(1–2): 103–128.
- . 2017. “Class Politics as the Unity of Theory and Practice and the Criticism of Epistemology.” *Revista Theomai* 35(1): 72–85.
- . 2019. “Activity, Labour, and Praxis: An Outline for a Critique of Epistemology.” *Critique: Journal of Socialist Theory* 47(4): 585–602.
- . 2020. “Evald Ilyenkov’s Marxian Critique of Epistemology and Education.” *Science & Society* 84(3): 342–368.
- . 2021. “The Match of ‘Ideals’: The Historical Necessity of the Interconnection Between Mathematics and Physical Sciences.” *Social Epistemology* 35(1): 20–36.
- Engels, Frederick. 1975. “Dialectics of Nature.” In *Marx and Engels Collected Works*, Vol. 27. 311–588. Moscow: Progress Publishers.
- . 1988. “On Authority.” In *Marx and Engels Collected Works*, Vol. 23. 422–425. Moscow: Progress Publishers.
- . 1990. “Ludwig Feuerbach and the End of German Classical Philosophy.” In *Marx and Engels Collected Works*, Vol. 26. 355–398. Moscow: Progress Publishers.
- Ilyenkov, Evald V. 1974. “Activity and Knowledge.” *Marxists Internet Archive*. Translated by Peter Moxhay, transcribed by Nate Schmolze.
<https://www.marxists.org/archive/ilyenkov/works/activity/index.html>

- . 2007. "A Contribution on the Question of the Concept of "Activity" and Its Significance for Pedagogy." *Journal of Russian and East European Psychology* 45(4): 69–74.
- . 2017. "Cosmology of Spirit." *Stasis* 5(2): 164–190.
- Ilyenkov, Evald V., and Valentin Korovikov. 1954. "Theses on the Question of the Interconnection of Philosophy and Knowledge of Nature and Society in the Process of their Historical Development." *Marxists Internet Archive*. Translated by David Bakhurst, transcribed by Andy Blunden.
<https://www.marxists.org/archive/ilyenkov/works/articles/Theses.pdf>
- Kangal, Kaan. 2020. *Friedrich Engels and the Dialectics of Nature*. Palgrave Macmillan.
<https://doi.org/10.1007/978-3-030-34335-4>
- Kolakowski, Leszek. 1978. *Main Currents of Marxism*. Translated by P. S. Falla. Oxford: Oxford University Press.
- Lichtheim, George. 1961. *Marxism*. New York: Frederick A. Praeger.
- Lukacs, Georg. 1971. *History and Class Consciousness*. Translated by R. Livingstone. Cambridge, MA: MIT Press.
- Maidansky, Andrey. 2016. "Reality as Activity: The Concept of Praxis in Soviet Philosophy." In *The Practical Essence of Man: The 'Activity Approach' in Late Soviet Philosophy*, edited by A. Maidansky & V. Oittinen, 42–57. Leiden & Boston: Brill.
- Marx, Karl. 1975. "Economic and Philosophic Manuscripts of 1844." In *Marx and Engels Collected Works*, Vol. 3. 229–346. Moscow: Progress Publishers,
- . 1992. *Capital: A Critique of Political Economy, Vol. 1*. Translated by B. Fowkes. New York: Penguin Books.
- Marx, Karl, and Frederick Engels. 1976a. "Manifesto of the Communist Party." In *Marx and Engels Collected Works*, Vol. 6. 477–519. Moscow: Progress Publishers.
- . 1976b. "The German Ideology." In *Marx Engels Collected Works (MECW)* Vol. 5, 19–452. Moscow: Progress Publishers.
- Murray, Patrick. 1988. *Marx's Theory of Scientific Knowledge*. Atlantic Highlands: Humanities Press International.
- Oittinen, Vesa. 2016. "Praxis' as the Criterion of Truth? The Aporias of Soviet Marxism and the Activity Approach." In *The Practical Essence of Man: The 'Activity Approach' in Late Soviet Philosophy*, edited by A. Maidansky and V. Oittinen, 29–41. Leiden & Boston: Brill.
- Piedra Arencibia, Rogney. 2021. "Ilyenkov's Dialectics of the Ideal and Engels' Dialectics of Nature." *Historical Materialism* (published online ahead of print 2021).
<https://doi.org/10.1163/1569206X-12342048>
- Rees, John. 1994. "Engels' Marxism." *Marxists Internet Archive*.
<https://www.marxists.org/history/etol/writers/rees-j/1994/xx/engels.html>
- Schmidt, Alfred. 1971. *The Concept of Nature in Marx*. Translated by B. Fowkes. London: NLB.
- Vygotsky, L. S. 1997a. "Consciousness as a Problem for the Psychology of Behavior." In *The Collected Works of L. S. Vygotsky* Vol. 3. translated by R. Van Der Veer, 63–79. New York: Springer.
- . 1997b. *The Historical Meaning of the Crisis in Psychology: A Methodological Investigation*. In *The Collected Works of L. S. Vygotsky* Vol. 3. translated by R. Van Der Veer, 233–343. New York: Springer.

Origin of Engels' *The Origin*: A Reappraisal in the Light of *The Ethnological Notebooks of Marx*

Melda Yaman

ABSTRACT: Engels had based his *The Origin of the Family, Private Property, and the State* on Marx's ethnological notebooks. In this paper, I want to place the roots of Engels' book in Marx's notes and reveal the various contributions of Marx to it. Marx's notebooks provided both the motivation and the initial source material, and Engels' life-long cooperation with him also contributed to this work. However, there are some significant divergences between Engels' work and that of Marx. I will focus only on the differences related to the rise of the patriarchal family. Marx's notebooks on ethnology are published under the title *The Ethnological Notebooks of Karl Marx*. Since it is much less known compared to Engels' book, I also would like to highlight it in the paper.

KEYWORDS: Engels, Marx, ethnological notebooks, patriarchy, socialist feminism.

INTRODUCTION

After more than one hundred years of its first publication, Friedrich Engels' *The Origin of the Family, Private Property and the State* (*The Origin*, hereafter) is still relevant for Marxists and socialist feminists.

Engels had based his book on *Ancient Society*, a classical work published in 1876 by the American ethnologist Lewis H. Morgan. He had been acquainted with this book via Karl Marx's notebook on the subject. After Marx's death, while working on the manuscripts he left behind, these notes aroused Engels' interest; making use of them, he began to write *The Origin* to fulfil the bequest of Marx. Engels concluded:

My work can offer but a meagre substitute for that which my departed friend was not destined to accomplish. However, I have before me, in his extensive extracts from Morgan, critical notes, which I reproduce here as far as they refer to the subject in any way. (Engels 2010a, 131)

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Engels completed his book in two months and published it in 1884. However, it took 89 years for the publication of Marx's ethnological notebooks, including the one on Morgan, until Lawrence Krader transcribed and published them with the title *The Ethnological Notebooks of Karl Marx*. Marx's notebooks on ethnology are among the most important of his unpublished works and consist of excerpts and commentaries compiled between 1879 and 1882.

The Origin and the *Ethnological Notebooks* originate from the same source. Krader (1973a, 238) notes, "Its [*The Origin*'s] genesis is closely related to the *Ethnological Notebooks of Karl Marx* upon the identical source work". Marx's influence on *The Origin* is probably much deeper than that, as is seen throughout Krader's Introduction to Marx's work. In this paper, I want to underline this connection and, carrying Krader's idea a little further, try to reveal the various contributions of Marx to Engels' *The Origin*. First, Marx's notebook provided both the motivation and the initial source material for *The Origin*. Second, Engels' life—long cooperation with Marx also contributed to this work. Engels had already discussed with Marx some of the arguments he would later develop in *The Origin*. For example, in one of his letters to Marx, we come across one of the principal claims of *The Origin*: The social status of women is determined by their contribution to social production. More importantly, the methodology Engels offers in *The Origin* depends on *The German Ideology*, co-written by Marx and Engels decades ago. In the Preface to *The Origin*, Engels (2010a, 131) suggests a "new" perspective to examine social production as a whole, since according to the materialistic conception, the determining factor in history is, in the final instance, the production and reproduction of the immediate necessities of life. Here he takes reproduction as important as production—a conception that is a reformulation of the much earlier one in *The German Ideology*. Doing so, he provides a ground for social reproduction theory, a recent socialist feminist approach that combines production and reproduction.

Placing the roots of *The Origin* in Marx's notes is the first point I want to posit in this paper. To illustrate Marx's contribution, I will review the process of Engels' writing of *The Origin*, which has so far been described only partially (Rosemont 1989; Ward Gailey 2003; Cohen et al. 2010b). In this way, I will have the opportunity to investigate the development of some of Engels' arguments, early forms of which can be found in their joint work or correspondence.

However, there are some significant divergences between Engels' work and that of Marx. I will focus only on the differences related to the rise of the patriarchal family. Researchers have referred to the various issues on which they differ. Some highlight the differences in their attitude to Morgan and claim that Marx was more sceptical and less impressed with his conclusions (Krader 1973a; 1974). Some point to their methodological differences and argue that while Marx's notebooks depend on a dialectical perspective, Engels was less dialectical (Krader 1974, 82; Fluehr-Lobban 1979; Dunayevskaya 1991, 177–78; Levine 1973, 26). Besides, according to some scholars, Marx had a multi-linear approach, but Engels had a unilateral one (Krader 1973a; Anderson 2002, 90). Here, I will focus only on the differences related to the rise of the patriarchal family. In the third part of this paper, I will briefly discuss Engels' famous contention about the "world-historic defeat of the female sex."

Engels claims women have always been oppressed since the transition from the matriarchal family to the patriarchal one, that is, since their "world-historic defeat", because of the establishment of private property. Since Engels' *The Origin*, Marxists have generally accepted that patriarchy, or male domination, has emerged with the rise of private property within class society. Although it is an important achievement for Engels to point out as early as 1884 that the oppression of women is not a natural but historical phenomenon, later developments in anthropology have not supported his assertion of an early matriarchal phase in human history (Gough 1971, 761; Leacock 1974, 21; Fluehr-Lobban 1979, 343). Besides, Engels' claims have been criticized by several studies. First, many scholars state that most of Engels' claims were challenged by the developments in anthropology (see Stern 1948; Gough 1971; Fluehr-Lobban 1979; Aaby 1977). Many researchers question the concentration of private property in the hands of men and argue against Engels' explanation of the transition to patriarchal family with men's desire to pass their wealth to their children (Humphries 2009; Trat 1998; Weikart 1994). Most of these critiques, especially written from a feminist viewpoint, do not refer to the connection between *The Origin* and Marx's notebook.¹ Yet Engels' thesis about the transition to patriarchal family creates one of the boldest differences between the two works. Engels explains the emergence of the patriarchal family with private property, while Marx extends the roots of patriarchy to

1. See, e.g., articles on *The Origin* in the book edited by J. Sayers, M. Evans and N. Redclift in 1987. However, in a recent article, Frigga Haug (2015) mentions Marx's work.

communal ownership characteristic of primitive societies. I will refer to the *Ethnological Notebooks* to show how Engels' approach differs from that of Marx on the so-called "world-historic defeat of women". This may provide us with an idea of the difference between the general perspectives of Marx and Engels in their own works—i.e., the *Ethnological Notebooks* and *The Origin*. More importantly, it can shed new light on the debate on the origin of patriarchy, one of the most important topics of socialist feminist theory.

The Ethnological Notebooks is evidently much less known compared to Engels' *The Origin*. Therefore, in the second part, I will try to expand on Marx's *Notebooks*. It is indeed an unfinished work; however, it contains the substance of Marx's late writings and suggests that Marx was preparing for a new project. As many scholars state, in his later years, Marx turned to his earlier ideas, especially on the male-female relations and the family, and evaluated the transformations taking place in social organizations with their effects on women (Rosemont 1989; Dunayevskaya 1991, 190; Chattopadhyay 1999, 68; Anderson 2002, 90). It opens a new way of analyzing societies—not only pre-capitalist societies but also present bourgeois and the future ones—from a broader perspective to consider the family and sexuality, that is, a point of view that suggests including gender alongside class. Likewise, it can provide new vistas for socialist feminists to explain the sources of the oppression of women and for the possibilities of women's emancipation.

THE MAKING OF ENGELS' *THE ORIGIN*: THE "CONTRIBUTION" OF MARX

Engels began to write *The Origin* just after he discovered the ethnological notebooks of Marx. Having seen the one on Morgan, he thought that Marx had intended to write a book on *Ancient Society*, and then decided to carry out this work by himself. However, in fact, we do not know Marx's exact intentions about this study.

Engels also made use of the broad knowledge on the history of Rome, Ireland, and the Ancient Germans compiled in his own studies such as *Anti-Dühring* and his early writings with Marx—*The Holy Family*, *The German Ideology*, and the *Communist Manifesto*. His earlier works (both his own works and those written collaboratively with Marx) also signify that Engels was interested in gender issues all his life. For example, in the *Anti-Dühring*, published in 1878, Engels included some comments on women,

the family, and the reproduction of the working class, which generally recapitulate his own and Marx's earlier analyses and positions and approve of Fourier's critique of the relations between the sexes and of women's position in capitalist society. He referred to primitive and ancient communities and mentioned common ownership of the land as the origin of private property. Their conversations and debates in his correspondence with Marx also seem to have contributed to his erudition hence to the writing of *The Origin*.

Besides, his methodological perspective of combining production with reproduction reflects an earlier conception from the *German Ideology*.

Marx's Notebook on Morgan

After Marx's death, in "rummaging through" Marx's manuscripts, Engels found a notebook consisting of a detailed 98-page summary of Morgan's *Ancient Society*.² Engels might not have known about Marx's study on Morgan when he discovered this notebook. However, a few months after Marx's death, he remembered Marx had recommended *Ancient Society* to him: "Marx mentioned it, but my head was full of other things at the time, and he never referred to it again, which was, no doubt agreeable to him wishing as he did to introduce the book to the Germans himself" (letter to Kautsky, 16 February 1884) (Marx and Engels 2010f, 102).³ Here Engels attributed Marx's failure to mention Morgan's book again to his planning of a study himself on it on his own. In the Introduction to *The Origin*, Engels repeats his idea that Marx was planning to write a book on *Ancient Society*:

It was no less a person than Karl Marx who had planned to present the results of Morgan's researches in connection with the conclusions arrived at by his own—within certain limits I might say our own—materialist investigation of history and only thus to make clear their whole significance. (Engels 2010a, 131)

In the meantime, Marx's detailed notes on Morgan aroused Engels' excitement, and he decided to study the subject by himself. At first, he thought to write a feuilleton for *Sozialdemokrat* or the *Neue Zeit* from Marx's

2. Note that a single page of Marx's very minuscule handwriting is the equivalent of a minimum of 2,2 pages of print, as David Ryazanov, the founder of the Marx-Engels archive in Soviet Russia, explained (see Dunayevskaya 1991, 177–78).

3. When he first saw the notebook, Engels thought Marx was planning to write a book on Morgan's work; this could easily be seen "from his very exhaustive extracts", he wrote. It indeed contains the most detailed excerpts among the ethnological notebooks of Marx. The editors of the *Collected Works*, for example, write that Marx had himself planned to write on the subject (Cohen et al. 2010b, xx).

notes, but gave up the idea because of lack of time (letter to Kautsky on 16 February 1884). He was writing to Kautsky about it excitedly even though he did not have the book yet:⁴

There is a definitive book—as definitive as Darwin’s was in the case of biology—on the primitive state of society [...] Morgan enables us to present entirely new aspects by providing us, in the shape of prehistory, with a factual basis we have hitherto lacked. (Marx and Engels 2010f, 103)

A few years later, in 1888, enthusiastic with Morgan’s discovery of the gens, he would add a footnote to the opening sentence of *Communist Manifesto*: “The history of all hitherto existing society is the history of class struggles.” Here Engels wrote, “That is, all written history.”⁵ He mentioned several contemporary works on ethnology, including *Ancient Society*:

[...] the inner organisation of this primitive communistic society was laid bare, in its typical form, by Lewis Henry Morgan’s (1818–1861) crowning discovery of the true nature of the gens and its relation to the tribe. With the dissolution of the primeval communities, society begins to be differentiated into separate and finally antagonistic classes. I have attempted to retrace this dissolution in *The Origin of the Family, Private Property, and the State*. (Marx and Engels 2010c, 482)

In a word, Engels was so impressed by Marx’s notes—and by Morgan’s work—that he consequently decided to carry out the “project” of Marx by himself as the fulfilment of Marx’s will, as he wrote in the Preface to the first edition of *The Origin*: “The following chapters are, in a sense, the fulfilment of a behest” (Engels 2010a, 131).

Engels, then, planned to examine Morgan’s book from a historical materialist perspective, just as Marx might have once thought of doing. However, he had not read the book by that time and could not find a copy of it either; he had only Marx’s excerpts. These notes became the first and

4. Engels wrote in the Preface to fourth edition of *The Origin* in 1891, Morgan rediscovery of mother-right gens has “the same significance for the history of primitive society as Darwin’s theory of evolution has for biology, and Marx’s theory of surplus value for political economy” (Engels 2010b, 212). These words echo Engels’ comments on Morgan in his letter to Kautsky; but they also equate Morgan’s contribution to anthropology not only with Darwin’s contribution to biology but also with Marx’s contribution to political economy.

5. This addition of Engels has been severely criticized by some writers. According to Krader, for instance, Engels’s note withdraws the attention from the opening declaration and, by implication, from the entire *Manifesto* as a manifesto, as a declaration of class war, as an act of the Communist Party toward its end (Krader 1973a, 231). According to Dunayevskaya (1991, 196), Engels thereby modified the dialectical structure of Marx’s historic call to revolution.

sole source material of his work until he got a copy of Morgan's book. Eventually, setting his "responsibility" of editing and publishing the two volumes (II, III) of *Capital* aside, Engels started to work intensively on these notebooks by the end of February 1884. He prepared a synopsis of a book of his own, which at first bore the title *Entstehung der Familien* (*The Formation of the Family*) in March. He was so immersed in the work that he could not help but read his synopsis to Bernstein, who visited him at the end of February-beginning of March 1884:

When I had arrived in London, he [Engels] read to me, night after night, until the small hours in the morning, passage from Marx's manuscripts, and the synopsis of a book with which he connected Marx's excerpts from the American writer Lewis Morgan's *Ancient Society*. (Bernstein 1921, 168)

At last, as he wrote in his letter to Kautsky on March 24, he found a second-hand copy of *The Ancient Society* at the end of March. Having Marx's notes, his own synopsis, and Morgan's book as well as a background of wide erudition, Engels began writing his book in March 1884, exactly one year after Marx's death, and completed his "pamphlet" within two months, at the end of May, as he wrote to Laura Lafargue on the 26th. A few days later, in a letter to August Bebel (6 June 1884), he mentioned that his book "on the origin of the family, property, and the state" is about to appear—it would be published in October 1884 (Marx and Engels 2010f, 151).⁶

Several years later, in another letter to Laura Lafargue on 13 June 1891, he admitted that he had not read the whole literature on the subject while he was writing his book. He would have to do this during the research for the fourth edition:

I had to read the whole literature on the subject (which *entre nous* I had not done when I wrote the book with a cheek worthy of my younger days) and to my great astonishment I find that I had guessed the contents of all these unread books pretty correctly—a good deal better luck than I had deserved. (Marx and Engels 2010g, 202)

The Collaboration of Marx and Engels

Marx and Engels had dealt with societies from a historical materialist perspective with anthropological implications since their first collaborative work, *The Holy Family*, which they had written after they first met in Paris at the end of August 1844. In this work, each of them wrote a separate

6. For the other letters mentioned in this paragraph, see this volume.

part, but they both stressed that people make their history themselves. They developed this idea further in *The German Ideology*. In this co-written but unpublished work, they looked at societies from a broader perspective, both historically and theoretically.⁷ Lise Vogel (2013, 78) points out that *The German Ideology* marks a turning point in the development of Marx and Engels's work. It also contains their first comprehensive formulation of a theory and history of the family. They posited the idea of different forms of property in human history—tribal, old communal and state, and feudal—, each corresponding to a specific stage of development in the division of labor (Marx and Engels 2010b, 32), and they studied development of the private property.

Primitive communal forms and the transition to private property, core issues of *The Origin*, were frequently recurring topics in their works. They wanted to understand the transition to class societies and draw lessons from primitive communal societies for communism in the future. In an 1868 (25 March) letter from Marx to Engels, we find the germ of this perspective of both *The Ethnological Notebooks* and *The Origin*. While mentioning his latest readings on primitive ages and the later developments, Marx points to the newest within the oldest—to the germ of a socialist tendency in primitive communal societies. He emphasizes that it is necessary to look at primitive societies—“this corresponds to the socialist tendency,” “though these learned men [Maurer and Grimm]⁸ have no idea they [the primitive societies] are connected with it [the socialist tendency]. And they are then surprised to find *what is newest in what is oldest*” (Marx and Engels 2010d, 557–559). After a decade, Morgan would provide what Marx criticized in Maurer and Grimm: [In a higher plane of society] it will be a revival, in a higher form, of the liberty, equality, and fraternity of the ancient gentes [communal forms]. Marx cited Morgan's words and was

7. Actually, Marxist researchers generally think that Marx and Engels developed “historical materialism” in this work. Ryazanov, for example, described it in his Introduction to the “I. Feuerbach” section of *The German Ideology* as “the earliest account of the materialistic conception of history” (Carver and Blank 2014, 19). According to editors of Marx and Engels' *Collected Works*, “it was in *The German Ideology* that the materialist conception of history, historical materialism, was first formulated as an integral theory” (Cohen et. al. 2010a, xiii). To August Cornu, it marks the break point for the “formation of historical materialism” by Marx and Engels (Krader 1973a, 240). However, Krader (ibid.) claims, according to Marx, the materialist factor, or the material relations, were already set forth by him in 1843–44, in the critical revision of Hegel's *Philosophy of Right*.

8. Georg Ludwig von Maurer was a historian, writing on the constitution of the German Mark; Jacob Ludwig Carl Grimm was a philologist, author of a historical grammar of the German language and of folklore adaptations.

indeed entranced by his claim that ancient gens such as the Iroquois contained the communal nucleus to be reproduced at a higher form of the future society. Marx took Morgan's work on the matrilineal clan as confirmation that an early form of communism (Knight 2018, 68). As for Engels, he, too, quoted these words by Morgan in the conclusion of his *The Origin*.

Moreover, we see some essential arguments related to the transition to private property, similar to those in *The Origin* in their correspondence. In a letter to Marx, just a few months before his death (8 December 1882), Engels compared Tacitus' Germans and the American "Redskins" in terms of their modes of social organizations. He pointed out that, although the modes of production of these two societies were much different—the American Indians had only fishermen and hunters, while the Germans had migratory stockbreeding with crop farming—they both showed that "the method of production is less crucial than is the degree to which old blood ties and the ancient mutual community of the sexes within the tribe are being dissolved" (Marx and Engels 2010e, 394–395).⁹ In this letter, we come across the initial form of one of Engels' ideas introduced in *The Origin*: at earlier stages of the development of labor and the more limited amount of its products, the social order appears to be dominated by ties of kinship (Engels 2010a, 132).

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In *The Origin*, Engels used the transition to private property to explain the emergence of the monogamous patriarchal family—male domination—, which I will investigate a bit more in detail in the last chapter. However, two points are worth mentioning here. First, one of the central topics of *The Origin*, the oppression of women, the so-called "querelle des femmes" at that time, was another problem they dealt with in their early writings.

9. Engels explained he had made excerpts from the first volume of "your [Marx's] Bancroft" and added that Tlingits (a group of Indian tribes inhabiting south-eastern Alaska) seemed the counterpart of the Germans – "probably even to a greater extent than your Iroquois". This letter also points out two other things about their collaboration in ethnological studies: First, it was Marx who had introduced Hubert H. Bancroft to Engels. In 1882, Marx had asked Engels to make excerpts from his book. Second, since Engels is familiar with "his" Iroquois people, Marx probably had mentioned them earlier. However, we do not know whether they discussed about them or not. Still, what is important is that Engels had drawn on the discussions with Marx in their correspondence in developing his own theory.

They had mentioned many times the temporality of family and the subordinate position of women in it.¹⁰ In *The German Ideology*, for example, they took the family as a product of the social division of labor and placed the origin of the latter in the “natural” division of labor in the family. They saw in the family the germ of all inequalities as well as the germ of private property:

[...] the distribution, and indeed the unequal distribution, both quantitative and qualitative, of labour and its products, hence property, the nucleus, the first form of which lies in the family, where wife and children are the slaves of the husband. This latent slavery in the family, though still very crude, is the first form of property, but even at this stage it corresponds perfectly to the definition of modern economists, who call it the power of disposing of the labor-power of others. (Marx and Engels 2010b, 46)

Referring to *The German Ideology*, Engels wrote in *The Origin*, “In an old unpublished manuscript, the work of Marx and myself in 1846, I find the following: ‘The first division of labor is that between man and woman for child breeding’”; then continued:

And today, I can add: The first class antithesis which appears in history coincides with the development of the antagonism between man and woman in monogamian marriage, and the first class oppression with that of the female sex by the male. (Engels 2010a, 173)

Second, we find in his letter to Marx (8 December 1882) one of his basic arguments in *The Origin*, which provides a ground for the claim of the world-historic defeat of women: Women’s social status is determined by their contribution to social production.¹¹ In the letter, referring to the

10. Marx and Engels discussed both the social inferior status of women and the oppressive character of marital relations in ancient and primitive societies also in their correspondence. For example, in a letter to Engels (11 May 1870), Marx cited his notes gathered from several works related to gender issues in Celts, including the weakness of the marriage bond, voting rights for women as well as “precepts on ascertaining virginity” (Marx and Engels 2010d, 515). These issues of the virginity/chastity of women seem to have preoccupied both of them quite a bit. A few months later, on 6 July 1870, Engels similarly made quotations about the provisions of the old Welsh laws (Ancient Laws and Institutes of Wales, volumes I-II) concerning the virginity of the bride (ibid., 531). He mentioned the subject several times in *The Origin* too. For instance, he compared Germans with Celts and pointed out that strict chastity was required of the girls in the whole community (Engels 2010a, 240).

11. The very same letter contains also the earlier presentation of another emphasis, *jus primae noctis*, in *The Origin* claiming that “In the case of [...] an official person -the chief of the tribe or of the gens, the cacique, shaman, priest, prince or whatever his title- [...] exercises the right of the first night with the bride. [...] this *jus primae noctis* persists to this day as a relic of group marriage among most of the natives of the Alaska territory”. According to Engels,

Tlingits, he wrote, “Another puzzle which is solved here is how placing the main burden of work on women is perfectly compatible with great respect for those women” (Marx and Engels 2010e, 395). In *The Origin*, Engels posited a similar argument in the discussion on the transition to private property. He argued that, under the conditions of communal property, women’s household work had equal social significance with men’s production outside:

In the old communistic household, which embraced numerous couples and their children, the administration of the household, entrusted to the women, was just as much a public, a socially necessary industry as the procurement of food by the men. (Engels 2010a, 181)

However, with the overthrow of the mother-right by private property, exclusive supremacy of men was established, and women were excluded from social production: Women became the slave of men’s lust¹²—that is the world—historic defeat of the female sex:

This situation changed with the patriarchal family, and even more with the monogamian individual family. The administration of the household lost its public character. It was no longer the concern of society. It became a private service. The wife became the first domestic servant, pushed out of participation in social production. (Engels 2010a, 181)

According to Engels, the emancipation of women is impossible as long as women are excluded from social production and remain restricted to private domestic duties (ibid., 262). Following Marx, he wrote that the emancipation of women would only be possible when they could take part

despite the widespread transition from group marriage to pairing, the latter is compatible with only women; men, “they have never—not even to the present day—dreamed of renouncing the pleasures of actual group marriage” as the *jus prime noctis* shows. He continues: “Only after the transition to pairing marriage had been effected by the women could the men introduce strict monogamy—for the women only, of course” (Engels 2010a, 161–162). We read in the letter (Engels to Marx on 8 December 1882) a very similar interpretation: “I have found confirmation of my assumption that the *jus prime noctis* originally found in Europe among the Celts and Slavs, is a survival of the ancient sexual community” (Marx and Engels 2010e, 395).

12. According to Peter Aaby (1977, 36), the “new” male/female relationship Engels describes is more than just political subordination, economic exploitation, or inferior social status; it is the “reification” of women. Claiming to stand Engels on his head, he argues that the reification of women cannot be explained by private property and the state, but on the contrary, is a necessary condition for the emergence of these social phenomena.

in production on a large scale. Marx writes in *Capital* that insofar as machinery dispenses with muscular power, it becomes possible for women—and children—to be drawn to wage work (Marx 2010a, 398). Engels wrote:

The emancipation of women becomes possible only when women are enabled to take part in production on a large, social scale [...] And this has become possible only as a result of modern large-scale industry, which not only permits of the participation of women in production in large numbers, but actually calls for it. (Engels 2010b, 262)

This is one of Engels' (and Marx's) most controversial views and challenged by findings of women's contribution to subsistence production in pre-capitalist and non-capitalist societies. They reveal that since hunter-gatherers, women had taken part in production processes in several ways. First, in primitive societies, the distinction Engels made between a public sphere—men's work—and a private sphere—women's household service—did not exist (Leacock 1974; see also Luxton 2006, 25).¹³ Furthermore, several scholars such as Eleanor Leacock (1978, 27), Peter Aaby (1977), Carolyn Fluehr-Lobban (1979), and Moira Maconachie (2009) underline women's contribution to food provision in primitive societies. D. N. and G. K. (1989) give several examples of primitive societies, in which women take part in hunting. Leacock (1978, 252) points out women make an essential economic contribution in every society, but, according to her, their status depends on whether they control the conditions of their work and the distribution of the goods they produce. Again, many researchers such as Joan W. Scott (2005, 378) shows that women have worked as domestic workers, as farm laborers, and as apprentices and clerks, long before the factory work. Another problem in Engels' claim is that it has been impossible to explain the breadth and depth of the sexual division of labor by reference to different physical capabilities, for it is well known that women's work historically has been as laborious as that of men (see Humphries 2009, 26). Regarding this problem, Juliet Mitchell (1990, 47) points out that Engels therefore gives women's physiological weakness as a primary cause of women's oppression. As a result, it escaped Engels that women's labor contributes to social production and reproduction and is not limited to the domestic sphere.¹⁴

13. Luxton also criticizes Engels for his analysis ignored issues of race and racism.

14. Another problem of Engels' claim is related to the participation of women in social production in socialist societies. Feminist scholars, referring to women's situation in the ex-socialist countries, point to the continuation of patriarchal relations and the double workload of women (see, e.g. Eisenstein 1979; Hatrmann 1981; Walby 1989).

Further, the initial connection between production and reproduction found in Engels became blurred with the assumption that the transformation of productive structures would automatically erase women's oppression (Beneria and Sen 1981, 294). As Cinzia Arruzza (2013, 87) points out, Engels' optimism over how women's joining the labor force would be the key to their emancipation has been disproved by reality itself.

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As we saw, we find roots of central claims of *The Origin* in the earlier works and correspondence of Marx and Engels. More importantly, we find in *The German Ideology* the initial form of Engels' new perspective in *The Origin*. Marx and Engels had accepted that people produced themselves by their labor since the dawn of human societies. They had developed this conception in their early writings, such as Marx's *1844 Notebooks* or their *Holy Family*. Engels repeated this thesis but with a different emphasis in the Introduction to *The Origin*:

According to the materialist conception, the determining factor in history is, in the last resort, the production and reproduction of immediate life. But this itself is again of a twofold character. On the one hand, the production of the means of subsistence, of food, clothing and shelter and the implements required for this; on the other, the production of human beings themselves, the propagation of the species. (Engels 2010a, 1131–1132)

The first form of Engels' methodological stance is present in *The German Ideology*. There, Marx and Engels considered the production and reproduction of human beings, the woman-man relationship, and the family as one of the three essential aspects of social activity. They ascribed to the family a more independent role and placed it alongside production as a determining moment in history. In other words, they suggested analyzing society as a whole, including the relation between man and woman and the production of human beings alongside the production of material life and means of production. In the first section, "Feuerbach", they wrote:

The third circumstance, which, from the very outset, enters into historical development, is that men, who daily re-create their own life, begin to make other men, to propagate their kind: the relation between man and woman, parents and children, the family. (Marx and Engels 2010b, 42–43)

Some Marxist researchers claim that the first section of that chapter belongs to Marx. Ryazanov, for example, in his introduction to the "on Feuerbach", assigned the first section, entitled "Ideology in General,

German Ideology in Particular”, to Marx (Krader 1973a, 236) and claimed that the rest of the chapter was written solely by Engels (Carver and Blank 2014, 21). Krader, however, pointed out that Marx’s characteristic phrasing is not confined to the first section but rather is evident in the rest of the chapter as well (Krader 1973a, 236). He suggested considering the entire chapter as basically the work of Marx. If one follows Krader, she has to admit the above quotation comes from Marx. That is, it was Marx alone who had considered the production of human beings as one of the essential three aspects. What Engels developed in *The Origin* was actually just the resurrection of Marx’s earlier conception. However, if one stands on Ryazanov’s side, Engels must have written this section alone. We are not sure whether it was only Marx, or Engels, or both who developed this perspective. Nevertheless, it is a product of their collaboration, and they both had approved the text—at least none of them crossed out this part.

In *The Origin*, Engels turned to this conception and went a step further by merging the first two aspects of social activity they posed in *The German Ideology* into one. Now we have “the production of the means of existence [...] and of the tools necessary for that production” on the one hand and “the production of human beings themselves, the propagation of the species” on the other—production and reproduction. He explained what is meant by the “production and reproduction of the immediate life”.

Engels offers a theoretical and methodological guideline for the investigation of the origins of women’s oppression by establishing a relation between the spheres of production and the reproduction. This methodological approach provided socialist feminists a ground to develop social reproduction theory.¹⁵ Thereby, patriarchal domination was distinguished from capitalist domination (Burris 1982, 60).¹⁶ Yet, some scholars, for example, Vogel (2013), Martha Gimenez (2009), and Paul Blackledge (2018) criticize Engels since his conception legitimizes the dual-system theories. Rather, they support the idea that there is only one system, relations of production, which also determines reproduction. On the contrary, socialist feminists praise what they lament but criticize him for not giving sufficient weight to reproduction. Frigga Haug (2015, 48), for example, appreciates

15. Social reproduction involves fundamental social processes and institutions through which people and society are reproduced. It has three dimensions: (a) Biological reproduction of the species, (b) Reproduction of the labor force, and (c) Reproduction of provisioning and caring needs.

16. That is, while laborers related to production are under capitalist exploitation, (female) laborers related to reproduction would essentially be under male domination.

Engels for he named both spheres as “production” and thereby established the starting point for a theory of gender relations. Jane Humphries (2009) praises Engels for his view that activities related to reproduction are analytically equivalent to those related to production, but criticizes him for subsuming reproduction under production. Heidi Hartmann (1981), in her classical critique of Engels, argues against the claim that reproduction is dependent on production and the contradiction between men and women has to be subsumed under the class struggle. She suggests explaining the sources and dynamics of the oppression of women by the interaction between capitalism and patriarchy (ibid.).

Although his methodological contribution opens new horizons, Engels' approach still suffers from various shortcomings. One of the most important problems is that his conception of reproduction is connected only to biological procreation. Maconachie (2009) points out the “naturalistic” approach of Engels toward the sexual division of labor between men and women. Susan Himmelweit and Simon Mohun (1977, 17–18), Vogel (2013), Humphries (2009, 13), and Haug (1998, 109) criticize Engels by claiming that he examined only procreation and not the domestic labor for the reproduction of society. Besides, in the rest of his book, he ignored the role of reproduction and the family and subsumed them under the mode of production, as Humphries mentioned above (Maconaiche 2009; Humphries 2009; Haug 2015, 48; Eisentein 1990, 123; Burris 1982, 60; Himmelweit and Mohun 1977; 17–18). Richard Weikart (1994, 663) rightly finds Engels' attitude in accord entirely with the earlier view in *The German Ideology*, where the family dropped out of consideration after having been ascribed a role. Humphries (2009, 11) points out that, in this way, feminist issues become secondary, and the contradiction between men and women is subsumed to that between capital and labor.

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We see that the source material of *The Origin* was Marx's notebook on Morgan. Moreover, Engels' life-long cooperation with Marx also contributed to his work. We find in their joint works and correspondence similar debates on and initial forms of his arguments in *The Origin* on both the transition from communal to private property and its effects on women. Further, we see his view to ascribe to the family a more independent role and to place it as a determining moment in history has its origin in *The German Ideology*. Therefore, it would not be an exaggeration to claim that *The Origin's* roots go back to Marx.

THE ETHNOLOGICAL NOTEBOOKS OF KARL MARX

Although the genesis of *The Origin* is closely related to the *Ethnological Notebooks of Karl Marx*, it differs from the latter in many aspects, especially on the topics of transition from matriarchy to patriarchy, that is, the so-called world-historic defeat of the female sex. To see these differences, we need to take a closer look at *Ethnological Notebooks*.

In the *Ethnological Notebooks*, Marx revitalized his early thoughts, including those on the women question. He also developed new ideas and new perspectives, which remain relevant for our age.

Marx's engagement with anthropology continued in various ways throughout his life. One of the main subjects in his early studies was philosophical anthropology, as can be seen in his dissertation, in his writings, in his correspondence, and his polemics against Hegel, Feuerbach, and Proudhon. However, his interest in anthropology emerged most prominently in his last years, when he began to work intensively on empirical anthropology, from the works of the modern anthropology quartet, Lewis Henry Morgan, Sir Henry Sumner Maine, Sir John Budd Phear, and John Lubbock (Lord Avebury). Marx also studied several other works in ethnology; for example, in 1879, he excerpted the book *Communal Landownership: The Causes, Course, and Consequences of its Dissolution* by Maxim M. Kovalevsky. Thomas C. Patterson (2009, 3) points out that Marx was an anthropologist by nineteenth-century standards if not by modern ones.

However, his notebooks were left to the "gnawing criticism of mice" for a long time and did not attract anyone's attention, other than Engels and a few scholars. Nearly forty years later, at the beginning of the 1920s, David Ryazanov, the editor of the historical edition of the collected works of Marx and Engels, rediscovered Marx's ethnological notebooks. Although committed to publishing the whole opus of Marx and Engels, Ryazanov rejected the idea of publishing one type of text of Marx, his excerpt notebooks, such as the ethnological notebooks. He characterized them, with other late unpublished works of Marx, as "inexcusable pedantry."¹⁷

17. Still, he gave a lecture of a brief account of them entitled as "Latest Report on Unpublished Works by Marx and Engels" at the Socialist Academy in Moscow in 1923. After that, he published his speech in the *Vestnik Sotsialisticheskoy Akademii*, in the same year. In his speech he told, "Sometimes, in reconsidering these Notebooks, the question arises: Why did he waste so much time on this systematic, fundamental summary, or expend so much labor as he spent as late as the year 1881, on one basic book on geology, summarizing it chapter by chapter. In the 63rd year of his life—that is inexcusable pedantry. Here is another example: he received, in 1878, a copy of Morgan's work [...] makes a detailed summary

After eighty-nine years from Marx's death, in 1972, Krader transcribed and published his notes under the title *The Ethnological Notebooks of Karl Marx*. However, the *Ethnological Notebooks* contain only about half of Marx's 1879–82 notes on non-Western and pre-capitalist societies.¹⁸

Marx's work is incomplete and sketchy. It is very difficult, as D. Norman Smith (2002, 74) writes, to navigate the labyrinth of Marx's text, which consists of German, English, Greek, Latin, French, Gaelic, Hindi, and other languages. According to Franklin Rosemont (1989), the book presents the reader with all the difficulties of James Joyce's *Finnegan's Wake* and even more. Christine Ward Gailey (2003, 52) argues that reading the Notebooks makes one feel like the street cop in *Blade Runner*¹⁹ who was grappling with "City-speak."

As many scholars such as Rosemont point out, it is very far from being a rough draft, as well. It is a kind of "raw substance of work" (Rosemont 1989). In these notebooks, Marx both developed new ideas and revitalized his early thoughts, including those on the so-called women question—the oppression of women.



The Ethnological Notebooks opened up entirely new perspectives. In these notebooks, Marx went over many themes he formulated in philosophical anthropology in the 1840s. In the notebooks, Marx paid special attention to the origin of both the classes and the family and patriarchy. While this has continuity with his past thoughts, it also contains new openings. Marx thought that communist concepts were embodied in these ethnological studies, particularly in Morgan's work on the Iroquois society; more importantly, he found the germ of future communist societies in these primitive communities. In other words, Marx not only looked at the past but developed a broad perspective that sheds light on the present and the future.

However, these notebooks did not attract the attention of many scholars; yet some, for example, Raya Dunayevskaya (1991, xxi), welcomes the

of Morgan" (Dunayevskaya 1991, 177–178). In 1941, the notebook on Morgan alone was published in the Arkhiv of the Marx-Engels based on photocopies of the original made by Ryazanov (For the details, see Krader 1974, 1; Anderson 1998, 2; Carver and Blank 2014, 15).

18. An all-English edition would be published soon. (For the details, see Anderson 2002 and Smith 2002.)

19. 1982 science fiction film adapted by Ridley Scott from *Do Androids Dream of Electric Sheep* by Philip K. Dick.

book as a historical happening which creates “a new vantage point from which to view Marx’s oeuvres as a totality” (ibid., 195). Kevin Anderson praised the book as a new window into Marx’s thought (Anderson 1998).

These notebooks suggest that Marx is on the eve of a new and grander project. For some, these notebooks are the drafts of such a study. Krader (1973a, 312), for example, thinks that the outlines of such work were depicted in the *Grundrisse*, a plan for the composition of *Capital*. Rosemont (1989), too, compares them with the *Grundrisse* and considers, as Marx had said of the latter, *Ethnological Notebooks* to contain some “nice developments.” He also thinks that Marx was, just as in the *Grundrisse*, in conversation with himself (ibid.). Similarly, Ward Gailey (2003, 47) compares them with the *Grundrisse* and other earlier works, however, in another respect. She finds continuity in them in terms of their concern of the relationship of communities to the state in various pre-capitalist contexts. Donald Kelley (1984, 256) compares the notebooks with Marx’s *Economic and Philosophic Manuscripts*: “just as he had prepared the ground for his theory of capital by the critical notes in his *Manuscripts*, so now Marx began his new project through notes on the early and primitive societies.” Kelley concludes that Marx was in a transition process from *Capital* to “a possibly even grander project” on a larger province of the human sciences: “Marx continued to look beyond the fictions of economic analysis. Implicit in his last notes [...] was the aspiration of opening the door to larger categories, especially those of tribe, kinship, and sexuality [...]” (Kelley 1984, 256).

In his last years, Marx really seemed planning a new grand project, setting aside all his other studies, especially the second and third volumes of *Capital*, and immersed himself in ethnology readings. This opens a new way of analyzing societies from a broad perspective by considering family and gender. This offers an opportunity to analyze also both the present bourgeois and the future societies. The question is, as Ward Gailey (2003, 47) asks, why Marx turned to the earlier forms of societies when his explicit aim in undertaking the study of capitalism was its dismantling? Moreover, what does his ethnological investigation mean in terms of his revolutionary perspective? Does that mean, for example, as some researchers claim, Marx abandoned his *Capital* project? According to Kelley (1984, 256), for instance, “caught up in this interest [...] Marx could not finish his *Capital*.” Ryazanov thinks similarly; however, he complains about what Kelley praises. Ryazanov’s criticism that “the old Marx” wasted so much time on this systematic, fundamental summary while he should have finished *Capital* is the other side of the same coin. Actually, both Kelley and

Ryazanov claim the same thing: that Marx completely broke with the *Capital* “project.” Against this, Smith (2002, 79) links Marx’s interest in ethnology to the ongoing project of *Capital*, arguing that Marx’s ethnology offers insights into globalizing capitalism and the dialectic of clan and class societies: “Marx began to explore the ‘extended reproduction’ of capitalism on a world scale”; therefore, he “needed [...] to know as much as possible about non-capitalist social structures [...] That is what the ‘ethnological notebooks’ represent.” Patterson (2009, 91–92) agrees with Smith and thinks that Marx’s turn to anthropology and history was not distinct from his concern with capitalism but rather was an integral part of that project. Similarly, Anderson (2002, 90) asserts that Marx’s interest was organic to his wish to understand the periphery of an expanding global capitalist system.

Both approaches fail to provide the total conception of Marx fully. It was, actually, not a break with the *Capital* “project” as Kelley claims; on the contrary, the problems dealt with in *Capital* continued in the period of his more systematic ethnological researches in 1879–1882. However, Marx’s interest in ethnology in his last years was not limited to, as Smith suggests, seeing “extended reproduction of capitalism on a world scale” either. Rather, the problem was related to, as Dunayevskaya (1991, 190) highlights, “how total must be the uprooting of existing society,” a new type of revolution. From a similar perspective, according to Bellamy Foster and his colleagues, Marx set *Capital* aside due to his interest and direct identification with indigenous revolts (Foster, Clark and Holleman 2020, 9). As a result, the problem was, seeking a new type of human relations, a new type of society. This vision of a new type of— an egalitarian, classless, free— society is connected to, as Stanley Diamond (1975, 3) points out, Marx’s lifelong purpose of concretizing the human possibilities he developed in his early writings. It is connected to realizing the human potentials fully, which was most clearly posed in what we know as the *Grundrisse, the Economic Manuscripts of 1857–1858*. Here in the *Grundrisse*, he redefined true wealth as the universality of individual’s needs, capacities, enjoyments, productive forces, as the absolute unfolding of woman’s creative abilities and potentials, as the development of all human powers as such the end in itself, as reproducing oneself in her totality and as the seeking in the absolute movement of becoming (Marx 2010b, 411–12).

Therefore, Marx approached anthropology from a historical materialist perspective and called upon the human past to develop a project for the future with revolutionary consequences. Marx’s vision was a new form of

society; therefore, he did not stop at any historical stage as if it were an ultimate one but insisted on the continuity of struggle and revolution. Diamond (1975, 3) concludes, he began with a vision and ended, just before his death, with the ethnological notebooks. However, that was not an “end”; rather, that was what Ward Gailey called “dialectical return” (Gailey 2003, 52–53), which we can see throughout Marx’s works that provides us with a clue to one of the purposes of the anthropological explorations in the Notebooks. That is what Marx found in Morgan several years after he had criticized Maurer and Grimm; that is the problem of “what is newest in what is oldest.” In short, ethnological studies in his last years enabled him to continue the vision he embraced in his early writings in a new way, from a different view, and with new revolutionary implications.

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With this revolutionist perspective, in his ethnological studies, Marx turned back to his earlier ideas, especially to the oppression of women. Many scholars mention that the early thoughts of Marx were present in his very last work. E. P. Thompson (1981, 163), for example, writes “Marx, in his increasing preoccupation in his last years with anthropology, was resuming the projects of his Paris youth.” For Dunayevskaya (1991, 190), with his study on primitive societies, Marx was diving into the study of human development, in the most basic Man/Woman relationship that he had worked out in his *1844 Economic-Philosophic Manuscripts*. Rosemont (1989) also thinks that the relation between man and woman, a topic of Marx’s *1844 Manuscripts*, is one of the recurring themes of his ethnological inquiries. Maximilian Rubel (2005, 354) claims that Marx returned to some of Fourier’s intuitions that he had incorporated in his first book, *The Holy Family*, written some thirty years earlier. But some writers object to these views. Anderson (2002, 90), for example, underlines that, in these writings, one of the core theoretical issues was family and gender relations across a wide variety of societies; however, he thinks they did not arise, except briefly, during any other period of Marx’s work. For Paresh Chattopadhyay (1999, 68), on the contrary, this was not a return to the women’s issue but the maintenance of the “feminist” position which Marx had already had.

In his ethnological research, Marx returned to his earlier theme of the “women question.” He traced the roots of family and oppression of women. Moreover, Morgan’s studies on gentile societies made him concretize his early consideration of communal societies. He now worked out his

earlier vision of the emancipation of women he had taken up in his early writings in a new way. The egalitarian relations were one of the characteristics of gentile societies that most interested Marx. Indeed, he was struck by the freedom women enjoyed in gentile organizations such as the Iroquois, where the degree of social involvement of women was far beyond that of any civilized society. Therefore, he cited several passages from Morgan on women. For instance, he quoted a letter sent to Morgan by a missionary among the Seneca:

The women were the great power among the clans, as everywhere else. They did not hesitate, when occasion required, 'to knock off the horns', as it was technically called, from the head of a chief, and send him back to the ranks of the warriors. (Marx 1974, 116)

Marx's readings in ethnology also led him to dig into the roots of oppression of women and the development of—patriarchal—family across history. For example, his notes on Lange contain varying forms of the marital power of the Roman *paterfamilias* across class, ethnic lines, and history (see Anderson 2002, 92). In these notebooks, he turned one more time to Fourier and wrote that “the modern family contains in germ not only slavery, but also serfdom [...] It contains in miniature all the antagonisms which later develop widely in society and its state” (Marx 1974, 120). Further, he evaluated the transformations taking place in the institutions of society with their impact on women. For example, Marx pointed out that as Roman civilization developed, marriage was included within the scope of secular rather than traditional law. This resulted in the weakening of *paterfamilias* and the empowerment of women (see Anderson 2002, 94).

DIFFERENCES BETWEEN *THE ETHNOLOGICAL NOTEBOOKS* AND *THE ORIGIN*

Although one of the source materials of *The Origin* is the ethnological notebooks of Marx, and although Engels and Marx agreed on many issues, *The Origin* differs from Marx's manuscripts in many respects; actually, it reflects Morgan's book far more than it reflects Marx's notes (Rosemont 1989). The reason is that Engels made use of, but a small part of, Marx's excerpts in *The Origin*. However, this is not a question of quantity but methodology. There are significant divergences in vision (Kelley 1984, 260).

One of the main topics of Engels in *The Origin* was the transition from the matriarchal family to the patriarchal one through private property—the world—historic defeat of the female sex. According to Engels:

The overthrow of mother right was the world-historic defeat of the female sex. The man seized the reins in the house too, the woman was degraded, enthralled, became the slave of the man's lust, a mere instrument for breeding children. (Engels 2010a, 165)

However, Marx seemed not interested in this transition as Engels did.

The origin of patriarchy was indeed one of the prominent controversial issues in nineteenth-century anthropology (see Fluehr-Lobban 1979; Krader 1974; Levine 1973; Maconachie 2009). Bachofen, in his *Das Mutterrecht* (1861), developed the concept of the matriarchate and proposed the idea of the historical priority of maternal kinship and matriarchal social order over paternal kinship and patriarchal order. Independently J. F. McLennan described archaic endogamous groups forming around "primitive mothers." Lubbock based *The Origin of Civilization* on the matriarchy thesis. Sir Henry Maine (1861), on the contrary, described the early human society as male-dominated. In the *Ancient Society*, Morgan, criticizing Maine's idea, pictured the gentile organization of society, based on mother-right, as preceding the monogamous organization of society, based on father right. Engels, following Bachofen and Morgan, asserted that matriarchy (and descent in the female line) was a general phase of human history, which was overthrown and replaced by patriarchy (and descent in the male line). He had additional assumptions that women did not participate in direct production in primitive societies, and their domestic work had equal social significance with men's work outside. He assumes that supremacy of women characterised primitive societies, but he argues that it rested on the material foundation of a natural sex-division of labour within the primitive communistic household (Vogel 2013). According to Engels, with the transition to livestock and agricultural production, men now began to gain control over the surplus product—possession of the herds—and gained the dominant position in the family. Women's domestic work lost its public character, and the wife became the domestic servant of men. Men wanted to pass on their inheritance to their sons. But under the conditions where the descent was reckoned according to the mother, it was not possible. Two major changes were required: on the one hand, tracing the lineage through the father—overthrow of matrilineality—, and on the other hand, transferring men's inheritance to only their sons—the overthrow of matriarchal law of inheritance—. That means matriarchy had to be overthrown. Consequently, a form of marriage, patriarchal monogamy, which ensures the male line of descent and the paternal law of inheritance, was invented.

As many scholars show, Engels failed to support his claim of the “world-historic defeat of women” due to private property. His assumptions failed, too. His arguments of the concentration of private property in the hands of men and men’s desire to pass their wealth to their sons, in particular, remain unexplained. Humphries (2009, 12), for instance, points out that it is not clear why men controlled the herds when agricultural production was women’s sphere. According to her, if the surplus product was wrested from women’s control, men must already have appropriated power. Josette Trat (1998, 91) highlights that Engels’ argument presupposes relations of domination which he claimed to explain. Maconachie relates Engels’s explanation to his “naturalistic” approach toward the sexual division of labor between men and women (Maconachie 2009). Weikart (1994, 663) posits another essential question: Why would men in a matrilineal system want to bequeath their property to their biological children? Trat (1998, 91) asks similarly, what is this curious “instinct” pushing men to act like that; as Arruzza (2013, 85) asks similarly, “what are the foundations of it?” Weikart (1994, 663) and Stevi Jackson (1999, 21) reveal that this vitiates Engels’ analysis, for he insisted that the transformation to monogamy was social and not natural. Gimenez (2009, 42) thinks Engels’ explanation that men wanted to pass their wealth to their children is idealistic. Materialist analyses, however, examine transformations in human needs and behaviors through social relationships. Treating such social relations as natural thus undermines materialism.

In light of these criticisms, I want to question Engels’ notion of the world—historic defeat of the female sex—the transition from the matriarchal society to a patriarchal one—, comparing *The Origin* with *Ethnological Notebooks*. First, as many researchers in anthropology indicate, findings do not support the matriarchal epoch thesis.²⁰ Matrilineality (that is, the maternal line) cannot be confused with a matriarchal society in which women have a dominant power. There are only some matrilineal societies but not any matriarchal ones. However, there is no contemporary or historical example of a matrilineal social organization in which political power is monopolized by women. It is true that in these matrilineal societies, men exert little authority over their wives; however, women and children are under greater or lesser authority from the women’s kinsmen—brothers or mothers’ brothers—. The position of women did indeed decline with the

20. Fluehr-Lobban (1979) gives details of the anthropological debates (see also Gough 1971, 761 and Leacock 1974).

emergence of class society, but that does not mean that women were executors and rule makers in pre-class societies. Further, many data illustrate that women are not the complete equals of men in most primitive societies lacking private property. There is also some evidence, which shows the gradual emergence of male domination within primitive communal societies. Trat (1998, 92) mentions feminist views, which extend oppression over women to the gradual emergence of a kind of property held by the kin groups within communal societies. Karen Sacks (1983, 397)²¹ and Trat (1998, 91) also point out that male domination can be found in pre-class societies, which do not know of private property. The concentration of private property in the hands of men actually proves that men previously had power and privileges, as Humphries and Trat suggest above. Aaby (1977, 27) concludes that if we follow Engels's logic, the female sex should never have been defeated because women were the direct producers of agriculture. Similarly, when we reject his arguments that women did not participate in direct production in primitive societies and animals were domesticated before agriculture, the ground of the world-historic defeat of female sex collapses. It means the private property does not seem to be the basis for male supremacy, though the position of women declined with the emergence of class society.²²

Aside from these problems, Engels' notion of the "world-historic defeat of the female sex" creates one of the deepest divergences between *The Origin* and the *Ethnological Notebooks*. One reason for this is that there are differences between Marx and Engels in their approach to Bachofen's and Morgan's works on the issue of the historical priority of the mother-right. First, it was not really Marx's statement; it originated in Bachofen. Concerning Morgan, although both were greatly influenced by his book, their approaches differ. According to Engels, Morgan independently discovered the materialist interpretation of history; however, Marx was less impressed

21. Just like Engels did by comparing American Indians with Germans in a letter to Marx (see the first chapter), Sacks, starting from a distinction between public and domestic labor and women's role as adult and wife, compared the position of women in four different societies: a hunter-gatherer society (Mbuti), two non-state agricultural societies (Loved, Pondo), and a state society (Ganda). She concludes that women are not necessarily either social adults or dependent wives; they may be both since their position in each sphere is determined by different factors. However, her analysis does not explain the relation of women's social status with their labor (Sacks 1983 386–87).

22. Still, despite their criticisms, some scholars agree with Engels' claim that gender oppression emerged with private property and classes (see, e.g., Leacock 1974 and Gimenez 2009, 41).

with Morgan's conclusions and did not share Engels' view that *Ancient Society* is an epoch-making work (see Krader 1973a, 250 and Fluehr-Lobban 1979, 343). Moreover, while Engels took from Bachofen the idea of matriarchy and thought it was approved by Morgan's researches, Marx did not adequately support this argument in his notes. Moreover, as Fluehr-Lobban insists, in none of Marx's writings on primitive communist societies is there any suggestion that he accepted the historical priority of matriarchy (Fluehr-Lobban 1979, 344).

Further, in explaining the origin of the oppression of women, Engels made the topic of property of herds a central one; however, Marx did not put a special emphasis on that. Rather, for Marx, the establishment of patriarchy was based on the same dynamics that also lead to private property. Marx's approach to empirical anthropology was underpinned by a historical and dialectical notion of society (Patterson 2009, 93). He considered, like Hegel, human society as a process of becoming and contradictions as the motor of historical movement. He focused on the inner contradictions of gentile societies, not on the struggle between matriarchal and patriarchal forces, as Fluehr-Lobban (1979, 344) shows. Thus, he proceeded from the fact that the principle of gens has its negation in concrete social organization as ranks, casts, and social stratification (Krader 1974, 13–15). Besides, while Engels explained the emergence of the patriarchal family only with subjective factors—men's desire to pass their property to their children—, Marx included objective sides of interest.²³ He focused on the formation of ranks and the relation between the chiefs and the mass. This dialectical approach was quite clear in his comment on Morgan:

The expression by Plutarch, that 'the humble and poor readily followed the summons of Theseus' and the judgment from Aristotle cited by him, that Theseus 'was inclined toward the people', appear, however, despite Morgan, to indicate that *chiefs of the gentes [...] through wealth etc. had already reached a conflict of interest with the common people of the gentes.* (Marx 1974, 210; emphasis added)

In these words, Marx challenged Morgan, pointing out the conflict between the chiefs and the mass. This means the conflict of interests has its roots in communal societies. Moreover, this is not only the conflict between two individuals but between two different social *layers*. That is the objective side of the interest of property Marx pointed out.

23. Krader (1973a) offers a detailed analysis about objective and subjective factors of interest.

Marx extended the roots of inequalities to communal societies, and he discerned the germs of male domination there. The development of gender inequalities was, in fact, according to Marx, accompanied by a substantial process, the birth of social stratifications, the gradual emergence of a propertied and privileged tribal caste within the gentile organization. In brief, he showed that oppression in general and the suppression of women, in particular, arose from within primitive communism, related to the establishment of ranks—the relationship of the chief to the mass (Kraeder 1974; Dunayevskaya 1991). One can see this from the commentaries he added to the excerpts he took. For example, when Morgan mentioned Iroquois women were free to express their wishes and opinions through a representative in the Council of Chiefs, Marx added with emphasis “Decision given by the [all-male] Council.” Marx (1974, 162) showed that even in a gentile organization like the Iroquois, where women enjoyed much greater freedom, men already had some privileges.

Those comments Marx added also reveal the dialectic in his reasoning. Marx did not take facts as they were, as they seem, but evaluated them together with their negation through their dialectical movement. For example, as the quotation above shows, where Morgan spoke of the freedom of the Iroquois women, he pointed out that women’s rights were restricted by men. Likewise, where Morgan stated that the Greeks exhibited a principle of studied selfishness among the males, tending to lessen the appreciation of women, Marx referred to the situation of the goddesses on Olympus as the demonstration of the formerly free and more influential position of women (Marx 1974, 121).

Another but essential problem with the notion of “the world-historic defeat” is that it ignores the struggle of women that has taken various forms throughout history against male domination. On the one hand, this statement does not mention struggles, weapons, and other means of oppression in the emergence of patriarchy. On the other hand, and more importantly, it portrays women as passive, submissive victims rather than active, persistent, history-making subjects. It, therefore, postpones the emancipation of women until an indefinite time.

However, for Marx, in the historical development, human beings are the main subject—men and women acting, self-actualizing, reproducing themselves and the society—. Hence, *The Ethnological Notebooks*, as Ward Gailey (2003, 52) emphasizes, can be seen as a defense of human agency in determining pathways of change. As he did not stop at any historical stage as if it were ultimate, he did not take the rise of patriarchy as an end.

What is essential for Marx was the ongoing struggle for a new form of human relationship, a new form of society, a classless, free society—a society in which all the women and men would realize all their human possibilities. We see this in his emphasis on the emancipation of women in his writings throughout his life. In *The Holy Family*, for example, he quoted Fourier's words that claimed the degree of the emancipation of women is the measure of emancipation of society and explicitly accused men of oppressing women:

The change in a historical epoch can always be determined by women's progress towards freedom, because here, in the relation of woman to man, of the weak to the strong, the victory of human nature over brutality is most evident. The degree of emancipation of woman is the natural measure of general emancipation. [...] No one is punished more severely for keeping woman in slavery than man himself. (Marx and Engels 2010a, 196)

Further, in his letter to Ludwig Kugelman dated 12 December 1868, Marx wrote that everyone who knows anything of history also knows that great social revolutions are impossible without the feminine ferment (Marx and Engels 2010d, 185). After that, he repeated his words in the *Holy Family*, slightly altering them: Social progress may be measured precisely by the social position of the fair sex (plain ones included).

Consequently, Marx called upon the human past to understand the present and develop a vision for the future (Foster, Clark and Holleman 2020, 9). Marx's work included clues about not only the past but also the future. Again, this was far more than a mere move from a philosophic to an empirical anthropological view, rather a revolutionary move.

CONCLUSIONS

Remaining from the founders of Marxism, we have two major works, both of which originated from the same source, from the ethnological readings of the "old" Marx: *The Origin* and the *Ethnological Notebooks*.

The main topics Engels dealt with in *The Origin*, the transition from communal to private property, the impact of this transition on women, oppression of women, and family, were recurring themes in Marx and Engels' earlier works and their correspondence. Engels developed from early insights through Marx's notes and Morgan's work his arguments in *The Origin*, one of which is his famous contention about the world-historic defeat of the female sex. The roots of *The Origin*, therefore, go to Marx.

The overthrow of the matriarchal social order by private property and the establishment of the patriarchal order, the world-historic defeat of the female sex, which is the central topic of *The Origin*, is the most controversial claim of Engels as well. This claim and the assumptions put forward to support it were later challenged by anthropological findings and criticized by feminist scholars. Moreover, this notion creates a substantial divergence between *The Origin* and the *Ethnological Notebooks*. Marx did not support this view in his notebooks. While Engels explained the emergence of the patriarchal family with private property, Marx extended the roots of the patriarchy to communal ownership and focused on the contradictions in primitive societies. Marx tried to grasp the dialectic of the emergence of male domination out of egalitarian relations. When we consider this notion together with Marx's evaluations, a new path opens before us. If the origin of patriarchy cannot be explained by private property, the abolition of private property cannot abolish it. In this case, the abolition of capitalism does not guarantee the emancipation of women. Of course, in today's capitalist world, patriarchy has gained new determinations. Male control and domination over women's labor processes and bodies continue but in different ways. Today we are talking about capitalist patriarchy. However, the roots of today's patriarchy go to the primitive one. So the emancipation of women requires the struggle not only against capitalism but also against patriarchy. Further, while Engels described this transition as a worldwide, historical defeat, Marx did not stop at any historical stage as if it were an ultimate one but insisted on the continuity of struggle and revolution. What was essential for Marx was a new form of society, a society in which all the women and men would realize all their human possibilities, which was, of course, essential to Engels as well. However, Engels did not mention women's struggle for such freedom, for their emancipation.

Following Marx, we can say that wealth, the true freedom, is the absolute unfolding of women's creative abilities and potentials, the development of all her powers, reproducing herself in her totality, and seeking in the absolute movement of becoming. For women to realize their human possibilities, all domination over their bodies and labor must be eliminated. They can have such freedom only by struggling with the capitalist and patriarchal forms of domination. Hence, Marx's discoveries on the origin of patriarchy in communal societies and his insights about the communal societies of the future can provide socialist feminists with a new perspective as they explore the sources of women's oppression and the ways of emancipation.



While Engels derived many of the arguments in *The Origin* from his earlier studies and his joint works with Marx, still, his work is the first to present them openly and systematically. Therefore, it can be seen as perhaps the first major work of Marxism in the post-Marx period.

Despite Engels' differences from Marx and some of his theses being challenged by modern research, *The Origin* is still an important book for socialist feminists. Engels had underlined that the oppression of women is not natural but historical, and going beyond the production relations (economic field) in the narrow sense and combining production with reproduction, developed a perspective analyzing society as a whole. Thereby, he offered a methodological guideline to explain the oppression of women. Consequently, he made a significant contribution to the debate on the origin of the family and the oppression of women.

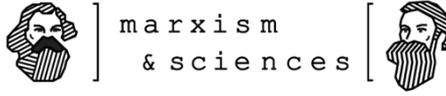
REFERENCES

- Aaby, Peter. 1977. "Engels and Women." *Critique of Anthropology* 3(9–10): 25–53.
- Anderson, Kevin. 1998. "Uncovering Marx's Yet Unpublished Writings." *Critique* 30(3): 179–187.
- Anderson, Kevin. 2002. "Marx's Late Writings on Non-Western and Precapitalist Societies and Gender." *Rethinking Marxism* 14(4): 84–96.
- Arruzza, Cinzia. 2013. *Dangerous Liaisons: The Marriages and Divorces of Marxism and Feminism*. Wales: Merlin Press.
- Beneria, Lourdes and Gita Sen. 1981. "Accumulation, Reproduction, and Women's Role in Economic Development: Boserup Revisited." *Signs: Journal of Women in Culture and Society* 7(2): 279–298.
- Bernstein, Edward. 1921. *My Years of Exile: Reminiscences of a Socialist*. Translated by Bernard Miall, London: L. Parsons.
- Blackledge, Paul. 2018. "Frederick Engels, Social Reproduction, and the Problem of a Unitary Theory of Women's Oppression." *Social Theory and Practice* 44(3): 297–321.
- Burris, Val. 1982. "The Dialectic of Women's Oppression: Notes on the Relation between Capitalism and Patriarchy." *Berkeley Journal of Sociology* 27: 51–74.
- Carver, Terrel and Daniel Blank. 2014. *A Political History of the Editions of Marx and Engels's "German Ideology Manuscripts"*. New York: Palgrave Macmillan.
- Chattopadhyay, Paresh. 1999. "Women's Labor under Capitalism and Marx. Capital Accumulation and Women's Labor in Asian Economies by Peter Custers." *Bulletin of Concerned Asian Scholars* 31(4): 67–77.
- Cohen, Jack et al. 2010a. "Preface." In *Marx and Engels Collected Works*, Vol: 5. London: Lawrence & Wishart.
- . 2010b. "Preface." In *Marx and Engels Collected Works*, Vol: 26. London: Lawrence & Wishart.
- . 2010c. "Preface." In *Marx and Engels Collected Works*, Vol: 47. London: Lawrence & Wishart.

- Diamond, Stanley. "The Marxist Tradition as a Dialectical Anthropology." *Dialectical Anthropology* 1: 1–5.
- Dunayevskaya, Raya. 1991. *Rosa Luxemburg, Women's Liberation, and Marx's Philosophy of Revolution, 2nd edition*. Urbana and Chicago: University of Illinois Press.
- Eisenstein, Zillah. 1979. "Developing a Theory of Capitalist Patriarchy and Socialist Feminism." In *Capitalist Patriarchy and the Case For Socialist Feminism*, edited by Zillah Eisenstein, 5–41. London: Monthly Review Press.
- . 1990. "Constructing a Theory of Capitalist Patriarchy and Socialist Feminism." In *Women, Class, and the Feminist Imagination: A Socialist-Feminist Reader*, edited by Karen V. Hansen and Ilene J. Philipson. Philadelphia: Temple University Press.
- Engels, Friedrich. 2010a. "The Origin of the Family, Private Property and the State." In *Marx and Engels Collected Works*, Vol. 26, 129–277. London: Lawrence & Wishart.
- . 2010b. "Preface to the Fourth German Edition of The Origin of the Family, Private Property and the State (1891)." In *Marx and Engels Collected Works*, Vol. 27. 203–215. London: Lawrence & Wishart.
- Fluehr-Lobban, Carolyn. 1979. "A Marxist Reappraisal of the Matriarchate." *Current Anthropology* 20(2): 341–359.
- Foster, J. Bellamy, Brett Clark and Hannah Holleman. 2020. "Marx and the Indigenous." *Monthly Review, Commentary* 71(9): 1–19, <https://monthlyreview.org/2020/02/01/marx-and-the-indigenous/>.
- Gough, Kathleen. 1971. "The Origin of the Family." *Journal of Marriage and Family* 33(4): 760–771.
- Gimenez, Martha. 2009. "Marxist and non-Marxist Elements in Engels' Views on the Oppression of Women." In *Engels Revisited*, edited by Jane Sayers et al., 37–57. New York: Routledge.
- Hartmann, Heidi. 1981. "The Unhappy Marriage of Marxism and Feminism: Towards a more progressive union." In *The Unhappy Marriage of Marxism and Feminism: A Debate of Class and Patriarchy*, edited by Lydia Sargent, 1–43. Montréal: Pluto Press.
- Haug, Frigga. 1977. "Problematical Aspects of Engels' View of the Woman Question." *Science & Society* 62(1): 106–111.
- . 2015. "Gender Relations." In *Marxism and Feminism*, edited by Shahrzad Mojab, 33–76. London: Zed, 2015.
- Himmelweit, Susan and Simon Mohun. 1977. "Domestic Labour and Capital." *Cambridge Journal of Economics*, 1: 17–18.
- Humphries, Jane. 2009. "The Origin of the Family: Born out of Scarcity Not Wealth." In *Engels Revisited*, edited by Jane Sayers et al., 11–37. New York: Routledge.
- Jackson, Stevi. 1999. "Marxism and Feminism." In *Marxism and Social Science*, edited by Andrew Gamble, David Marsh and Tony Tant, 11–35. London: MacMillan Press.
- Kelley, Donald R. 1984. "The Science of Anthropology: An Essay on the Very Old Marx." *Journal of the History of Ideas* 4(2): 245–262.
- Knight, Chris. 2018. "Early Human Kinship Was Matrilineal." In *Early Human Kinship: From Sex to Social Reproduction*, edited by Nicholas J. Allen, Hilary Callan, Robin Dunbar and Wendy James, 61–83. Oxford: Blackwell Publishing.
- Krader, Lawrence. 1973a. "The Works of Marx and Engels In Ethnology Compared." *International Review of Social History* 18: 220–248.
- . 1973b. "Karl Marx As Ethnologist." *Transactions New York Academy of Sciences II. Serial* 35: 304–313.

- . 1974. "Introduction." In *The Ethnological Notebooks of Karl Marx*, transcribed and edited by Lawrence Krader, 2nd edition, 1–86. Amsterdam: Internationaal Instituut Voor Sociale Geschiedenis.
- Leacock, Eleanor B. 1974. "Introduction." In *Frederick Engels, The Origin of the Family, Private Property and the State*, 7–67. New York: International Publishers.
- . 1978. "Women's Status in Egalitarian Society: Implications for Social Evolution." *Current Anthropology* 19(2): 247–275.
- Levine, Norman. 1973. "Anthropology in the Thought of Marx and Engels." *Studies in Comparative Communism* 6(1–2): 7–26.
- Luxton, Meg. 2006. "Feminist Political Economy in Canada and the Politics of Social Reproduction." *Social Reproduction: Feminist Political Economy Challenges Neo-liberalism*, edited by Kate Bezamen and Meg Luxton, 11–45. London: McGill-Queen's University Press.
- Maconachie, Moira. 2009. "Engels, Sexual Divisions, and the Family." In *Engels Revisited*, edited by Jane Sayers et al., 98–113. New York: Routledge.
- Marx, Karl. 1974. *The Ethnological Notebooks of Karl Marx*. Transcribed and edited by Lawrence Krader, Amsterdam: Internationaal Instituut Voor Sociale Geschiedenis, 2nd edition.
- . 2010a. "Capital Volume I." In *Marx and Engels Collected Works*, Vol. 35. London: Lawrence & Wishart.
- . 2010b. "Economic Manuscripts of 1857-58." In *Marx and Engels Collected Works*, Vol. 28. London: Lawrence & Wishart.
- Marx, Karl and Friedrich Engels. 2010a. "Holy Family." In *Marx and Engels Collected Works*, Vol. 4. 5–212. London: Lawrence & Wishart.
- . 2010b. "German Ideology." In *Marx and Engels Collected Works*, Vol. 5. London: Lawrence & Wishart.
- . 2010c. "Manifesto of the Communist Party." In *Marx and Engels Collected Works*, Vol. 6. 477–520. London: Lawrence & Wishart.
- . 2010d. *Marx and Engels Collected Works*, Vol. 43. 184–185. London: Lawrence & Wishart.
- . 2010e. *Marx and Engels Collected Works*, Vol. 46. London: Lawrence & Wishart.
- . 2010f. *Marx and Engels Collected Works*, Vol. 47. London: Lawrence & Wishart.
- . 2010g. *Marx and Engels Collected Works*, Vol. 49. London: Lawrence & Wishart.
- Mitchell, Juliet. 1990. "Women: The Longest Revolution." In *Women, Class, and the Feminist Imagination: A Socialist-Feminist Reader*, edited by Karen V. Hansen and Ilene J. Philipson, 43–74. Philadelphia: Temple University Press.
- N., D. and K., G. 1989. "Sexual Division of Labour." *Economic and Political Weekly* 24(34): 1949–1950.
- Patterson, Thomas C. 1989. *Karl Marx, Anthropologist*. New York: Oxford International Publishers.
- Rosemont, Franklin. 2005. "Karl Marx and the Iroquois." In *Arsenal: Surrealist Subversion 4* edited by Franklin Rosemond. Chicago: Black Swan Press.
- Rubel, Maximillian. 2005. "The Emancipation of Women in the Works of Marx and Engels." In *Political and Historical Encyclopedia of Women*, edited by Christine Fauré, 335–356. London: Taylor and Francis.
- Sacks, Karen. 1983. "Appendix Three—Engels Revisited: Women, the Organization of Production, and Private Property." *Bulletin of Science, Technology and Society* 3(4): 385–401.
- Scott, John. W. 2005. "Kadın İşçi." In *Kadınların Tarihi*, edited by Geneviève Fraisse and Michelle Perrot, translated by Ahmet Fethi, V. Cilt, 374–398. İstanbul: İş Bankası Kültür Yayınları.

- Smith, David N. 2002. "Accumulation and the Clash of Cultures: Marx's Ethnology in Context." *Rethinking Marxism* 14(4): 73–83.
- Stern, Bernhard J. 1948. "Engels on the Family." *Science & Society* 12(1): 42–64.
- Trat, Josette. 1998. "Engels and the Emancipation of Women." *Science & Society* 62(1): 88–105.
- Thompson, Edward P. 1981. "The Poverty of Theory or An Orrery of Errors." In *The Poverty of Theory & Other Essays*, 4th edition. London: Merlin.
- Vogel, Lise. 2013. *Marxism and the Oppression of Women: Toward a Unitary Theory*. Boston: BRILL, Historical Materialism Book Series.
- Walby, Sylvia. 1989. "Theorizing Patriarchy." *Sociology* 23(2): 213–234.
- Ward Gailey, Christine. 2003. "Community, State and Questions of Social Evolution in Marx's 'Ethnological Notebooks'." *Anthropologica* 45(1): 45–57.
- Weikart, Richard. 1994. "Marx, Engels, and the Abolition of the Family." *History of European Ideas* 18(5): 651–672.



Unity, Motion, and Reciprocity in Friedrich Engels' *Dialectics of Nature*

Cihan Cinemre

ABSTRACT: The *Dialectics of Nature* is one of the most significant works regarding materialist dialectics, first and foremost because it fills the gap in expounding materialist dialectics as the objective law of motion on earth. The fundamental aspect of this expounding is the view that postulates human and nature in their unity and presenting the dialectic as the objective law of motion on earth through the sphere of natural sciences and establishing the material basis of the materialist dialectics as the view of the whole. This is not merely a matter of theory; this activity is required for the praxis to sublimate the capitalist mode of production and the mode of scientific production internal to it.

KEYWORDS: Dialectics of nature, motion, reciprocity, metaphysics, unity of opposites.

INTRODUCTION

Lenin (2009) says, “without revolutionary theory there can be no revolutionary movement” in *What is to be Done?* In the section titled ‘Engels on the Importance of the Theoretical Struggle’ in which this phrase appears, Lenin (2009, 370) also mentions that Friedrich Engels placed the theoretical struggle on a par with two forms of the great struggle of Social-Democracy (political and economic). In this work, I propose to consider the *Dialectics of Nature* of Engels as a moment of this struggle. This undertaking of Engels is essentially comprised of constituting the materialist dialectics as the law of movement internal to nature, which connotes that dialectics is not only a subjective process of the mind that one may or may not choose to reflect on the world. Thus, the laws of motion of nature and society are not separate and one can find the necessity of social revolution in the womb of nature. When Karl Marx (1985, 246–247) in his letter to Ferdinand Lassalle wrote that “Darwin’s work is most important and suits my purpose in that it provides a basis in natural science for the historical

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class struggle” he was maintaining the unity of the laws of motion of society and nature. In this way, an essential aspect of dialectical materialism is also discerned: the unity of humans and nature through their multi-faceted reciprocal relations.

It should be well-understood that the motives of Engels in delivering the *Dialectics of Nature* were not his individual interest in the natural sciences or philosophy. He wrote it down with the view of constituting the theory of the socialist revolution in its wholeness. Engels’ interest in the natural sciences was primarily due to the fact that the advances realised by them made the dialectical laws of motion of nature evident. At the same time, Engels’ occupation with the natural sciences served to achieve the theoretical conception in its wholeness that the struggle of the proletariat needed. This is one of the reasons of the importance he gave to the discovery of the conservation of motion (energy), for it demonstrated that the various spheres of the natural sciences previously had been supposed as independent from and indifferent to each other were in fact interconnected. Thereby the being of the natural sciences as independent fields of specialisation was negated. Then, while the advances made by the natural sciences affirm dialectics as the mode of motion in nature, simultaneously we arrive at the necessity of a single science to reflect on both society and nature.

What is the relationship between nature and materialist dialectics? First and foremost, nature and the motion internal to it unite the materialist dialectics as an objectively valid theory. The dialectics internal to nature negates the view that dialectical reasoning is originated as a particular motion of the human mind reflected on nature and society. On the contrary, motion internal to nature necessitates materialist dialectics as the true mode of reasoning. This necessity, at the same time, corresponds to the act of turning the dialectics, standing on its head to be turned right side up again (Marx 1996, 19). The specific ordering in time of the various notions that are in opposition is what discerns the materialist dialectics from the Hegelian dialectics. The materialist dialectics asserts the primacy of matter to the idea, practice to theory, labour to mind, nature to spirit. Therefore, regarding the laws of dialectics, Engels states,

The mistake lies in the fact that these laws are foisted on nature and history as laws of thought, and not deduced from them. This is the source of the whole forced and often outrageous treatment; the universe, willy-nilly, has to conform to a system of thought which itself is only the product of a definite stage of development of human thought. If we turn the thing round, then everything

becomes simple, and the dialectical laws that look so extremely mysterious in idealist philosophy at once become simple and clear as noonday. (Engels 1987a, 356)

It is reflected on Engels' view of the whole in *Dialectics of Nature* in this contribution through key subject matters that point at unity in general. These are the unity of organic and inorganic nature, of human and nature, and of cause and effect. Related to the notion of unity are two fundamental principles of dialectics, the changes in quantity result in qualitative changes and the unity of opposites; through this work, it is attempted to provide insight into the way these principles manifest themselves in nature. This way it becomes possible to attain a view of the world in constant motion in virtue of the reciprocal actions of the objects that comprise the world, a view freed from all metaphysical residue. This view matters today in particular to comprehend the ecological crisis, a symptom of which is the Covid-19 pandemic. This comprehension is also decisive to bring about the struggle against those who cause the crisis. This struggle necessarily aims at new modes of relations between the human and nature, which requires new relations of production, new social relationships, a new social organisation freed from the market relationships.

THE UNITY OF HUMAN BEING AND NATURE

The *Dialectics of Nature* is not only determinative to achieve a true dialectical materialist comprehension but also to sublimate the capitalist relations of production that encompass all life on earth, to realise the praxis of the constitution a new mode of relationship between human and nature. As yet beginning from *Economic and Philosophical Manuscripts of 1844* the necessity to comprehend nature and society through a single science has been put forward,

Industry is the *actual*, historical relationship of nature, and therefore of natural science, to man. If, therefore, industry is conceived as the *exoteric* revelation of man's *essential powers*, we also gain an understanding of the *human* essence of nature or the natural essence of man. In consequence, natural science will lose its abstractly material—or rather, its idealistic—tendency, and will become the basis of *human* science, as it has already become—albeit in an estranged form—the basis of actual human life, and to assume *one* basis for life and a different basis for *science* is as a matter of course a lie. (Marx 1975, 303)

Two years after these lines had been written, when Marx and Engels (1975, 28) in *German Ideology* stated that the history of nature and the history of men were inseparable and each of them depended on the other, they were conveying this unity to the science of history. But as István Mészáros rightly remarks the constitution of a unitary science that deals with nature and society in their unity can't be a matter of theoretical undertaking:

In order to realise 'human science' philosophy, political economy, the 'abstractly material' natural sciences, etc., must be *reciprocally integrated* among themselves, as well as with the totality of a social practice no longer characterised by the alienation and reification of the social relations of production. (Mészáros 1970, 114)

Even when the theory acknowledges the human society as its sole subject matter, the materialist dialectics that postulates nature and society in their unity is necessary for the object and its notion to overlap, thereby it is necessary to constitute a true praxis, to constitute a true ontology of humans for them to transform their reality, to constitute the true notions regarding human history. Nature is the greatest necessity, it also necessitates the division of labour, thus it necessitates the socialisation of humans. This is why Christopher Caudwell (1958, 211) maintains that "man, the individual, cannot do what he wants alone. He is unfree alone. Therefore, he attains freedom by co-operation with his fellows." Human existence both as a natural being and as a social being, and the unity of freedom with the necessity that these modes of being connote was expounded by Marx with clarity:

A being which does not have its nature outside itself is not a natural being, and plays no part in the system of nature. A being which has no object outside itself is not an objective being. A being which is not itself an object for some third being has no being for its object; i.e., it is not objectively related. Its being is not objective. (Marx 1975, 337)

Essentially, what mediates nature as the necessity with human subjectivity and his freedom is labour. Human ontology necessarily derives from his essential activity as production and from the latter's collective character. Postulating production as the fundamental activity makes it evident that what makes human consciousness is his necessity to transform nature, and makes it possible to constitute the human ontology accordingly. Thereby the dialectical materialist idea of the human, contrary to the view

that considers humans as passive beings belonging to a teleological process, that considers nature as externalisation of the Spirit as Hegel did, constitutes itself as the conception of the constitution of nature and humans through the latter's actions. Then we get to a fundamental aspect of historical materialism: labour antedates consciousness. Just as Caudwell (1958, 212) says, man's free will depends on economic production. Consciousness develops by the evolution of language, science, and art, and these are all born of economic production.

Charles Darwin's work proved that nature has its own history and it is not separated from human history. This inseparability imposes itself in particular in the era of ecological crisis by the capitalist class that views nature as the raw material from which value to be extracted. The Covid-19 pandemic as an aspect of today's ecological crisis, rigorously expresses the reciprocity of human and nature, the subjectivity of nature as such; nature is not receptive in the face of human actions upon it. Today, nature indisputably expresses that its own ontology is inseparable from humans'. Caudwell spoke of this inseparability,

The development of humanity is not the increasing separation of man from a 'state of nature'. It is man's increasing interpenetration with nature. History is not, as the bourgeois supposes, the story of man in himself, or of human 'nature' [...] but the story of the increasing interpenetration of nature by man as a result of his struggle with it [...] The story of man is not the story of the increasing subjection of man's freedom and individuality to organisation in order to cope with nature, but his growth of freedom and individuality through organisation imposed by nature, in his interaction with it. (Caudwell 1950, 133)

The sublation of the era of the ecological crisis that we live in is a matter of practice of course. But this practice should rest on a true theory of non-human nature and its relation to the human. This theory, if it is going to work to end the ecological crisis, should postulate the unity of humans with nature. The theory should not suppose the non-human nature as a passive entity, since the history of humans' interaction with nature tells us that the work of humans on nature is not one-sided and nature responds to humans and forges a new living, a new history for humans. The following passage is illustrative to understand the unity of the history of humans and of nature,

Let us not, however, flatter ourselves overmuch on account of our human victories over nature. For each such victory nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only

cancel the first [...] Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature –but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly. (Engels 1987a, 460–461)

This excerpt is significant particularly in the era of the Covid-19 pandemic. Just as Engels said, man’s activity over nature, even though immediately brings forward the desired effects, the activity internal to nature produces unintended effects. For example, Richard Lewontin and Richard Levins (2007, 18) speak of so-called human victory over diseases. In the sphere of public health, in the “war” against diseases, it was thought that the “weapons” acquired through technological advances ensured the ultimate victory of civilisation over diseases. This view described by the authors is bourgeois ideology *par excellence*, which presupposes nature as a passive recipient of human actions, the ideology that imagines nature as the raw material of the commodity-producing society. Then Lewontin and Levins are in line with Engels when they speak of the unintended consequences of human action on nature,

Waves of European conquest spread plague, smallpox, and tuberculosis. Deforestation exposes us to mosquito-borne, tick-borne, or rodent-carried diseases. Giant hydroelectric projects and their accompanying irrigation canals spread the snails that carry liver flukes and allow mosquitoes to breed. Monocultures of grains are mouse food, and if the owls and jaguars and snakes that eat mice are exterminated, the mouse populations erupt with their own reservoirs of diseases. New environments, such as the warm, chlorinated circulating water in hotels, allow the Legionnaire’s bacteria to prosper. (Lewontin and Levins 2007, 19)

Besides, even though it is not mentioned directly in these passages, various symptoms of the ecological crisis that the world is getting through, such as the Covid-19 pandemic, the climate crisis, deforestation, extinction of the species, and so on are the costs of the capitalist class that it externalises to be paid by the public. Thus, the unity of the history of humans and nature is constituted also through the class struggle.

Engels implied another aspect of the ecological crisis of the present. He said that “classical political economy, the social science of the bourgeoisie, in the main examines only social effects of human actions in the fields of production and exchange that are actually intended” (Engels 1987a, 463). Thus, the political economy’s inability to understand the objectivity that

the subject moves within. This inability both applies to the understanding of the unity of human and non-human nature and to the systematic crises that the capitalist economy suffers from. This corresponds to what Georg Lukács called as false consciousness of the bourgeoisie. The cause of this false consciousness is the bourgeoisie's inability to perfect its own science of classes, to discover a theoretical solution to the crises problem. There is of course a true scientific solution to this problem, but this is necessarily ineffective since the bourgeoisie's adoption of this solution would mean viewing society from a position other than the bourgeois class'. Lukács said that this is impossible unless a ruling class willingly abdicates its social dominance. Then false consciousness of the bourgeois class originates from the objective class situation of the bourgeoisie (Lukács 1971, 53–54).

Engels related bourgeoisie's social science's concerning itself solely with the intended consequences of subjective actions to the social organisation,

As individual capitalists are engaged in production and exchange for the sake of the immediate profit, only the nearest, most immediate results must first be taken into account [...] The same thing applies to the natural effects of the same actions [...] In relation to nature, as to society, the present mode of production is predominantly concerned only about the immediate, the most tangible result; and then surprise is expressed that the more remote effects of actions directed to this end turn out to be quite different, are mostly quite the opposite in character. (Engels 1987a, 463–464)

Here, crucial concepts and laws of motion concerning the materialist dialectics, the undertaking internal to the *Dialectics of Nature* in particular, and the understanding of Marxism as praxis (the unity of practice and theory) were enunciated.

For instance, this last phrase of Engels is built on the objectivity of the capitalist economy as the anarchy dominating the sphere of circulation. Independent commodity producers constitute the basis of the capitalist economy and this corresponds to a disorganised whole that works through anarchy. This is why Nikolai Bukharin (1971, 29–30) said, “in capitalist society the theoretical foreknowledge of the general course of events does not provide the instrument for taking direct control of that course (and there is no subject to set himself such a task: society itself is subjectless, blind, unorganised).” This revives two fundamental problems regarding the crises of capitalist society which are also connected with the problem of the unity of the human with non-human nature. The first is the inability of the bourgeois class to unite its theory with its practice. It is impossible

to realise this unity through theoretical work; the sublation of the capitalist mode of production is necessary. This is why Alexander Bogdanov spoke of the futility of philosophy as a means of bringing together a world that is practically torn apart. Bogdanov said that philosophy is nothing but the attempt to organise and to gather up that is divided and fragmented through the force of specialisation. The social experience is atomised in reality. Thus, it is objectively impossible for philosophy to connect what reality has disunited. The task becomes objectively achievable only when reality changes (Bogdanov 2016, 238). Then the bourgeois class in its theory and practice is unable to procure wholeness and therefore is desperate to control the effects of its disorganised actions.

The second problem which is also related to the disorganisation of the capitalist society in particular pertains to the primacy of the action to the knowledge, which is originated in the reciprocal relationships of the independent commodity producers within the scope of the market. In the relationship of exchange, the subject acquires the knowledge of his action only after the event. In *Capital*, Marx (1996, 86) said “we are not aware of this, nevertheless we do it” regarding the exchanging subjects who also equate different kinds of labour expended on products, while they equate different products as values. Then the market is where the subject acts unconsciously. In this sense, the market, in its essence is the expression of the world that the bourgeoisie created after its own image. To have a true insight into the workings of this world, comparing it with its opposite, socialist planning is important,

Planning is not equivalent to ‘perfect’ allocation of resources, nor ‘scientific’ allocation, nor even ‘more humane’ allocation. It simply means ‘direct’ allocation, *ex ante*. As such, it is the opposite of market allocation, which is *ex post*. These are the two basic ways of allocating resources, and they are fundamentally different from each other [...] Essentially they have a different internal logic. They generate distinct laws of motion. They diffuse divergent motivations among producers and organizers of production, and find expression in discrepant social values. (Mandel 1986, 7)

Today the capitalist class and its various representatives struggle to alleviate the effects of the economic crisis of 2008 and to revive the economic activity, but miserably fail. The crisis that was brought about by the Covid-19 pandemic continues; besides, the overwhelming forces of the market at every moment add new facets to the ecological crisis that themselves are the reason of. Therefore, the mutual exclusiveness of a society whose economic life is organised through socialist planning and the one whose

economy is under the rule of the blind forces of the market is necessary to understand the historical materialist view and this necessity was emphasised by various Marxists in various epochs (Engels 1925; 1987a; 1987b; Marx and Engels 1976; Marx 1986; Jameson 2009; Marcuse 2009; Liodakis 2001; Magdoff and Williams 2017). Is there a way to understand the relationship between socialist planning and the market other than their mutual exclusion? A possible way to approach this problem is to examine the modes of organisation of production and distribution envisioned by utopian socialists. One of the most prominent examples of it is the issue of labour-time tickets to mediate the exchange of goods and the establishment of the labour-time ticket bank, which would manifest itself as the subject conducting to that exchange. This view was comprehensively criticised by Marx; the essential reason of his opposition to this mode of organisation was this:

There can therefore be nothing more incorrect and more absurd than to assume, on the strength of exchange value and money, control by the associated individuals of their collective production, as was done in the case of the labour-time ticket bank mentioned earlier. (Marx 1986, 96)

Still, Engels (2010, 296–297) admires Robert Owen's vision of labour-ticket, which is supposed to mediate the exchange of the products of labour in *labour bazaars*. Although these institutions are necessarily doomed for failure they were the first steps towards a much more radical revolution of society. Therefore, the relationship between planning and the market mechanism, if not to be understood in terms of mutual exclusion it must be comprehended as the former being developed in the womb of the outlook of utopian socialists, which presupposes the exchange value as given. The effort to sublimate the blind necessity of the market also pertains to the activities of the members of the capitalist class. Monopoly capitalism emerges and with it the reign of the planning, not of the market. Planning reaches out from the factory to the firm. The fundamental reason behind this state of affairs is the inner logic of capitalism itself “and its peculiar dynamic of accumulation and competition” (Mandel 1986, 6) and the growing objective socialisation of labour (*ibid.*, 11). Therefore, one can infer that the act to sublimate the inefficiencies, uncertainties, and the strict limits imposed by the blind necessity of the market on human subjectivity is not exclusive to socialist revolutionaries only, but the big capital itself in actuality works towards the same effect.

THE UNITY OF ORGANIC AND INORGANIC NATURE

From the point of view of the materialist dialectics, to ascertain the unity of nature and human in it, to apprehend the decisiveness of labour as the mediator of the unity of human and nature, understanding the unity of the inorganic and organic nature is crucial. In the *Economic and Philosophical Manuscripts of 1844*, Marx expounded this unity. He said that both man and animal live on inorganic nature. The universality of man in practice consists in the fact he makes all nature his inorganic body, first as his direct means of life and then as the material, the object, and the instrument of his life activity. Nature is man's inorganic body. Man is linked to nature physically and spiritually, thus, nature is linked to itself, for man is a part of nature (Marx 1975, 275–276). Humans as organic beings are tied to inorganic nature first and foremost by means of labour. Through labour, humans extend the breadth of their activity, the inorganic nature becomes humans' extension to ensure their dominance over nature in general. To reckon with this unity conduces the sublation of all metaphysics that postulates that the human and society can be understood in themselves.

Aside from the activity of humans over nature, Engels maintains the unity of the organic and inorganic, through demonstrating a process that does not involve humans directly. This is the preparation of the compounds hitherto had been produced only in living organisms through inorganic means, which proved the laws of chemistry have the same validity for organic as for inorganic bodies. This bridges the gulf between inorganic and inorganic nature, a gulf Kant regarded as impassable (Engels, 1987a, 326).¹

Engels (1987a, 338) spoke of the necessity of classifying material of knowledge in separate fields of investigation only to bring them into correct connection with one another afterwards. In a similar vein, Lewontin

1. Kant's consideration of the antinomy between organic and inorganic as impassable was propounded in the discussion he makes under the heading 'Critique of Teleological Judgement.' According to Kant the understanding concerned with the things in the form of natural ends is such that, mechanical explanation of these things is not only limited but also circumscribed within definite boundaries. Our judgement on such products should always be subject to a teleological principle (Kant 2007, 246). Here the teleological judgement of Kant not only gravitates towards the purpose but also involves the notion Engels calls as the first impulse. The antinomy between natural ends and their mechanical explanation also manifests itself as the antinomy between *generatio aequivoca* and *generatio univoca* in the philosophy of Kant. The former is the generation of an organised being from crude inorganic matter. According to Kant the principal is the latter, according to which the organic can only come into existence out of organic.

and Levins (2007) spoke of the necessity of making a distinction between internal and external for the advances that have been realised by modern reductionist biology. But for today's scientific problems this distinction is bad biology and presents a barrier to further scientific advance (Lewontin and Levins 2007, 31). The capitalist mode of production has changed the climate, polluted the soil, air, and water in various ways, it caused pathogens' further penetration into humans' social life. These changes in the inorganic nature both changed the organic nature on earth as a whole and the social relations of men. Therefore, to constitute the true ontology of today's humans, the notion of the unity of inorganic and organic nature is indispensable more than ever.

The unity of organic nature with inorganic nature is determinative to understand the emergence of human-being, to gain insight into this species' ontology. The determination of the species-being of humans through their action on their environment is at the same time comprises a fundamental aspect of the dialectical view of nature and its materialist outlook:

Man, too, arises by differentiation. Not only individually but also historically. When after thousands of years of struggle the differentiation of hand from foot, and erect gait, were finally established, man became distinct from the ape and the basis was laid for the development of articulate speech and the mighty development of the brain that has since made the gulf between man and the ape an unbridgeable one. The specialisation of the hand—this implies the tool, and the tool implies specific human activity, the transforming reaction of man on nature, production [...] Man alone has succeeded in impressing his stamp on nature, not only by shifting plant and animal species from one place to another, but also by so altering the aspect and climate of his dwelling-place, and even the plants and animals themselves, that the consequences of his activity can disappear only with the general extinction of the terrestrial globe. And he has accomplished this primarily and essentially by means of the hand. (Engels, 1987a, 330)

The notion of the unity of inorganic and organic nature is crucial for the dialectic materialist view of the world since by way of this unity some fundamental claims of dialectic materialism merge. This unity, first of all, entails that the essence of the human being is comprehensible only in its social and natural environment. Also, this notion of unity suggests that this essence is not passive and given but is determined through the activity—first and foremost labour—of human beings. It also implies that for any science to formulate a true notion of its subject matter, the latter must be

dealt with as it is immersed in the objective whole which is in constant flux.

Then the dialectic materialist view of human beings which supposes the unity of organic nature with inorganic nature begins with the differentiation of hand from the foot. The initial emergence of *bipedalism* in a line of apes is designated as probably the most significant of the biological milestones by Ardea Skybreak (2006, 148). Freeing of the hands made it possible for men to use them as tools and afterwards let the production and use of other various tools, let men travel greater distances, and was determinative for the reproduction of the human species in general. Darwin (1981, 141) indicates the decisiveness of the use of hands for men to attain their dominant position in the world.

Engels (1987a, 453) said that “the hand is not only the organ of labour, it is also the product of labour.” Here the reciprocal relationship between the living organism and its environment is put forward concisely, particularly by means of the changes in the primary organ of labour –the hand. But in order to understand the historicity that determines this change, through which men became capable of producing objects requiring finesse to form, another aspect of this change should be mentioned. The clearest instance of this aspect was indicated in *Capital*:

In so far as machinery dispenses with muscular power, it becomes a means of employing labourers of slight muscular strength, and those whose bodily development is incomplete, but whose limbs are all the more supple. The labour of women and children was, therefore, the first thing sought for by capitalists who used machinery. (Marx 1996, 398)

Then the organic change of hands in the history of the relationship of the human to his environment and in the course of the social life of the human is not just about the physical transformation of the hand, but also is about the subrogation of the possessors of the labouring hands. This change, in turn, brought about serious changes in society, particularly in the sphere of class struggle.

Freeing of the hands not only made humans able to transform their environments but elicited the main feature that identifies the human as such, which is his capacity and need to socialise. Engels says that labour expands man’s horizon at every advance. Labour facilitated to bring the members of society together by increasing cases of mutual support and joint activity, and by making clear the advantage of this joint activity to each individual. Then men became compelled to say something to each other (Engels 1987a, 454). Therefore, an element as much determinative

as freeing of the hands regarding the historical materialist view of the human emerges: being human is only socially possible. And this being is realised in the reciprocity of the hand and brain. This is called by Engels as “the reaction on labour and speech of the development of the brain and its attendant senses, of the increasing clarity of consciousness, power of abstraction and conclusion.” This reaction gave both labour and speech an ever renewed impulse to further development. Then comes into play the fully fledged man, society which drove forward and guided this further development of labour and speech (Engels 1987a, 456). Then, the historical emergence of the human is contingent upon his collective activity.

All these are not presented solely as explanatory material regarding the historical materialist view of history, but rather to indicate to arrive at a nodal point that is significant regarding the question of epistemology. This question concerns the idealistic view of the world. Asserting the primacy of the hands to the brain in the constitution of the human was revolutionary regarding the natural sciences of Engels' time –as a matter of fact, it still is. As Foster and Burkett emphasise:

[...] the significance of the freeing of the hands for tool making (hence, labour) was downplayed in 19th- and early 20th-century science, and the belief of most evolutionary scientists continued to be that brain had led the way in the evolution of the human species so that our earlier ancestors would distinguish themselves first and foremost by their cerebral development. (Foster and Burkett 2000, 415)

The meat diet was determinative for the development of the brain and also man had a lot more materials for his nourishment. In virtue of the expansion of edible materials, man became able to live in any climate. All this diversification of the relationships of man with non-human nature and the reciprocal, combined development of the hands, the speech, and the brain caused the man to determine and achieve higher aims for himself (Engels 1987a, 458). The determination of higher aims that Engels spoke of resulted in this,

Law and politics arose, and with them that fantastic reflection of human things in the human mind –religion. In the face of all these images, which appeared in the first place to be products of the mind and seemed to dominate human societies, the more modest productions of the working hand retreated into the background, the more so since the mind that planned the labour was able, at a very early stage in the development of society [...], to have the labour that had been planned carried out by other hands than its own. All merit for the swift

advance of civilisation was ascribed to the mind, to the development and activity of the brain. Men became accustomed to explain their actions as arising out of thought instead of their needs [...]; and so in the course of time there emerged that idealistic world outlook which, especially since the fall of the world of antiquity, has dominated men's minds. It still rules them to such a degree that even the most materialistic natural scientists of the Darwinian school are still unable to form any clear idea of the origin of man, because under this ideological influence they do not recognise the part that has been played therein by labour. (Engels 1987a, 458–459)

This excerpt matters in the sense that in it Engels elucidated the origins of idealism in the objective-material world; to be more specific, in the division of labour. This stands for what Engels (1987b, 169) called as “the great division of labour between the masses discharging simple manual labour and the few privileged persons directing labour, conducting trade and public affairs, and, at a later stage, occupying themselves with art and science.” This is the separation of mental labour from manual labour.

Alfred Sohn-Rethel (1978, 37) says that the importance of the division between mental and manual labour is for the bourgeois class as vital as the private ownership of the means of production. Then within the becoming of the class society, knowledge is appropriated by the ruling class, and knowledge becomes their property. Particularly under the rule of the bourgeois class, while knowledge is further drifted apart from the people that earn their livelihood through manual labour, the sphere of knowledge increasingly became the privileged realm of the ruling class. This way the world comes to be perceived as the product of the mind of the ruling class. This way ideological view of the world comes to be situated. Through this ideology that is brought about by the separation of mental labour and manual labour, man has imagined that he dominated the world in virtue of the power of his mind.

THE TRANSFORMATION OF MOTION INTO ONE ANOTHER

In nature, the transformation of one form of motion to another without any loss, which was proved by William Robert Grove matters for the materialist dialectics mainly due to two reasons. First of all, the conversion of motion is the proof of the dialectical law that the quantitative changes, at a specific nodal point are going to result in qualitative changes. And in a letter to Marx dated 1858, Engels (1983, 326) wrote that Hegel would be delighted with the correlation of forces in physics, or the transformation of motion without the occurrence of any loss. The conversion of motion,

the passing of one type of motion to another is according to Engels (1987a, 477) one of the three great discoveries of natural sciences in the sense that, through this discovery, it was understood that the numerous active causes in nature are the modes of existence of motion. And then the conservation of motion became a natural-scientific fact. This discovery negates the metaphysics since motion hitherto was understood as a quality of matter that had been given by an external and unknown power and it proves that motion is the epitome of matter. As Foster and Burkett (2000, 418) say, through the discovery of the conservation of motion in conversion, the ancient materialist principles of Democritus and Epicurus that nothing comes from nothing, and nothing being destroyed can be reduced to nothing were given new meaning. Without a doubt, countless advances in various fields of natural sciences have been made after the period the *Dialectics of Nature* had been drawn up. But these advances don't render dialectics obsolete as the method for making judgements on the natural processes. According to T. Jayaraman, the advance of scientific knowledge in the last century emphasised the instinctively dialectical materialist character of science. Particularly, when the physical matter is in question, the transformation of quantitative changes into qualitative ones is the standard understanding of science. Great advances have been made in the science of materials and one of these is about the understanding of the various transitions between the different phases of matter. Now enormously sophisticated machines are available to understand the transitions between qualitatively different phases of matter that arise from the quantitative change of some attribute. And the study of qualitative changes that arise from quantitative changes is virtually commonplace in scientific understanding (Jayaraman 2010, 63–70). Even a scholar who was very much skeptical towards dialectics and its relevance to natural sciences as Mario Bunge (1973, 182) claimed that “the only hypothesis of dialectics that would seem to hold universally is the quantity-quality law.” Ted Grant and Alan Woods (2002, 44) mention that some of the most recent investigations of the chaos theory are centered on the critical point where a series of small variations produce a massive change of state. The work of physicist Per Bak and others on self-organised criticality used the example of a sandheap to illustrate processes that occur at many levels of nature, corresponding to the law of transformation of quantity into quality.

Motion is always reciprocal, this is why it is so significant for dialectics: “Even the relative equilibrium of freely floating bodies can only exist where the motion is reciprocally determined” (Engels 1987a, 334). The reciprocal

determination of objects also connotes the unity of opposites as the unity of attraction and repulsion. Engels expounds on the nature of motion:

It is an eternal cycle in which matter moves, a cycle that certainly only completes its orbit in periods of time for which our terrestrial year is no adequate measure, a cycle in which the time of highest development, the time of organic life and still more that of the life beings conscious of nature and of themselves, is just as narrowly restricted as the space in which life and self-consciousness came into operation; a cycle in which every finite mode of existence of matter, whether it be sun or nebular vapor, single animal or genus of animals [...] is equally transient, and wherein nothing is eternal but eternally changing, eternally moving matter and the laws according to which it moves and changes. (Engels 1987a, 334–335)

The notion of the eternal cycle brings forth the unity of repetition and change, of transient and eternal, and of finite and infinite. It brings forth the finitude of all particular beings of nature and the social relationships that reproduce nature.

Essentially, Engels tried to present dialectics as a universal law of motion, and to realise this undertaking he expressed the dialectics as the truth by means of the exactness of natural sciences. This way, it becomes possible to obtain the concept of the necessity of proletarian dictatorship in the heart of nature. Therefore, by means of the advances in natural sciences, we are provided with the view of the whole, kernel of which is constituted by nature. Vigier (1966, 245) said that dialectical materialism is not only the demand of historical totalisation, it results first and foremost from the very movement of science. Empiricism is of course a necessary moment in the advance of the natural sciences. That's why Engels talks about the advances that have been made by the empirical natural sciences that arrive at brilliant conclusions. These made it possible not only to overcome the mechanic one-sidedness of the eighteenth century but also through generalising the results into a system of materialist knowledge of nature and by virtue of the proofs of the interconnections internal to nature, has become a theoretical science (Engels, 1987a, 476). It is the development of science that drums the dialectic into the natural scientists as Lukács (2000, 95) said. Then Engels' interest in natural sciences is not by itself but is rather to affirm dialectics as the view of the whole, as the method that connects the separate phenomena into a notion. Discoveries in the sphere of chemistry mattered to Engels also because Hegel had already informed them in his *Logic*, thus Engels (1987a, 359) says: "the sphere...in which the law of

nature discovered by Hegel celebrates its most important triumphs is that of chemistry.”

Chemistry, the conversion of motion in particular provided the exactness that Engels desired to incorporate into dialectics, not biology (Darwin's science) in which uncertainty, chance, and error play a bigger part. On this matter, Engels (1987a, 361) said this: “In biology, as in the history of human society, the same law holds good at every step, but we prefer to dwell here on examples from the exact sciences since here the quantities are accurately measurable and traceable.” The conservation of motion is the correlative of the dialectical law of the transformation of quantitative change into a qualitative one. This fundamental dialectical law of motion, which was celebrated by Lenin (1976, 123) in his *Conspectus of The Science of Logic* with the expression Leaps! Leaps! Leaps!, was expounded by Hegel,

In the quantitatively measured scale of musical relations, a quantum gives rise to a relation of harmony in the progression of notes without that quantum having on the scale any other relation to the preceding and the succeeding ones than these have in turn to those preceding and following them [...] The succession of merely indifferent relations which neither alter the preceding specific reality nor otherwise form any such reality, is suddenly interrupted; and while from the standpoint of quantity the succession proceeds in the same manner, a specific relation breaks in through a leap. (Hegel 2010, 321)

The same kind of nodes and leaps occur in chemical combinations and in every birth and every death. Hegel (2010, 321–322) opposes the ordinary saying *Natura non facit saltum*, because “the alterations of being in general are not only the passing over of magnitude into another magnitude, but the transition from the qualitative into the quantitative and contrariwise, a becoming-other that interrupts gradualness and stands over against the preceding existence as something qualitatively other.”

DIALECTICS AND METAPHYSICS

Engels (1987b, 513; 1990, 26, 370, 384, 385) speaks of the opposition between metaphysics and dialectics in his various works. The section titled Natural Science and Philosophy of the *Dialectics of Nature* is essential to comprehend the materialist dialectics and to find the base of materialist dialectics in nature. First, Engels presents the difference between materialist dialectics and Hegelian dialectics. Contradiction in Hegel is mystical since his categories are pre-existing and the dialectics of the real world are

mere reflections of these categories. Therefore, Hegel postulates the motion of mind as precedent to nature. For example, about Hegel's work titled the *Philosophy of Nature*, Kangal (2020, 132) mentions the same view of Hegel's. He says that Hegel's view of nature is dedicated to demonstrate that Spirit passes to Nature via Idea. It is the Spirit that gives life to Nature. Spirit is prior to Nature, motion and interaction in Nature is endowed to it by Spirit (Kangal 2020, 132). Hegel views nature as the alienation of the Idea. But Engels maintains that in reality, the relationship is the other way around: the forms of motion of the real world are reflected as the dialectics of the mind. Therefore, we also get the distinction between objective dialectics and subjective dialectics. The former prevails throughout nature and the latter is the dialectical thought, which asserts itself everywhere in nature, determines the life of nature (Engels 1987a, 485). Engels, in his 1891 dated letter to Conrad Schmidt mentions this opposition:

The inversion of Hegel's dialectics is based on the assumption that it is the 'self-development of the idea' of which, therefore, the dialectic of facts is only the image, while the dialectic in our minds is but the reflection of the actual development taking place in the natural world and human history in obedience to dialectical forms. (Engels 2001, 287)

Then Engels maintains the unity of subjective dialectics and objective dialectics. He says that our subjective thought and the objective world are subject to the same laws. Hegel's reasoning is significant in this sense: In his work, thought and being are in unity and his philosophy has proved the analogy of the processes of thought to those of nature and history and vice versa (Engels 1987a, 545). Georgi Plekhanov (1944, 11) makes the same point when he says, "man is only a part of nature, a part of being; that is why there can be no contradiction between his thought and being...the laws of being are also the laws of thought." The various types of judgement that Hegel specified in *Logic* are connected to the conservation of motion by Engels. On this subject, Engels says that what seems as the thought-form of judgement as such in Hegel, confronts us as the development of empirically-based theoretical knowledge of the nature of motion in general. Then, if they are truly known, the laws of thought and the laws of nature are necessarily in accord (Engels, 1987a, 505). The dialectics, as the laws of motion of nature, antedates the dialectical reasoning and the latter is the *aposteriori* reflection in our minds. Humanity achieves this reflection through the development of forces of production and its

contradiction with the relations of production. Therefore, materialist dialectics is not contingent; it is the mutual product of nature as such and human labour.

What are the main principles that make us discern dialectics from metaphysics? Engels (1987a, 356) has a simple answer to this question: "The general nature of dialectics to be developed as the science of interconnections, in contrast to metaphysics." Then we understand that the absolute opposition between dialectics and metaphysics also corresponds to the opposition between fluid categories and fixed categories. The fixed opposites such as basis and consequence, cause and effect, identity and difference, appearance and essence are untenable. One pole is present in the other *in nuce* and at a definite moment one opposite turns into its other, all logic develops from this contradiction (Engels 1987a, 485). Lewontin and Levins concisely explained dialectical materialism's view of nature,

Dialectical materialism enters the natural sciences as the simultaneous negation of both mechanistic materialism and dialectical idealism, as a rejection of the terms of the debate. Its central theses are that nature is contradictory, that there is unity and interpenetration of the seemingly mutually exclusive, and that therefore the main issue for science is the study of that unity and contradiction, rather than the separation of elements, either to reject one or to assign it a relative importance. (Lewontin and Levins 2009, 133)

Here, a common error should be set aside. From the perspective of the materialist dialectics, the problem is not the incorporation of philosophy into the activities of natural scientists, because philosophy inevitably is involved in the scientific activity. Kaan Kangal (2020, 112) also mentioned this as Engels' contention: "a philosophy always informs natural sciences in theory or in applied practice." The matter is to save the natural sciences from philosophical outlooks such as positivism and empiricism:

Natural scientists believe that they free themselves from philosophy by ignoring it or abusing it. They cannot, however, make any headway without thought, and for thought they need thought determinations. But they take these categories unreflectingly from the common consciousness of so-called educated persons, which is dominated by the relics of long obsolete philosophies [...], or from uncritical and unsystematic reading of philosophical writings of all kinds. Hence they are no less in bondage to philosophy, but unfortunately in most cases to the worst philosophy, and those who abuse philosophy most are slaves to precisely the worst vulgarised relics of the worst philosophies. (Engels, 1987a, 490–491)

Complementary to this operation is to connect the separate spheres of natural science. Then, natural science enters the field of theory and in this case, the methods of empiricism will not suffice (*ibid.*, 338). Therefore, an aspect of setting aside empiricism is to set up a theory that considers nature as a whole. That's why Engels (1987a, 341) regards the Greek philosophy as "fruitful for modern natural science," for the Greeks viewed nature as a whole, even though this was a result of contemplation.

Engels, emphasising the constraints of the empirical method of scientific production opposes its teleologic approach to the relationship between cause and effect and empiric mode of agglomerating the scientific material. Engels' opposition to teleology manifests itself when he criticises the derivation of force from the relationship of an organism to its environment. Engels designates this as replacing the changes caused by the functions of our organisms with a fictitious cause, "a so-called force corresponding to the change." Then he speaks of carrying this method to the external world and inventing as many forces as there are diverse phenomena (Engels 1987a, 372). This operation includes the collection of empirical, immediate knowledge of the changes that have only one cause.² Constitution of such a collection of the knowledge of appearances takes place on the basis of the pre-supposition that movement is caused by a force external to nature. The reciprocal relations of organisms to reproduce are realised as they were in virtue of the impulse of an external power.

THE UNITY OF OPPOSITES

To exhibit the dialectics in nature, one of the fundamental ways is to make the unity of opposites evident as it exists in nature. Engels approaches the case of polarity (attraction and repulsion) as the most apparent one regarding the unity of opposites. Engels remarked that the unity of attraction and repulsion in nature in a single body begins in the sphere of magnetism. Then, just as motion is the common mode of existence of all matter, the

2. Hegel's concept of bad infinity is appropriate to grasp the essence of this method. Bad infinity specifies the finitised infinity, the infinity of understanding, not of the reason; the infinity entangled in unreconciled, unresolved, absolute contradictions; the infinite as repetitive monotony; the infinite as a first elevation of sense representation above the finite to thought, but to a thought which, for content, has only a nothing and is unable to bring the negative back to the positive; the infinity in the form of the quantitative progress to infinity that does not enhance the object, but bloats the subject who ingests such vast quantities (Hegel 2010, 109-193); the view of objectivity of the sense perception and of essentialism.

unity of attraction and repulsion manifests itself in the various spheres of nature: in chemical processes, electricity, in the organic life while the cell nucleus is formed and regarding the evolution, the most complicated plant on the one hand and human on the other there is the continuous conflict between heredity and adaptation (Engels, 1987a, 492). Therefore, a fundamental principle of the materialist dialectics, the unity of opposites manifests itself in various processes of nature. This should make it clear that in dealing with nature employing fixed concepts that exclude each other, motion and development in nature become incomprehensible. In nature opposites such as positive and negative, finite and infinite, life and death,³ part and whole, chance and necessity, organic and inorganic, so on and so forth are in unity. All these oppositions in nature are intertwined, in this sense natural sciences' dealing with their subject matters by way of the ordinary logic of "either-or" is theoretically inhibiting. For example, when the relation of positive and negative is in question Hegel's (1991, 174) view is this: "Certainly, these [the positive and the negative] contain the determination of being and nothing. But the positive makes no sense by itself; rather, it is strictly related to the negative. And the situation is the same with the negative."

One of the most determinative unity –as affirmed by Engels– for the materialist dialectics is the unity between the cause and the effect. Hegel (2010, 494) said that "*an effect contains nothing whatever that the cause does not contain. Conversely, a cause contains nothing that is not in its effect [...]* Cause as such entails its effect, and the effect entails the cause." Then Hegel spoke of the sameness of endless progression from effect to effect and the regression from cause to cause. In the latter, a cause becomes an effect that has another cause and the effect becomes a cause that has another effect in turn. The cause has an effect and is at the same time itself effect, and the effect not only has a cause but is itself cause. Regarding the active substance, the cause reveals itself in the effect as what it is and the effect is identical with the cause, is not an other (Hegel 2010, 499–510). Why does the unity of the cause and the effect matter? First, the unity expresses that everything in nature and society is in a reciprocal relationship and no relationship is merely one-sided. Second, it presents a view of the world in which none of the beings is passive and each of them is active causes that

³ "The *negation* of life as being essentially contained in life itself, so that life is always thought of in relation to its necessary result, death, which is always contained in it in germ. The dialectical conception of life is nothing more than this [...] Living means dying" (Engels, 1987a 572).

have an effect on the other. Kangal sets forth the implications of this unity concisely: “The emergentist articulation of dialectical structures in nature serves to explicate the view that if one thing brings about another thing, the prior is affected by what it gives rise to” (Kangal 2020, 165).

In fact, the unity of the opposites as such is not only significant as an isolated law of dialectics. It is the notion within which various oppositions, laws of motion, relations, so on and so forth are intertwined. The unity of the opposites is also one of the determinative moments of the absolute opposition between dialectics and metaphysics. Engels put this opposition forward in these words,

The law of identity in the old metaphysical sense is the fundamental law of the old outlook: $a = a$. Each thing is equal to itself. Everything was permanent, the solar system, stars, organisms. This law has been refuted by natural science bit by bit in each separate case, but theoretically, it still prevails and is still put forward by the supporters of the old in opposition to the new: a thing cannot simultaneously be itself and something else [...] For natural science in its comprehensive role, however, even in each single branch, abstract identity is totally inadequate, and although on the whole it has now been abolished in practice, theoretically it still dominates people’s minds, and most natural scientists imagine that identity and difference are irreconcilable opposites, instead of one-sided poles which represent the truth only in their reciprocal action, in the inclusion of difference within identity. (Engels 1987a, 496)

Fundamental aspects of metaphysics, the idea of permanence, the idea of self-identity of all things necessarily evoke the idea of the first impulse, of an unnatural force that sets things in motion in a way that keeps them in equilibrium. And in fact, the dialectical negation of the idea of a force preceding nature not only negates the idea of creation, but it also implies change is inherent to nature and society, that they are in a reciprocal relationship and the unity of cause and effect. Thereby an essential aspect of Engels’ undertaking made through the *Dialectics of Nature* becomes evident as to include the natural sciences and the advances realised by them in the materialist dialectics and to comprise the truth that the world is constantly changing.

CONCLUSION

Why the *Dialectics of Nature* is Important for Marxism and Praxis?

In the *Dialectics of Nature* Engels elaborates the laws of dialectics through the immediacy of empiric natural sciences and provides the dialectics with

its materialist basis. In so doing, he exposes dialectics not merely as a subjective mode of reasoning that is to be reflected on nature, but as the law of motion internal to nature. This way, it becomes possible to approach nature and society in their unity with a single method.

This takes us to the problem of human ontology. Engels' view is the negation of the metaphysical human concept that views the human as identical with himself, a being in itself. In fact, what identifies the human is his being in constant flux, due to his activities and relationships. Neither nature nor human is postulated through fixed and rigid categories, then it becomes possible to consider the whole and its part in reciprocal constant change. This change is first and foremost happens through the reciprocal relations between humans and nature; that is to say, these two opposites are both the cause and the effect of each other.

Engels spoke of the unity of social history and natural history. Therefore, the actions of the revolutionary subject not only change the history of society but also of nature. The revolution is necessary to sublimate the capitalist mode of production that caused the ecological crisis and further leads it to an impasse. The relations of production internal to the capitalist mode of production constitute the objectivity in which all subjects and nature are subordinated to market relationships. The capitalist relations of production necessitate the overproduction of capital, thereby the ecological crisis, the price of which is paid by the proletariat becomes an objective necessity. The fragmented capitalist society in which the actions of the subjects are governed by the law of competition is unable to cope with the crisis. Therefore, the resolving of the ecological crisis hinges on the struggle of building a socialist society in which manual labour is not separated from mental labour, science views society and nature in their unity, and exchange value disappears.

REFERENCES

- Bogdanov, Alexander. 2016. *The Philosophy of Living Experience*. Edited and translated by David G. Rowley. Leiden: Brill.
- Bukharin, N. I. 1971. "Theory and Practice from the Standpoint of Dialectical Materialism." In *Science at the Cross Roads: Papers Presented to the International Congress of the History of Science and Technology*, 11–33. London: Frank Cass & Co. Ltd.
- Bunge, Mario. 1973. *Method, Model and Matter*. Dordrecht: D. Reidel Publishing Company.
- Caudwell, Christopher. 1950. *Further Studies in a Dying Culture*. New York: Dodd Mead & Company.
- . 1958. *Studies in a Dying Culture*. New York: Dodd Mead & Company.

- Darwin, Charles. 1981. *The Descent of Man, and Selection in Relation to Sex*. Princeton: Princeton University Press.
- Engels, Frederick. 1925. *Principles of Communism*. Translated by Max Bedacht. Chicago: The Daily Worker Publishing Co.
- . 1983. “Engels to Marx. 16 July.” In *Marx and Engels Collected Works*, Vol. 40. 325–327. London: Lawrence & Wishart.
- . 1987a. “Dialectics of Nature.” In *Marx and Engels Collected Works*, Vol. 25. 313–588. New York: International Publishers.
- . 1987b. “Anti-Dühring.” In *Marx and Engels Collected Works*, Vol. 25. 5–309. New York: International Publishers.
- . 1990. “Ludwig Feuerbach and the End of Classical German Philosophy.” In *Marx and Engels Collected Works*, Vol. 26. 353–398. London: Lawrence & Wishart.
- . 2001. “Engels to Conrad Schmidt. 1 November.” In *Marx and Engels Collected Works*, Vol. 4. 285–288. New York: International Publishers.
- . 2010. “Socialism: Utopian and Scientific.” in *Marx and Engels Collected Works*, Vol. 24. 281–325. London: Lawrence and Wishart.
- Foster, John Bellamy and Paul Burkett. 2000. “The Dialectic of Organic/Inorganic Relations.” *Organization & Environment* 13(4): 403–425.
- Hegel, G. W. F. 1991. *The Encyclopaedia Logic*. Translated by T. F. Geraets et al. Indianapolis: Hackett Publishing Company, Inc.
- . 2010. *The Science of Logic*. Edited and translated by George Di Giovanni. Cambridge: Cambridge University Press.
- Jameson, Fredrick. 2009. *Valences of the Dialectic*. London: Verso.
- Jayaraman, T. 2010. “Dialectical Materialism and Development in Contemporary Science.” *The Marxist* 26(4): 61–98.
- Kangal, Kaan. 2020. *Friedrich Engels and the Dialectics of Nature*. London: Palgrave Macmillan.
- Kant, Immanuel. 2007. *Critique of Judgement*. Edited by Nicholas Walker, translated by James Creed Meredith. New York: Oxford University Press.
- Lenin, V. I. 1976. “Conspectus of Hegel’s Book *The Science of Logic*.” In *V. I. Lenin Collected Works Volume 38*, edited by Stewart Smith, translated by Clemence Dutt, 85–300. Moscow: Progress Publishers.
- . 2009. “What is to be Done.” In *V. I. Lenin Collected Works Volume 5*, edited by Victor Jerome, translated by Joe Fineberg and George Hanna, 347–520. Moscow: Progress Publishers.
- Lewontin, Richard and Richard Levins. 2007. *Biology Under the Influence*. New York: Monthly Review Press.
- . 2009. *The Dialectical Biologist*. Delhi: Aakar.
- Liodakis, George. 2001. “The People-Nature Relation and the Historical Significance of the Labour Theory of Value.” *Capital & Class* 25(1): 113–140.
- Lukács, Georg. 1971. *History and Class Consciousness*. Translated by Rodney Livingstone. Cambridge: The Mit Press.
- . 2000. “Tailism and Dialectic.” In *A Defence of History and Class Consciousness*. Translated by Esther Leslie, 45–149. London: Verso.
- Magdoff, Fred and Chris Williams. 2017. *Creating an Ecological Society*. New York: Monthly Review Press.
- Mandel, Ernest. 1986. “In Defence of Socialist Planning.” *New Left Review* 159(1): 5–37.
- Marcuse, Herbert. 2009. *Negations: Essays in Critical Theory*. Edited by Steffen G. Bohm, translated by Jeremy J. Shapiro London: Mayfly.

- Marx, Karl. 1975. "Economic and Philosophic Manuscripts of 1844." In *Marx and Engels Collected Works*, Vol. 3, 229–346. London: Lawrence & Wishart.
- . 1985. "Marx to Ferdinand Lassalle." In *Marx and Engels Collected Works*, Vol. 41. 245–247. London: Lawrence & Wishart.
- . 1986. "Economic Manuscripts of 1857–1858." In *Marx and Engels Collected Works*, Vol. 28. 5–537. London: Lawrence and Wishart.
- . 1996. "Capital." In *Marx and Engels Collected Works*, Vol. 35. 7–852. London: Lawrence & Wishart.
- Marx, Karl and Frederick Engels. 1975. "The German Ideology." In *Marx and Engels Collected Works*, Vol. 5. 28. London: Lawrence & Wishart.
- . 1976. "Manifesto of the Communist Party." In *Marx and Engels Collected Works*, Vol. 6. 477–517. London: Lawrence and Wishart.
- Mészáros, István. 1970. *Marx's Theory of Alienation*. London: Merlin Press.
- Plekhanov, Georgi. 1944. *Fundamental Problems of Marxism*. Edited by D. Riazanov. New York: International Publishers.
- Skybreak, Ardea. 2006. *The Science of Evolution and the Myth of Creationism*. Chicago: Insight Press.
- Sohn-Rethel, Alfred. 1978. *Intellectual and Manual Labour*. Edited by Jock Young and Paul Walton. London: The Macmillan Press Ltd.
- Vigier, Jean-Pierre. 1966. "Dialectics and Natural Science." In *Existentialism versus Marxism*, edited by George Novack, 244–257. New York: A Delta Book.
- Woods, Alan and Ted Grant. 2002. *Reason and Revolt Volume I*. New York: Algora Publishing.

Engels, Reductionism and Epigenetics: The Lysenko Debate

Hari Kumar

ABSTRACT: This article has three goals: To reprise Engels' view of dialectical change; second to review how epigenetics challenges classical genetics and assess its tenets against those of Trofim Lysenko; finally, to consider the political rise of Lysenko. Engels viewed interconnectedness and change as key principles of nature and society, as did Marx. Eschewing a-priori schematization, both viewed theory as derived *from* and tested *by* practice. Western classical genetics and Lysenkoism took diametrically opposite forms of reductionism. Genetics ignored cell-organism interactions with the environment, adopting predeterminism; Lysenko stressed cellular roles minimizing genes. However modern epigenetics supports Engels' rejection of an 'either-or' mentality. Parallel historical reductionism places Stalin in sole command of the USSR. Two intersecting reductionisms—in biology, and in political history—need updating to understand Lysenkoism.

KEYWORDS: Engels, reductionism, epigenetics, The Lysenko Debate, Lysenkoism, Stalin.

1. INTRODUCTION

The dominant, determinist view of genetics seemed assured when Watson and Crick discovered deoxyribonucleic acid (DNA). This was hailed as a 'code of life', or 'program':

The completely individualistic and yet also species-specific DNA program of every zygote, which controls the development of the central and peripheral nervous systems, of the sense organs, of the hormones, of physiology and morphology, is the **program** for the behavior computer of this individual. (Mayr 1976, 365)

Such a Manichean view mirrored the Lysenkoist espousal of cytoplasm *against* the nucleus. Projecting back to the 1940s from the DNA viewpoint of the 1960s, makes Lysenko's theories appear bizarrely wrong. Yet Lysenkoist theories were *not* unusual in international genetics then, and that

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divide extended beyond the 1940s. This article asks these specific questions: How did Engels understand nature? How did the divide between proponents of gene and those of the cell develop? How does modern genetic theory sit besides Morganism and Lysenkoism? Finally, how did Lysenko come to scientific power? I argue that reductionism cannot explain genetics or Soviet history.

2. ENGELS ON NATURE AND DIALECTICS

Marx and Engels disparaged ‘mechanical materialism’ now more commonly termed ‘reductionism’. J.D. Bernal characterized this as:

[...] a reduction of all the universe to a number of separate abstract categories: space, time, matter, motion, Now the whole body of the scientific knowledge of the universes does not rest at on the possibility or actuality of a reduction to those categories, There are still only very small parts of the scientific fields which can be treated in this way, and the attempt to understand it upwards from pure mathematical physics to sociology is faced with a series of impassable breaks which are merely slurred over with a pious hope that we will calculate. (Bernal 1949, 369)

Engels believed two main principles imbued nature—the universality of change (coupling transformation and negations); and a ‘holism’ (expressed as interpenetration of opposites). He thought these were ‘intuitively’ understood by Greek natural philosophers, but ignored in later mechanical materialism.

The Attacks on Engels by Lukács

Especially after the 20th Party Congress CPSU(B) when Stalin was denounced, Engels became unfashionable in a left influenced by Georgy Lukács. Only recently have Marxists more willingly refuted Lukácsism, to praise Engels’ *Dialectics of Nature* (Kangal 2020; Foster 2020; Sheehan 1993; Blackledge 2020). Engels had already faced attacks earlier prompting Lenin’s (1962) counter in *Materialism and Empiriocriticism*. But in 1923 Lukács launched a new attack to join Marx to Hegel: “The conception of society that Lukács articulates owes as much to Hegel as to Marx” (Stahl 2018).

Lukács pleaded he had to rescue Marx from Engels’ clutches: “(I am) defending orthodox Marxism against Engels himself [...] We adhere to Marx’s doctrines, then, without making any attempt to diverge from them,

to improve or correct them. The goal of these arguments is an *interpretation*, an exposition of Marx's theory as *Marx understood it*" (Lukács 1993, 131).

Sheehan (1993) shows that Lukács retains currency. Lukács inspired several 'Western Marxisms' (Anderson 1987), including Alfred Schmidt: "Lukács [...] deserves recognition as the first to oppose Engel's fateful attempt to extend the dialectic to cover pre-human and extra-human nature, by pointing out how important it is precisely for materialism to restrict the dialectical methods to the socio-historical areas of reality" (Schmidt 2014, 168).

Lukács especially repudiated Engels' on practice as a test of theory or science:

Engels' deepest misunderstanding consists in his belief that the behavior of industry and scientific experiment constitutes praxis in the dialectical, philosophic sense. In fact, scientific experiment is contemplation at its purest. The experimenter creates an artificial, abstract milieu in order to be able to observe undisturbed the untrammelled workings of the laws under examination, eliminating all irrational factors both of the subject and the objects, He strives as far as possible to reduce the material substratum of his observation to the purely 'rational' product, to the 'intelligible' matter: of mathematics. (Lukács 1993, 3)

Lukács thus places "pure" thought into an idealist framework.

Did Marx and Engels Diverge on Key Principles of Dialectics?

There is no need to 'defend' Marx from Engels. In their long partnership Marx and Engels conceptualized societal change in the *The German Ideology*, but then divided their labours. Marx delved into the economics underlying changes in society. Engels, after retiring from his 'day job', began to systematize their joint views on philosophy and nature. While Engels never finished he left clear directions in his completed philosophical works only as polemics against Duhring, and Feuerbach. Hence it is fatuous to extract a finally worked out theory of, say heredity. But Engels does state principles underlying a universe where three 'laws' play out. These are traceable today, but I stress two principles. First, a principle of change, or 'flux' being primary in the universe. Marx agreed, depicting 'society' as a metaphorical 'organism': "the present society is no solid crystal, but an organism capable of change, and is constantly changing" (Marx 1976b, 93).

For Engels this constant change was fundamental: "The whole of nature, from the smallest element to the greatest, from grains of sand to suns,

from protista to men, has its existence in eternal coming into being and passing away, in ceaseless flux, in un-resting motion and change” (Engels 1987b, 327).

Such change came about through ‘motion’, although such motion was easier to grasp in inanimate nature than in organic nature:

The investigation of the nature of motion had as a matter of course to start from the lowest, simplest forms of this motion and to learn to grasp these before it could achieve anything in the way of explanation of the higher and more complicated forms. [...] Only after these different branches of the forms of motion governing non-living nature had attained a high degree of development could the explanation of the processes of motion representing the life process be successfully tackled. (Engels 1987b, 362)

Only such intense awareness of ‘flux’ explains how Engels could write before Darwin’s ‘Origins’ publication (1859), in 1858:

So much is certain; comparative physiology gives one a withering contempt for the idealistic exaltation of man over the other animals. At every step one bumps up against the most complete uniformity of structure with the rest of the mammals, and in its main features this uniformity extends to all vertebrates and even—less clearly—to insects, crustaceans, earthworms, etc. The Hegelian business of the qualitative leap in the quantitative series is also very fine here. (Engels 1936, 114)

This leap was a movement of change, not in a linear but a ‘spiral’ form of motion. In 1878 Engels’ outlined his ‘General Plan’:

Dialectics as the science of universal inter-connection. Main laws: transformation of quantity and quality—mutual penetration of polar opposites and transformation into each other when carried to extremes—development through contradiction or negation of the negation—spiral form of development. (Engels 1987b, 313)

Engels’ second major principle was opposition to rigid ‘hard and fast lines’. This utilises two laws—the inter-penetration of opposites, and the negation of the negation:

Dialectics, so-called objective dialectics, prevails throughout nature [...] Hard and fast lines are incompatible with the theory of evolution. Even the borderline between vertebrates and invertebrates is now no longer rigid [...] just as that between fishes and amphibians, while that between birds and reptiles dwindles more and more every day [...] Dialectics, which likewise knows no HARD AND FAST LINES, no unconditional, universally valid “either”-“or” and which bridges the fixes metaphysical differences [...] and reconciles the opposites, is

the sole method of thought appropriate in the highest degree. (Engels 1987b, 492–493)

Thus for him, polar opposites weave into each other. In biology the complexity of living systems frequently revived ‘vitalism’—a ‘living force’ arising from inexplicability and/or theology. Complexity forced some to a mechanical application of dialectics, lapsing into vitalism. Against this simplification Engels demanded more data, rejecting reductionist pseudo-explanations to fill gaps:

In organic nature the category of force is completely inadequate and yet continually applied. True, it is possible to characterise the action of the muscles, in accordance with its mechanical effect, as muscular force and also to measure it [...] One can even think of other measurable functions as forces, e.g. the digestive capacity of various stomachs, but one quickly arrives ad absurdum [...] This misuse however, has led to speaking of a vital force [...] The last refuge of all supernaturalists. (ibid., 560)

In short vitalism cannot resolve inexplicability of complexity, as the ‘whole’ does not equal the ‘parts’:

Part and whole, for instance are already categories which become inadequate in organic nature. The ejection of seeds—the embryo—and the new-born animal are not to be conceived as a “part” that is separated from the “whole”; that would give a distorted treatment. It becomes a part only in a **dead body**. (Hegel quoted in Engels 1987b, 494)

Engels realised that dissecting portions away enabled deeper study, but such processes were ‘for everyday use’: “of course for everyday use, for the small change of science, the metaphysical categories retain their identity” (ibid.). This is why Engels resonated with developmentologists in the 1930s *Theoretical Biology Club* (Peterson 2017). Though some preferred Whitehead’s ‘Holism’, Bernal especially recognized Engels’ priority (Bernal 1937).

Engels did not announce a-priori theoretical rules. Engels insisted that only ‘strictly scientific research’ reveals the underlying dialectic. Factual bases enabled later scientists to transcend the Greek ‘brilliant intuition’. Lack of facts in evolutionary history, rendered Lamarck not more than “anticipatory”: “We must not overlook the fact that in Lamarck’s time science was as yet far from being in possession of sufficient material to have enabled it to answer the question of the origin of species except in an anticipatory way, prophetically, as it were” (Engels 1987a, 69).

Instead of foisting theory onto nature, Engels argued to move from observation to theory: “In every field of science as in historical science, one must proceed from the given facts, in theoretical natural science too the inter-connections are not to be built into the facts but it be discovered in them, and when discovered to be verified as far as possible by experiment” (Engels 1987b, 342–343).

Marx agreed fully when discussing societal changes with the ‘critic’ Mikhailovsky: “By studying each of these evolutions on its own, and then comparing them, one will easily discover the key to the phenomenon, but it will never be arrived at by the all-purpose formulae of a general historico-philosophical theory, whose supreme virtue consists in being super-historical” (Marx 1989, 201).

Some Specific Views on Heredity

In the late 1800s Engels could not specify specific theories. Yet he had startling insights, through a lens of interconnectedness and unity of opposites. For example, the interplay of heredity and adaptation:

One can conceive of heredity as the positive, conservative side, adaptation as the negative side that continually destroys what has been inherited, but one can just as well take adaptation as the creative, active, positive activity, and heredity as the resisting, passive, negative activity. But just as in history progress makes its appearance as the negation of the existing state of things, so here also—on purely practical grounds—adaptation is better conceived as negative activity. (Engels 1987b, 492–493)

Duhring states [...] nice trash about preformationism. Nothing is easier than to turn such opposites, like all other opposites of this kind, around and prove that adaptation, precisely by altering the **form** preserves the essence, the **organ itself**, while heredity, by the fact alone of the mixture of 2 individuals different each time, constantly brings about changes the accumulation of which does not exclude a change in species. As a matter of fact, the results of adaptation are also inherited! [...] Haeckel is quite right in considering heredity essentially the conservative, positive side of the process and adaptation, its revolutionising, negative side. (Engels 1987c, 600)

Opposing the later Lukács, Marx used the same processes as Engels, when settling accounts with Proudhon:

this thesis [...] opposed to itself, splits up into two contradictory thoughts—the positive and the negative, the yes and the no. The struggle between these two antagonistic elements comprised in the antithesis constitutes the dialectic movement. The yes becoming no, the no becoming yes, the yes becoming both yes and no, the no becoming both no and yes, the contraries balance, neutralise,

paralyse each other. The fusion of these two contradictory thoughts constitutes a new thought, which is the synthesis of them. This thought splits up once again into two contradictory thoughts, which in turn fuse into a new synthesis. Of this travail is born a group of thoughts. This group of thoughts follows the same dialectic movement as the simple category, and has a contradictory group as antithesis. Of these two groups of thoughts is born a new group of thoughts, which is the synthesis of them. Just as from the dialectic movement of the simple categories is born the group, so from the dialectic movement of the groups is born the series, and from the dialectic movement of the series is born the entire system. (Marx 1976a, 162–63)

Summary: Engels argues that change and the inter-penetration of opposites are crucial. How did genetics fare by ‘tests of practice’ over the next 100 years?

3. BUILDING THE GENETIC AND EVOLUTIONARY STANDARD NUCLEAR LINE

This potted history of genetics hopefully assists interpreting later controversy. Ernst Mayr, the evolutionist echoes Engels, opposing ‘continuity’ to ‘change’ in heredity: “Intuitively all students of nature felt the existence of some conflict or contradiction between the facts of inheritance and those of variation. Inheritance implies continuity and constancy; variation implies change and divergence” (Mayr 1982, 681).

This tension played out in the 1900s. Controversy engulfed the proposed primacy of the nucleus against the cytoplasm of a cell (Sapp 1987). Those promoting the cytoplasm resented the ‘nuclear monopoly’ established in the ‘fly room’ of Thomas Hunt Morgan: “Many German investigators fought vigorously against what they called the “*Kernmonopol*” (“monopoly of the nucleus”) [...] far into the twentieth century” (Churchill 1987, 357).

In the 19th century heredity was still loosely conceived as a blending of characteristics of the two parents. But this was mired in ‘uninhibited speculation’ (Mayr 1982, 668). Biologists were roughly divided into pre-formationists who argued a prefigured outcome (whether ovists favouring the ovum or as spermists)—or epigenesists relying on unspecified powers of development (ibid., 645). Gradually a particulate theory of hereditary transmission became established. Particles now did not ‘blend’ but retained separate agency. After Darwin and Mendel, such particles (gemmules, factors) were located on chromosomes, becoming ‘genes’ in isolated nuclei. How did *Kernmonopol* become established?

Darwin on Heredity and His Particles of Heredity

Engels (1987b, 476) thought evolution was one of three ‘great discoveries’ transforming views of natural science. Darwin’s theory is now fundamental. But reductionists including Richard Dawkins (1976) favour certain aspects. Especially the role of ‘chance’ or ‘non-directed’ mutations ‘filtered’, and retained or discarded by ‘blind’ natural selection. However, Charles Darwin was inconsistent, also espousing a Lamarckian inheritance of acquired characteristics. Darwin favoured environmental influences to defend the theory of natural selection:

Darwin nearly always concluded that each of the variations he paraded before his readers was the product of a divergence from a single original source rather than of a convergence due to racial or species crossings. It suited Darwin’s theory of speciation that the conditions of life, not hybridization, provided the root cause of such somatic changes. (Churchill 1987, 344)

We see the young of living beings, become permanently changed or subject to variety, according to circumstances, —seeds of plants sown in rich soil, many kinds, are produced, though new individuals produced by buds are constant, hence we see generation here seems a means to vary, or adaptation. Again we believe (know) in course of generations even mind and instinct become influenced. (Darwin n.d.)

Darwin also highlighted the ubiquitous effects of inheritance: “No breeder doubts how strong is the tendency to inheritance; that like produces like is his fundamental belief” (Darwin 1958, 35).

If the varying individual did not actually transmit to its offspring its newly-acquired character, it would undoubtedly transmit to them as long as the existing conditions remained the same, a still stronger tendency to vary in the same manner [...] But if variations useful to any organic being ever do occur, assuredly individuals thus characterised will have the best chance of being preserved in the struggle for life; and from the strong principle of inheritance, these will tend to produce offspring similarly characterized. (Darwin 1958, 97, 128)

Because he lacked experimental proof, Darwin resorted to hypothesis: “My view is merely a provisional hypothesis or speculation; but until a better one be advanced, it will serve to bring together a multitude of facts which are at present left disconnected by any efficient cause” (Darwin 1875). He proposed a particulate ‘gemmule’:

Each kind of cell in the body is represented by its own kind of gemmule; the mosaic of characteristics in hybrids is due to the mixing of parental gemmules;

and the facts of reversion to ancestral characteristics [...] is due to the activation of previously dormant gemmules. (Mayr 1982, 693)

[...] gemmules were the surplus products of cells; when set free to circulate, they multiplied and provided for new growth, regeneration, and gemmae, and they collected in the gonads to form gametes. (Darwin 1875, 32)

Mendel's Solution to The Problem of Heredity

Meanwhile Gregor Mendel reported (1865) a different heredity, neglected until 1900. Mendel derived 'discrete units' from chemistry and physics (Orel 1984, 32; Sandler and Sandler 1985). In experimental crosses using peas he mapped 15 external characteristics (phenotypes) in 34 varieties. He showed that segregation (separation) of simple characteristics was largely predictable. His 'factors' became the later dominant and recessive genes differing in generations in a 3:1 ratio (Orel 1984, 50, 56). But where—physically—were such factors?

Identifying Chromosomes—The Rise of the Nucleus

Robert Hooke found cells in 1665, as Anton Van Leeuwenhoek described bacteria. Only in 1833 did Robert Brown distinguish nucleus from cytoplasm, after which the Schwann-Schleiden cell theory of life (1842) was stated (Mayr 1982, 652–655). For Engels this was another of three 'great discoveries' (Engels 1987b, 476). Initially ill-understood, functions of nucleus and cytoplasm became clearer. In 1876 Oscar Hertwig watched fertilization microscopically as the sperm pronucleus fused with the egg pronucleus. In 1883 van Beneden confirmed that in threadworm (*Ascaris*) a full chromosome number was only achieved after fertilisation, half each from male and female parent. August Weismann now defined heredity as lying in chromatin of chromosomes with: "a definite chemical and above all molecular constitution" (Mayr 1982, 699).

Weismann's experiments removed tails in mice with no generational transmission. So he concluded Lamarckian inheritance was incorrect, and now (1893) invoked 'protection' for 'germ cells'. The 'germplasm' or 'nucleoplasm'—was 'reserved unchanged' (Weismann quoted in Robert 2004, 59): "In each ontogeny, a part of the specific germplasm contained in the parent egg-cell is not used up in the construction of the off-spring, but is reserved unchanged for the formation of the germ-cells of the following generation" (Keller 2000, 17).

The germplasm "determined" heredity in military manner. 'Determinants' progressively commanded somatic cells into ever 'simpler brigades':

(Weismann) posited the existence of particulate determinants, each of which possessed the properties of life, assimilation, growth and reproduction. Arranged in hierarchical groupings along the chromosomes, the determinants were postulated to parade out in the course of ontogeny so as to determine the different types of cells as ontogeny unfolded [...] The ‘nucleoplasm’ as ‘an army composed of corps, which are made up of divisions and these of brigades and so on [...] and as the groups become simpler so does their sphere of action become limited.’ (Sapp 2009, 904)

Thomas Boveri in 1889 also confirmed that normal development sea urchin embryos depended on a full chromosomal number (Mayr 1982, 679, 749). However, embryo development differed whether only male sperm nuclei, or only female egg nuclei, or both—were present. Boveri followed Weismann’s eternal protection of nucleus from externality (see Figure 1.a).

Mendel’s Factors Become the Gene

In 1900 De Vries, Correns and van Tschermak each independently verified Mendel (Mayr 1982, 727–731). Since each chromosome was unique, Walter Sutton (1902) proposed that maternal and paternal chromosomes joining at fertilisation formed “the physical bases of the Mendelian law of heredity” (Sapp 1987; 2009). Wilhelm Johannsen coined the terms “gene”, “genotype” and “phenotype” in 1909 to explain Mendel’s factors (Mayr 1982, 736; Sapp 2009). In 1928 the Sutton-Boveri theory formalised chromosomes as ‘bearers’ of hereditary transmission (Mayr 1982, 748).

Biologists began conceptualising genes as lying on or forming chromosomes. Morgan showed mutations in the fruit fly (*Drosophila*) were associated to phenotypic changes. Yet even in his 1934 Nobel Lecture, Morgan revealingly acknowledged that:

There is no consensus of opinion amongst geneticists as to what the genes are whether they are real or purely fictitious [...] it does not make the slightest difference whether the gene is a hypothetical unit, or whether the gene is a material particle. In either case the unit is associated with a specific chromosome, and can be localized there by purely genetic analysis. Hence, if the gene is a material unit, it is a piece of a chromosome; if it is a fictitious unit, it must be referred to a definite location in a chromosome—the same place as on the other hypothesis. Therefore, it makes no difference in the actual work in genetics which point of view is taken. (Morgan 1934, 315).

Still, gene theory became ever more determinist and mechanistic by the 1940s. Geneticists came to speak of “a gene for this and a gene for that” (Sapp 2009).

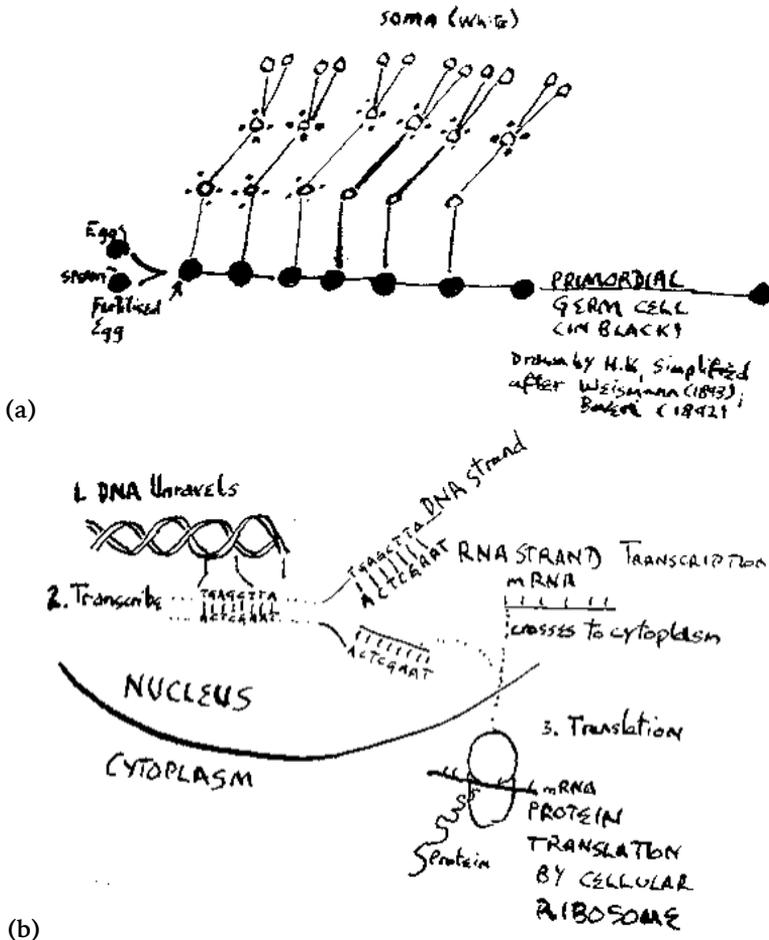


Figure 1. Composite Figure Weismann Concepts Old and New (drawn by author). **Legend:** The figures show that the concept of an eternal unchanging genetic substance has persisted into the current ‘Central Dogma’. This substance was not clearly identified by Weismann and Boveri. However, Figure 1.a shows their concept of the germ cells (in black filled—in circles) being separated off from the body cells or soma (in white open circles). The diagram based on originals from 1900s has been simplified and re-drawn. The notion of an eternal unchanging ‘genetic substance’ is seen. This depended upon the separation of nucleus and cytoplasm. Figure 1.b shows how this notion underlies the Central Dogma of Crick and Watson from 1950s. After their reports of the structure of DNA, the coding depicted by A, T, G and C marks nitrogenous bases (pyrimidines and purines) that link to each other in specific pairings. These allow for translating a coding at nuclear level into proteins. But their theory permitted only one-way information flow from DNA or RNA (transcription) through to the migration of messenger RNA (mRNA) to the cytoplasm where it is ‘translated’ into protein by a complex formed with the cytoplasmic ribosomes. DNA and RNA cross-talk was allowed after later modifications.

The Cytoplasmologists and Embryologists—Largely Anti-Reductionist

Actually Weismann's scheme had already been disproven in 1891 by Hans Driesch. Contrary to Weissman's prediction, early experimental division of the fertilised egg did not prevent two normal larvae developing. Correspondingly, embryologists tended to be anti-reductionist:

Cellular differentiation was not the result of the disintegration of the germplasm. Experimental embryologists thus maintained that development was an epigenetic phenomenon: the fate of a cell was the result of its position in the whole. They turned away from machine theory, and from reductionist conceptions that bestowed the properties of the whole onto parts. (Sapp 2009, 904)

Since Driesch could not explain his results, he invoked 'entelechy' or vitalism. However, this began a long struggle against reductionism and determinism, where:

[...] embryologists conceived of the cell as a whole as an interactive system, and they embraced the concept of emergence [...] New atoms with new properties are formed by new combinations of protons and electrons, new molecules by new combinations of atoms. In a similar manner embryologists argued, the distinctive properties of life, and the formation of new materials and qualities in the course of development, arise or "emerge" from the interactions of parts which in themselves do not show these properties. (ibid., 905)

Against Weismann, the American cytologist Ernest Just insisted that: "Ectoplasm was also responsible for the movements of chromosomes, which Just compared to 'puppets in a puppet show'" (ibid., 907).

Even as late as 1950 embryologists like Andre Lwoff echoed Just: "Lwoff's post-war rhetoric against what he called the "dictatorship of the genes" was similar to Just's: "Cytoplasm is not just a collection of enzymes or plastic and complaisant receptor passively submitting to the dictatorship of genes, but certainly contains self-reproducing bodies endowed with specificity" (ibid., 908).

Even as the nuclear-ists became dominant, J.H. Woodger urged biologists to avoid the Chyabdis of 'vitalism' and the Scylla of 'mechanism':

Within an increasingly positivist philosophical framework, biology, with its remnants of vitalistic thinking and non-rigorous methodology was [...] filled with speculation. The outstanding critic [...] of biology was J. H. Woodger, who in 1929 [...] (criticised) what he viewed as a science in its infancy and rife with metaphysics [...] Only after biology paid "critical attention to the purification

of its concepts,” and only by “making sure of its foundations,” would it become a mature science. For Woodger, biologists, who thought they had found their Newton in Darwin, were mistaken, since biology had not yet reached a stage in its development comparable to eighteenth-century physics. (Smocovitis 1992, 4)

Perhaps Woodger heard Engels ringing in his ears. Two biologists tried to balance continuity or stability (nuclear forces) with disruption and adaptation (cytoplasmic forces): C.H. Waddington (England) and I. I. Schmalhausen (USSR). Independently they offered ‘canalisation’ (Waddington) or ‘stabilizing selection’ (Schmalhausen). At core was an integration of environmental pressures to internalise effects into the genome:

Schmalhausen argued that natural selection was not only directional, producing new adaptations to new circumstances, but stabilizing. That is, if a characteristic of a species causes it to be well adapted, then random variation in the characteristic caused by external or internal disturbances would reduce the fitness of the organism, so natural selection will operate to prevent such disturbances. The development and physiology of the species will be selected to be canalized, that is, insensitive to such random disturbances. (Lewontin and Levins 2000, 103)

But these voices, and Woodger’s—were ignored for some time.

The Evolutionary Synthesis

Ironically J.B.S. Haldane although impressed by Engels, alongside reductionist mathematicians formed the ‘Modern Synthesis’ of genes and evolutionary theory. As Woodger said, they “found their Newton in Darwin”, applying mathematical principles to gene-environment fitness: “Terms borrowed from the physical sciences, like “cause” (Haldane’s preferred word), “factor” (Wright’s preferred word), and finally “mechanism” (Dobzhansky’s and Huxley’s preferred word) slowly supplanted the term and the view of selection as agent” (Smocovitis 1992, 20).

Some derided this as a reductionist ‘bean-bag genetics’ (Dronamraju 2010; De Winter 1997). However, genes were proclaimed the motor of evolution, generating changes driven by random nuclear-chromosomal mutation. This view incorporated ‘blind’ chance filtered by environment as natural selection, preserving ‘superior fit’. Till recently Marxists in modern biology adopted this view, for example Richard Lewontin: “The organism [...] bears a significant mark of random processes” (Lewontin 2000, 38).

However, the ‘New Modern Synthesis’ faced challenges. Some original insights came from immunology. Since organisms have to deal with external infections queries arose as to how immunity developed. As Radman says:

A classic example of the generation of genetic diversity is the interaction between infectious agents and the immune system. Viruses and bacteria mutate extensively in an attempt to generate rare variants that can escape the host’s immune system. In turn, the immune system mutates to try to create antibodies that recognize these new variants. (Radman 1999, 867)

The Central Dogma

Undoubtedly by the 1960s a ‘*day to day*’ metaphysics had reaped fruitful insights. After Watson and Crick famously discovered DNA (1953), and decoded it (1957), the ‘Master Molecule’ was hailed (Keller 2000, 51). The similarity to Weismann’s Kernmonopol is startling (Figure 1.b). Crick’s one-way traffic from nucleus to cytoplasm became the ‘Central Dogma’: “Transfer [of information] from protein to protein, or from protein to nucleic acid is impossible” (Crick 1970; Sapp 2003).

Even after he modified Crick’s Central Dogma (sticking in gene ‘regulators’ responding to environment) Jacob, still insisted (1970): “The gene gives orders. The protein executes them” (Mosini 2013, 61; Sapp 2009, 909).

But more challenges accumulated, forcing another Nobel Laureate (1994) Phillip Sharp to admit: “The chemical definition of a gene has become much more difficult” (Sharp 1994).

Sharp again modified, making only the gene the ‘exon’ (parts read into protein transcripts) not the whole DNA. But increasingly the Central Dogma ‘master molecule’ required patching.

Extended Evolutionary Synthesis Becomes Necessary

A more fluid relationship between DNA and cytoplasm was needed to account for complex switching of two-way signals between nucleus and cytoplasm. At minimum these include: reverse information flow from RNA to DNA (violating ‘one-way traffic’); split genes mandating complex splicing of exon-genes for protein transcription (avoiding ‘junk DNA’ or introns); small non-coding RNAs acting as ‘silencers’ of DNA (generated by environmental stimuli) and; complex protein folding to unlocking effects of localized cellular environs (Table 1). Figure 2 encapsulates the new picture of two-way messaging that resulted in the Extended Evolutionary Synthesis (EES) (Danchin et al. 2019). Inter-generational ill-effects from

stress and poor environment are mediated by methylation marks, incredibly important for humans (Weaver et al. 2004). (see Figure 3).

Table 1. Some Modern Evidence Doubting Validity of Central Dogma. *

New Data	Implication On Central Dogma	Table References
Most prion vectors have no nucleic acids; Most unicellular organisms have no soma-germplasm separation; same true of many “plants, fungi, multicellular monerans and protists, and certain sponges, coelenterates, and worms”.	<ul style="list-style-type: none"> • The Central Dogma is not universal • ‘Prions operate outside of canonical steps of molecular biology’s central dogma’ 	Prusiner (1995) Wahl and Murray (2016) Buss (1983) Halfmann and Lindquist (2010)
RNA to DNA information flows using reverse transcriptase, enabling virus to induce host genome to produce virus	<ul style="list-style-type: none"> • Challenges one-way information only (nucleus to cytoplasm) • Central Dogma did specify RNA to DNA information could occur. However, virus is from outside nucleus boundary 	Temin and Mizutani (1970) Crick (1970)
Exons transcribed, not introns (‘junk DNA’); split genes; mRNA spliced by spliceosomes (protein–RNA complexes).	<ul style="list-style-type: none"> • Challenges simplistic one gene—one protein Central Dogma • Before split gene expressed, mRNA edited 	Sharp (1994)
DNA copy edits prone to error; require complex repair	<ul style="list-style-type: none"> • DNA is not as claimed “self-replicating,” “DNA by itself can actually do nothing; it is one of the most inert molecules known to science.” • Cellular Dogma complex, introduces potential for ‘creative errors’—variations for evolution 	Lewontin (1992) Radman (2001) Keller (2000, 26) Sapp (2009) Shapiro (1999)
Many proteins will not fold properly if not guided by proteins called molecular chaperones	<ul style="list-style-type: none"> • Translation of mRNA products require cytoplasm to exert effects 	Mosini (2013)
Methylation, histone marks, non-coding RNAs, PWI RNAs (pwi protein), iRNA (interfering RNA) Si (silencing RNA) – complex feedback loops on DNA	<ul style="list-style-type: none"> • DNA cannot form end biological products itself • See Figure 3 illustrating some of these 	Bonasio et al. (2010) Peng and Lin (2013)

Table 1. Some Modern Evidence Doubting Validity of Central Dogma. *
(continued)

Concerning Evolutionary Theory		
	Implication on Evolutionary Synthesis	Reference
Random 'undirected' mutations are not the sole source of variation; variation can be driven by plastic response to environment.	<ul style="list-style-type: none"> • Allows cells, organisms to respond by specific mutagenesis to environmental stresses (SOS response) • Random mutagenesis in genome by DNA breaks repaired- limits buildup of potentially deleterious mutations • Targeted environmentally driven mutations exist; provocator genes 	Galhardo et al. (2007) Keller (1983) Radman (1999) Shapiro (1999)
Most 'random' mutations are sub-optimal at best, more likely harmful in a ratio of 5 times as un-mutated	<ul style="list-style-type: none"> • Implies single isolated spontaneous mutations do not drive evolution; 	Keller (2000, 32) Radman (1999) Radman, Taddei and Matic (2000)
Presence of horizontal gene transfer; presence of 'jumping genes' transpositions	<ul style="list-style-type: none"> • Challenges 'gradualism' infinitely small variations drove evolutionary change • Speciation can be faster shifts of genes chromosomes) common across species • Most important in prokaryotes (bacteria) and archaea (another kingdom of bacteria), also applies to eukaryotes (plants and animals) 	Koonin (2009) Keller (1983) Quammen (2018) Woese and Goldenfeld (2009)

* The table shows some key objections to the Central Dogma. References given give full explanations of the concepts. For brevity this has been compressed here. The table is broken into two parts, the top relates more to the cellular functioning and division between nucleus and cytoplasm; while the second part shows objections with specific consequences for the evolutionary synthesis of the 1960s.

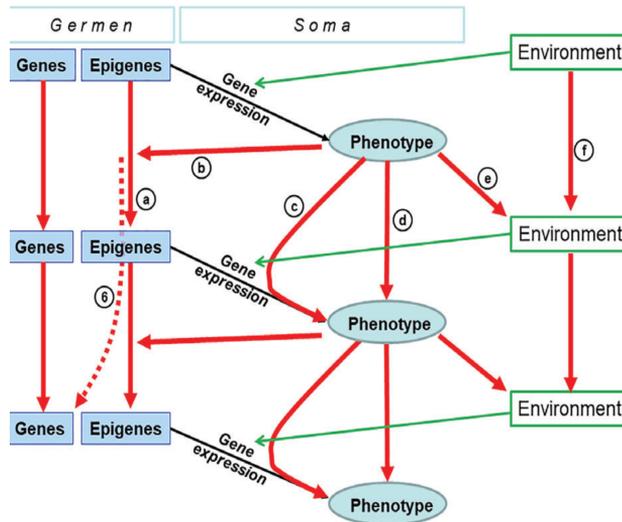


Figure 2. Multiple means of messaging from environment taken into genome (figure 6 in Danchin et al. 2019, 275).

Legend: The emerging view of inheritance that enables a variety of pathways. These allow for ‘accumulation’ of information from various strands: Development (black arrows); heritable epigenetic marks giving generational inheritance (dotted red arrows); epigenetic marks becoming part of the more stable genome (number 6); environmental signaling (green arrows); designations ‘a’ to ‘f’ detail several mechanisms of the way in which reverse information (i.e. cytoplasm to nuclear stable genome and epigenome) can occur. That includes (e) of cultural inheritance.

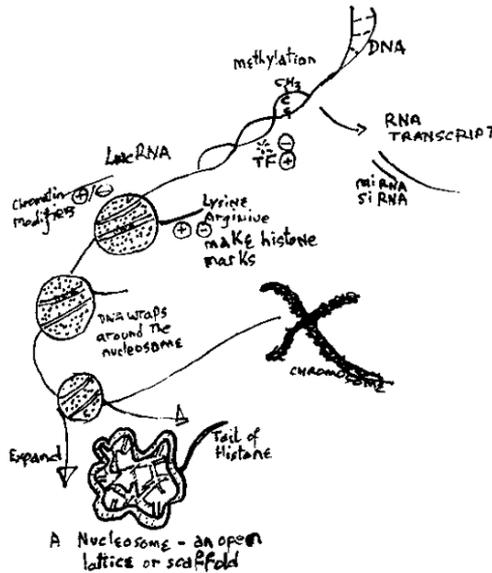


Figure 3. The complexity of the epigenome (drawn by author).

Legend: Waddington first described the epigenotype: “Between genotype and phenotype, and connecting them to each other, there lies a whole complex of developmental processes: (the ‘epigenotype’” (Waddington 2012, 10–13). Most of these are limited to one generation, but some are trans-generational: “Acquired epigenetic signatures [...] induced by environment will be erased in the early embryo and germline [...] Epigenetic reprogramming restores totipotency of the zygote [...] if germline reprogramming fails, epigenetic marks are potentially transmitted from one generation to the next. [...] A number of loci (>4500) [...] escape reprogramming [...] prime candidates for transgenerational epigenetic inheritance” (Fernandez-Twinn, Constância and Ozanne 2015, 85–95).

1) Chromosomes are chromatin units of four histone proteins and DNA, called nucleosomes. This scaffold allows cells of 1/100 millimetre to pack in a tightly coiled yard-long DNA (Austin n.d.). The 3D structure is complex and non-rigid, allowing electrostatic forces to ‘open’ or ‘close’ portions for variable expression (Goldberg, Allis and Bernstein 2007, 635–638). Many external signals make ‘*histone marks*’, altering transcription, especially on ‘tails’ with sites allowing ‘post-translational modification’ (methylation, acetylation, phosphorylation, or ubiquitination). This ‘histone code’ crucially affects gene expression by cinching the chromatin tighter or looser – exposing or hiding gene expression sites. (e.g. lysine 27 of histone 3 (H3K27) and lysine 4 of histone 3 (H3K4) promoters of trained immune genes are acetylated and trimethylated, priming immune genes to establish epigenetic memory to train immune response, e.g. BCG vaccination [Fok et. al. 2019].)

2) DNA itself can also be ‘*chromatin marked*’ at Cytosine-phosphate-Guanine (CpG) sites. Methyl groups (CH₃) are copied onto daughter strands, allowing some to become heritable. Methylation ‘*silences*’ the underlying DNA sequence. Other effects include repelling or attracting transcription factors. Methylation patterns usually arise from environmental changes, or aging or disease. [e.g. ‘5mC is associated with gene silencing and plays an important role in developmental processes such as genomic imprinting and X-inactivation’ (Fernandez-Twinn et al. 2015); or P-DMRs [Pre-natal malnutrition—associated Differentially Methylated Regions] induced by maternal starvation, result in foetal-child suboptimal glucose handling, higher BMI, elevated total and LDL cholesterol (Fernandez-Twinn et al. 2015)]

3) A growing list of non-coding (lc) RNAs do not make functional proteins but affect transcription. RNAs (long [L] and short [s]) include: micro miRNAs; silencing siRNAs; or piwi RNA. Most LncRNAs in the nucleus modify chromatin, to up or down regulate expression [e.g. behavioral and metabolic responses in next generation in traumatic stress’ (Fernandez-Twinn et al. 2015); e.g. Immune-gene Priming LncRNAs (IPLs) accumulate H3K4me3 at promoters of trained immune genes (Fok et al. 2019)]

4) transcription factors bind onto DNA directly to promote or repress gene expression.

All these mechanisms interact (Meaney and Ferguson-Smith 2010, 1313–1318).

Epigeneticists who had long argued against one-way traffic, were vindicated:

[...] chemical changes of chromatin structure, which have come to be called “epigenetics” or “epigenomics,” has led some researchers to confront the notion of the privileged role of genes as causal agents of heredity and development [...] In 1942, Conrad Waddington defined “epigenetics” as the causal mechanisms by which genes bring about phenotypic effects. Evidence since the 1970s of “epigenetic marks” on DNA by methylation and chemical modifications of

histone proteins and their role in the regulation of gene expression in vertebrates has led to a new usage of the term. A new definition of *epigenetics* has been put forward, namely “the study of mitotically and meiotically heritable changes in gene function that cannot be explained by changes in DNA sequences. (Deichmann 2014, 73)

Today, developmental–evolutionary ideas of the type that Waddington put forward are at the core of the Extended Evolutionary Synthesis. (Jablonka and Lamb 2020, 10)

One striking adjustment invokes reshuffling mechanisms enabling rapid speciation. Gene ‘jumping’ (transposons) in maize were reported by Barbara McClintock in 1950 but steadfastly minimised, only in 1983 was she awarded a Nobel (Keller 1983, 8–13). Horizontal Gene Transfer (HGT) was spotted first in bacteria, then in several other organisms. One author drily remarks:

(One) explanation for the presence of a globin gene in the genome of a plant is that it was translocated there recently in evolution as a passenger on a virus [...] Such a mechanism circumvents the rules of classical Mendelian genetics with rather important implications for our understanding of the mechanism of evolution. (Hyldig-Nielson et al. 1982, 700)

Old conceptions of ‘strict’ speciation are now untenable (Lewin 1982) and such HGT radical shifts in genome occur across eukaryotic kingdoms including into humans (Quammen 2018, 338–342).

The new model is steadily becoming more detailed (Noble and Noble 2017). Many warned about gene paradigms ignoring the environment (Lewontin 2000, 35; Rose, Kamin and Lewontin 1984; Rose 2002), but were unable to explain the balance between ‘continuity’ and ‘change’. This has become soluble through the ‘epigenome’: “The “epigenome” comprises a range of modifications that are imposed on the genome (DNA) and ensure the stable transmission of gene expression patterns without changes to the DNA sequence” (Hemberger and Pedersen 2010, 598).

This environmentally formed epigenome itself can become transmitted:

“Epigenetic disruptors” could change gene activity and in the case of stem cells, alter cell fate or number, causing, for example, an increased risk of cancer. “Epimutations” arising in this way may even pass through the germ line to the gametes, thereby affecting subsequent generations. (ibid.)

Elegant mechanisms explain differing durations in which gene–environment ‘switches’ operate. This ranges from short-term (a few generations), to much more robustly stable (Danchin, Pocheville and Huneman 2019).

This re-weaves the two separated strands of continuity and adaptation into a coherent mechanism. Nonetheless Dawkins (1976) and company are unlikely to concede quickly the new models that decisively reject Weismann and Central Dogma (Danchin, Pocheville and Huneman 2019).

Lysenko's Biological Theory Comparisons to Modern Epigenetics

Dialectical biologists accepted even in 1985 that: “the major scientific differences between Lysenkoist and geneticists have been resolved by developments in genetics [...] textbooks and practice of most geneticists, genetic determination carried with it an aura of fate” (Levins and Lewontin 1985, 165, 169).

“Lysenko's Ghost” as Graham (2016) puts it—lingers. Has time verified or refuted core elements of Lysenkoist theories as stated below?

1) The mutability of the gene

For Lysenko, heredity was a life long physiological interaction process between organism and environment, one where the gene was not immutable or eternal: “The principal error the geneticists commit is their contention that genes are immutable in a long line of generations. True, they admit that genes are mutable in the course of tens and hundreds of thousands of generations. Well we thank them for such mutability!” (Lysenko 1936, 189; Soyfer 1994, 88–89).

Comment: Lysenko was correct there is no eternal ‘immutable gene’. Perhaps, Lysenko showed changes in some phenotypes using vegetative hybrids and non-sexual hybrids. But it was entirely irrelevant to him to prove mechanisms. Clear unequivocal proofs of gene interactions, environmental effects, and mechanisms to explain this do now exist, but rest on understanding DNA coding.

2) Special role for the nucleus, or chromosomes, or Mendelian factors or genes

Lysenko denied any Weismann separation:

Following Weismann, the Mendelists—Morganists contend that the chromosomes contain a special “hereditary substance” which resides in the body of the organism as though in a case and is transmitted to succeeding generations irrespective of the qualitative features of the body and its conditions of life. The conclusion drawn from this conception is that new tendencies and characteristics acquired by the organism under the influence of the conditions of its life and development are not transmissible, can have no evolutionary significance. (Lysenko 1948, 521; Zirkle 1949, 105)

Lysenko rejected the Morganist concept of chromosomes: “We (*do not*) deny the biological role and significance of chromosomes in the development of the cell and of the organism. But it is not the role which the Morganists attribute to the chromosomes” (Lysenko 1948, 524).

Comment: Modern theory confirms Lysenko on rejecting Weismann’s separation of the nucleus. Despite denying accusations he ascribed no role for chromosomes, Lysenko never stated clearly what this was. Moreover, Lysenko over-extended beyond current theory:

- Most biologists now do not argue for an **exclusive** special role for the chromosomes and the nucleus.
- However, Lysenko minimizes genes even if a predominant effect is evident. For example, even a single gene mutation may have extraordinary deleterious effects in inborn errors of metabolism. True-effects can be modulated by environmental steps such as appropriately varying diets, but gene effects are undeniable.

3) *Organism-environment interaction*

For Lysenko heredity included the environment: “Heredity is [...] the property of a living body to require definite conditions for its life and development and to respond in a definite way to various conditions” (Lysenko 1943, 390). “Heredity is the effect of the concentration of the action of environmental conditions assimilated by the organism in a series of preceding generations” (Lysenko 1948, 538).

Comment: By today’s standards this is correct. Such formulations are found in Lewontin: “The organism is not specified by its genes, but is a unique outcome of an ontogenetic process that is contingent on the sequence of environments in which it occurs” (Lewontin 2000, 20). “The organisms not only determine what aspects of the outside world are relevant to them by peculiarities of the shape and metabolism, but they actively construct, in the literal sense of the word, a world around themselves” (Ibid., 54). “The concept of “alteration” of the environment does not capture entirely the way in which organisms mould their immediate local conditions” (Ibid., 56).

4) *Inheritance of acquired characteristics*

This was the fundamental reason that Lysenko rejected Weismann:

The materialistic theory of the evolution of living nature necessarily presupposes the recognition of heredity transmission of individual characteristics acquired by the organism under definite conditions of its life, it is unthinkable

without recognition of the inheritance of acquired characteristics. Weismann however set out to refute this materialistic proposition. (Lysenko 1948, 518; Zirkle 1949, 102)

But if Weismann is rejected, then a ‘sharp controversy’ divides biologists:

[...] a sharp controversy which has divided biologists into two irreconcilable camps, has thus flared up over the old question: can characters and properties acquired by plant and animal organisms in the course of their life be inherited? [...] We the representatives of the Soviet Michurin trend, contend that inheritance of characters [...] is possible and necessary. (Lysenko 1948, 522)

Comment: Lysenko’s view that such inheritance does occur, is generally supported by current theory.

- Mechanisms are now proposed for conserving life accumulated changes. These may arise from environmentally directed adaptations or from genetic mutations.
- Nuclear genes or DNA are modifiable by environmental events. Nucleus and cell share in the overall total response of the cell and organism.
- However, it is the DNA molecule and its regulators that gives mechanistic insight as to how the environment directly affects heredity.

5) *The possibility of changing heredity in a directed way and the phasic development of plants*

Lysenko believed that heredity (especially of plants) could be moulded in a ‘definite direction’:

By regulating external conditions, the conditions of life of plant organisms, we can change varieties in a definite direction and create varieties with desirable heredity. Heredity is the effect of the concentration of the action of the environmental conditions assimilated by the organisms in a series of preceding generations. (Ibid., 538)

Lysenko’s theory of phasic development of plants sprang from the reintroduction of ‘vernalization’. This practice is the acclimatizing of winter wheat to grow in the spring, by applying cold conditions. Such attempts to stimulate spring growth dates from 1662 (Graham 2016, 87); but more recently to 1850s in the USA, 1900s by Gassner in Germany, acknowledged by Lysenko (1935, 13–16).

However, vernalization was a part of the broader theory of plant phasic development: “The development of plants requires a definite set of factors, which in addition to mineral nutrition, includes temperature, light moisture, suitable length of daylight etc” (Ibid., 33);

Comment:

- The general thoughts on nutrition are not unique, but are also non-specific.
- Despite Lysenko's 'voluntarist' tone, Hudson and Richens note:

Perhaps no tenet of Lysenko's system has aroused such opposition as his belief in the capacity of plants to select nutrients for themselves, in particular, the selection by ova of appropriate pollen grains, which is but a particular instance of his general theory. It has been said that Lysenko attributes free will to plants and also presence in anticipating the conditions under which the plant or its offspring will find themselves in future. Neither of these criticisms is fair. (Hudson and Richens 1946, 58)

- Regarding vernalization, even vehemently anti-Lysenkoists state: "There is no historian of agronomy who would deny that this technique is really effective, at least when applied in determinate conditions [...] in dry climate" (Lecourt 1977, 63).
- But it was difficult to put into practice in the USSR (Graham 2016, 87). While Lysenko's application in the USSR did not elevate grain production, nor did it reduce it (Levins and Lewontin 1985, 189–191).

6) *Other forms of non-Mendelian heredity in plant biology.*

Lysenko rejected segregation in Mendelian terms, favouring instead theories of blending inheritance. This informed agricultural theory of: 'double dominance' (including an environmental factor); degeneration of 'pure lines' (thus improvement by heterosis or hybrid vigour); intra-varietal crossing with rejuvenation; and grafting (Hudson and Richens 1946, 32–51). Claims for graft hybridisation were important as: "The controversy as to whether or not graft hybridization grafting (*i.e. induces heritable modifications—HK*) occurs is one of the several long standing problems of biology [...]" (Ibid., 45, 50).

Lysenko argued that since graft hybridization gave true new hybrids, it was impossible for chromosomes to have played any part: "Chromosomes cannot pass from stock to scion and vice versa—that is a fact that no one disputes. Yet hereditary properties such as the colouring of fruit, its shape, the shape of the leaves and others, are transmitted from scion to stock and from stock to scion" (Lysenko 1948, 547).

Comment: Lysenko's own data on statistical and experimental rigour were inadequate. However, by modern data Lysenko's theory is often correct in these vegetative propagative tools:

- Modern work verifies graft hybrids occur. However, it is by a mechanism Lysenko would not accept—Horizontal Gene Transfer. Some authors anxiously rebut Lysenkoite heritage:

Finally, although our data demonstrate the exchange of genetic material between grafted plants, they do not lend support to the tenet of Lysenkoism that “graft hybridization” would be analogous to sexual hybridization. Instead, our finding that gene transfer is restricted to the contact zone between scion and stock indicates that the changes can become heritable only via lateral shoot formation from the graft site. (Stegemann and Bock 2009, 651)

Others in contrast, invoke Lysenko’s ‘graft hybrid hypothesis’:

The heritability of graft-induced phenotypic changes suggests that regulatory processes underlying the scion–rootstock communication also involve a genetic component. In fact, the presence of heritability coincides with Lysenko’s graft hybrid hypothesis, which suggests that graft hybridization has similar properties to those of sexual hybridization. This concept, which seems to be inconsistent with Mendelian genetics, was initially rejected by Western scientists, but research over recent decades has provided evidence for the existence of graft hybridization. (Wang, Jiang and Wu 2017, 58)

- Some rapid increases in yields of cereals world-wide since the 1940s have involved hybrid vigour. But newer combination breeding and mutations seem more useful (Altman et al. 2021; Priyadarshan 2019; Kempe, Rubtsova and Gils 2014; Schlegel 2018; Alemayahu 2017).

7) *Natural Selection and Darwinism*

Hudson and Ritchie pointed out that:

[...] a large portion of the characteristic tenets of Lysenko’s school are to be found [...] amongst Darwin’s theory [...] Summarizing [...] Darwin definitely believed that the environment could cause a directional change in the hereditary constitution of organisms, and that the Lamarckian principle of Use and Disuse and atavistic reversion were also operative. (Hudson and Richens 1946, 6–7)

However, Lysenko also criticised Darwin: “In his day Darwin was unable to fight free of the theoretical errors of which he was guilty. [...] based on Malthus’ theory of overpopulation with the inference of a struggle presumably going on within species” (Lysenko 1948, 517; Zirkle 1949, 101).

Comment:

- Marx and Engels criticised Darwin for importing into nature societal views from Hobbes and Malthus. Most Marxists accept this and extend

it to today's discredited 'sociobiology' (Rose, Kamin and Lewontin 1984; Lewontin 2000).

- Lysenko extrapolated criticism to attack 'intra-specific competition' (Lecourt 1977, 95). This is generally not accepted. Modern data [e.g. pines in China (Yang et al. 2019)] stress the opposite, although one survey does suggest a role for 'mutualist exchange, niche expansion or hybridization (Prinzing et al. 2017).
- Lysenko's application of this theory, failed 'the test of practice' in the so-called 'Stalin Plan to Transform Nature' (Brain 2011).

8) Consistency between Dialectics and theories for science

Finally, critics say the USSR state demanded a consistency between the laws of dialectics and the theories around science: "The most significant trend of biological research in the USSR—the subservience of science to social and political philosophy" (Sax quoted in Zirkle 1949, 55);

Comment:

- Lysenko dogmatically made a-priori statements, with weak evidence.
- However, some of Lysenko's biology turns out by modern theory to be correct, and challenged Western dogmas.
- The principle of *change* and *inter-connectedness* in the world however—remain fundamental.

Scathing dismissals like "the open absurdity of the Lysenkoist 'theory'" (Lecourt 1977, 63), are untenable.

Summary: Intense division between nuclear monopolists and cytoplasmic embryologists, was present in the West *as well* as in the USSR. As Morgan said: "The inheritance of all known characters can be sufficiently accounted for by the presence of genes in the chromosomes. In a word the cytoplasm may be ignored genetically" (Morgan 1926, 491).

Both Morgan, and Lysenko were reductionist, and both were wrong in areas. Only a two-sided consideration (per Engels) enabled the molecular toolbox of DNA, and environmental signaling to fit into a coherent theory. Doubtless that while Lysenko was partly correct, '*Arakcheyev-ism*' rendered USSR science unable to rectify gaps.

4. LYSENKO'S ADVANCE TO CONTROL OF USSR GENETICS AND AGRICULTURE

What explains Lysenkoism rise to power? By 1945 the USSR had lost 20 million people or a tenth of the population (McCagg 1978, 18), lost a massive infrastructure and was encircled (Levins and Lewontin 1985, 164). Cold War politics portrayed Lysenko and Morgan as political representatives: "Lysenko portrayed Mendelian genetics as an 'American', 'imperialist', 'racist', and 'fascist' pseudoscience, the Western media presented 'Lysenkoism' as a 'Soviet', 'Communist', 'Marxist', 'totalitarian' pseudo-science" (Dejong-Lambert and Kremontsov 2012, 377).

Yet generally overlooked is an internal class war battle inside the USSR. This is seen in the 'Leningrad Affair' (Bland 1980), the attack on Vosnoskensky and the 'Economics Debate' (Bland 1994), and the Zhdanov-Malenkov struggles. Frequent explanations for Lysenkoism are inadequate.

The Personality Cult

Joravsky acknowledges the complexity behind Lysenkoism: "One must realize the inadequacy of explanations that simply point to Lysenko's malevolence, or to Stalin's, or to some abstract non-historical principle of totalitarianism" (Joravsky 1986, 114). Levins and Lewontin agree:

Lysenkoism cannot be understood simply as the result of the machinations of an opportunist-careerist operating in an authoritarian and capricious political system [...] (or) the consequence of "bossism" in which the political bosses of Soviet agriculture, including the "supreme boss" embraced an incorrect scientific doctrine in a blind and capricious flailing about for solutions to Soviet agricultural problems. (Levins and Lewontin 1985, 163–164)

Sheehan also argues against simplification: "Lysenkoism cannot be understood simply as a story of personal opportunism and political terror, nor as a cautionary tale against the dangers of bureaucratic interference in intellectual life or of ideological distortion of science" (Sheehan 1993, 228).

As does Rolls-Hansen: "The support that Lysenko received from within the scientific community as well as from the outside depended on a number of factors that were quite independent of Stalin's will" (Roll-Hansen 1985).

The Cult of Personality was begun by Stalin's enemies—not by Stalin (Bland 1999). Recent materials also question conventional wisdom. Stalin edited out of the "Short History":

Dozens of paragraphs and scores of parenthetical references relating to himself and his career [...] Perhaps the most famous indictment of the ‘Short Course’, this accusation about Stalin’s ostensibly craven need for self-aggrandizement ignored enormous amounts of evidence to the contrary and mischaracterized the general secretary’s editing of the text in ways that persist to the present day. (Brandenberger and Zelenov 2019, 13, 35)

The Purges

Yezhov’s purges cut through Soviet life, but Joravsky concluded: “It is widely believed that the Lysenkoites had a direct line to the apparatus of terror and deliberately used it to get rid of their opponents. Insinuations to that effect have even been printed in the Soviet Union, though the evidence offered has been extremely weak” (Joravsky 1986, 118).

Eighty-three biologists and agricultural specialists were repressed, 6 of whom were “active anti-Lysenkoites”, outnumbered by ten non-Lysenkoites (*ibid.*, 123). Joravsky (1986, 115) remarks an ‘irrationality’ about the terror: “Irrationality, in this case meaning the lack of intelligible purpose, seems to be the hallmark of late Stalinist terror”. Perhaps not so irrational. Yezhov conducted a strategy to alienate the masses from the Party, only reversed when Beria took over the NKVD. Inflated numbers of victims contain a systematic upward bias (Getty, Rittersporn and Zemskov 1993).

Who Supported Lysenko?

Likely Stalin agreed with aspects of Lysenkoism:

[...] Stalin also believed there was some deep biological truth in the inheritance of acquired characters, a truth that was not recognized by contemporary classical genetics. Looking back from the importance of ‘epigenetics’ in the early twenty-first century one can perhaps add that there was a grain of truth in Stalin’s judgment. (Roll-Hansen 2015, 105).

However early on Stalin’s support for Lysenko was ‘weak’:

[...] as he was pushing his way to the top [...] Stalin’s public endorsement was comparatively weak [...] At a farmers’ meeting in 1935, when Lysenko stumbled in his speech and apologized for being a vernalizer rather than an orator, Stalin interjected “Bravo, Comrade Lysenko!” (Joravsky 1986,83)

The highest chief, Stalin, was subtly evasive, though pro-Lysenkoite. On May 17, 1938 [...] he proposed a toast [...]: “To the flourishing of science [...] whose people [...] do not want to be slaves of tradition [...]” Stalin refrained from a forthright statement that would have ended all disagreement and mobilized all officialdom in support of agrobiology. As a result, the chiefs of higher learning and ideology kept on fumbling for a compromise. (*ibid.*, 104–105)

Agricultural leaders led by Georgii Malenkov supported Lysenko, while Agitprop headed by Andrei Zhdanov resisted:

Chiefs of agriculture unreservedly supported agrobiolgy. Chiefs of science, education, and ideology were sympathetic but reserved, conceding dominance to Lysenko in the ag-ricultural field but trying to maintain an academic existence for genuine biology. (Joravsky 1986, 104)

No matter who wore the regalia, the chiefs of agriculture supported agrobiolgy, while the chiefs of higher learning and ideology temporized. (Joravsky 1986, 112)

The Division Between Zhdanov and Malenkov

Two factions within the party had emerged – Andrey Zhdanov’s and Malenkov’s (McCagg 1978, 20). Khrushchev supported Lysenkoist agriculture in Ukraine, while Malenkov’s ideologues aided Lysenko: “The ultraconservatives P.F. Yudin and M.N. Mitin [...] intrigued with Lysenko to discredit A. Zhdanov in Stalin’s eyes” (Hahn 1982, 25, 34).

Yuri Zhdanov, was enticed into open attack on Lysenko. The latter sought Stalin’s intervention, who advised Lysenko to address a key issue:

The Weismannists-Morganists also accept the effect of the environment. Their divergence from the Michurinists lies in their denial of the hereditary transmittance of the change.” Even when the geneticists accepted the influence of the environment on heredity, they believed it was not controllable. According to Stalin, the Michurinists “consider the effects to be regular and understandable, and within man’s ability to control. (Pollock 2006, 53)

This enabled Malenkov to stage the 1948 session on Biology. Lysenko’s address summarised two ‘trends in Soviet biology’. Stalin edited Lysenko’s speech, removing statements such as “any science is class-oriented by nature” (Stalin wrote in his edit: “Ha-Ha-Ha!! And what about Mathematics? And Darwinism?”); and: “By its nature the modern capitalist system cannot tolerate a true depiction of natural development”, and “there is no genuine science in that bourgeois society” (ibid., 57).

Since the conference demanded to know if Lysenko’s line was endorsed by the party, Malenkov’s team ensured Lysenko’s reply that the Central Committee endorsed Lysenko. This effectively stopped opposition. Under Lysenko’s domination, wide spread firing of university teachers, academicians and researchers known to be anti-Lysenkoist ensued. This direly affected USSR science.

After the Silencing of the Academy

By now Stalin's influence was limited by the Politburo under Malenkov and Khrushchev (Hahn 1982; McCagg 1978; Harris 2008). As early as 1978, the academic historian McCagg, identified that: "In 1950 and 1951 Stalin's power was limited [...] The reports from the (US—Ed.) Moscow Embassy strongly fostered the 'prisoner' image of Stalin at this time" (McCagg 1978 307, 382).

After the biology debate, Stalin's interventions were limited to 'theoretical' interventions on linguistics and economics. Though beyond the scope of this article, two points are noted. In linguistics Stalin's thrust was against "*Arakcheyev-ism*" (Count Arakcheyev led a despotic and brutal police regime in Russia in the 19th century) and domination by one linguist (Marr) and his ultra-left views (Stalin 1972). Not coincidentally, Lysenko was behaving similarly, and in 1951 Stalin was: "considering how to 'liquidate the monopoly of Lysenko in biological science'" (Zydanov quoted in Roll-Hansen 2015, 104).

Lysenko's failures became obvious and were reported to Stalin. In 1951, its main ideologist Prezent was relieved of all his duties and expelled from the party with severe political accusations. Stalin soon allegedly made the pronouncement that: "Lysenko should be forced to love criticism" (*citing Soyfer*). In 1952, with Stalin's permission, *Botanicheskii zhurnal* (Botanic Journal) published Turbin's article that criticized Lysenko's views on species and speciation. These were ominous signs of a forthcoming fall from grace. However, Stalin died on March 5, 1953 and Khrushchev assumed power. Lysenko again promised to greatly increase agricultural yields and gained Khrushchev's support. (Borinskaya, Ermolaev and Kolchinsky 2019, 7)

In the economics debate started by Stalin, the policies that Stalin argued against, came into being with Khrushchev's restoration of capitalism (Bland 1980).

Finally, the 'Stalin Plan to Transform Nature' predated Lysenko's takeover of genetics. Lysenko subverted it into dense 'mutual aid' plantings alongside wheat. Standard views on forest policy follow Weiner (1999), to argue that Stalin destroyed forest preserves. That view is challenged by Brain:

Stalin's environmentalism," I will argue (was) a real phenomenon [...] when Stalin chose to set aside huge tracts of Russia's best forestland in order to safeguard its hydrological properties, largely in response to the entreaties of Morozov's surviving students, and required that the protected forests remain

essentially unchanged over time. Morozov's teachings essentially became official state policy. Morozov's influence reached its zenith during the Great Stalin Plan for the Transformation of Nature, when a basically conservative project designed to restore the Russian landscape to its prehistoric ideal was twisted into a promethean endeavor dominated by Lysenko. (Brain 2011, 9)

5. CONCLUSIONS

Engels' view of nature of an interconnectedness is contrary to both Morganism and Lysenkoism. These latter are both reductionist, and obstructed a clear understanding of reality in nature. Battles in genetic theory based upon political ideology occurred in both the West and the USSR. Epigenetics is the 'proof of the pudding' of dialectics in genetics. Not only heredity but theories of evolution are being re-thought. Complicating the purely biological reductionism is often another type of reductionism, a political reductionism that insists upon painting Stalin as the all evil one. That political reductionism masks the real history of the battles of factions of revisionist politicians inside the USSR. Such reductionist simplifications obstruct any real history of Lysenkoism.

REFERENCES

- Alemayehu, Desalegn. 2017. "Review on Impact of Plant Breeding in Crop Improvement." *Ethiopia International Journal of Research Studies in Agricultural Sciences (IJRSAS)* 3: 26–35.
- Altman, Arie, Longjiang Fan, Christine Foyer, Wallace Cowling, Ron Mittler, Matin Qaim, Andreas P.M. Weber, Matthew Reynolds, Rajeev K. Varshney and Alisdair Fernie. 2021. "Past and Future Milestones of Plant Breeding." *Trends in Plant Science* 26(6): 530–538.
- Anderson, Perry. 1987. *Considerations on Western Marxism*. London: Verso Books.
- Austin, Christopher P. n.d. "Chromatin." *National Human Genome Research Institute*. <https://www.genome.gov/genetics-glossary/Chromatin>
- Bernal, JD. 1949. *The Freedom of Necessity*. London: Routledge Kegan & Paul.
- Blackledge, Paul. 2020. "Engels vs. Marx? Two Hundred Years of Frederick Engels." *Monthly Review* 72(1). <https://monthlyreview.org/2020/05/01/engels-vs-marx-two-hundred-years-of-frederick-engels/>
- Bland, W.B. 1980. "Appendix 3: 'The Leningrad Affair'." In *Restoration of Capitalism in the Soviet Union*. Wembley, London: Select Editions. <https://www.marxists.org/archive/bland/1980/restoration-capitalism-soviet-union/appendix-3.htm>
- . 1994. "The Historical Significance of Stalin's 'Economic Problems of Socialism in the USSR.'" *Marxist Internet Archive (MIA): Bill Bland*. <https://www.marxists.org/archive/bland/1994/x01/historical-significance-stalins-economic-problems-socialism-ussr.pdf>
- . 1999. "Stalin: 'The Myth and the Reality.'" In *The Conference Of International Struggle: Marxist-Leninist*. Paris. <https://www.marxists.org/archive/bland/1999/x01/x01.htm>

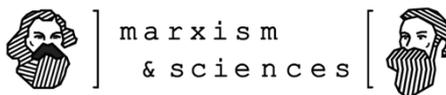
- Bonasio, Roberto, Shengjiang Tu and Danny Reinberg. 2010. "Molecular Signals of Epigenetic States." *Science* 330(29): 612–616.
<https://www.science.org/doi/10.1126/science.1191078>
- Borinskaya, Svetlana A., Andrei I. Ermolaev and Eduard I. Kolchinsky. 2019. "Lysenkoism Against Genetics: The Meeting of the Lenin All-Union Academy of Agricultural Sciences of August 1948, Its Background, Causes, and Aftermath." *Genetics* 212: 1–12.
- Brain, Steven. 2011. *Song of the Forest: Russian Forestry and Stalinist Environmentalism, 1905–1953*. University Pittsburgh Press, Pittsburgh.
- Brandenberger, David and Mikhail Zelenov. 2019. "Introduction." In *Stalin's Master Narrative: A Critical Edition of the History of the CPSU(B)—Short Course*. New Haven; Yale University Press.
- Buss, Leo.W. 1983. "Processes of Evolution, Development, and the Units of Selection." *Proceedings of the National Academy of Sciences of the United States of America* 80: 1387–1391.
- Churchill, Frederick B. 1987. "From Heredity Theory to Vererbung: The Transmission Problem, 1850–1915." *Isis* 78:336–364.
- Crick, Francis. 1970. "Central Dogma of Molecular Biology." *Nature* 227(5258): 561–563.
- Danchin, Etienne, Arnaud Pocheville, Olivier Rey, Benoit Pujol and Simon Blanchet. 2019. "Epigenetically Facilitated Mutational Assimilation: Epigenetics as a Hub within the Inclusive Evolutionary Synthesis." *Biological Reviews* 94: 259–282.
- Danchin, Etienne, Arnaud Pocheville and Philippe Huneman. 2019. "Early in Life Effects and Heredity: Reconciling Neo-Darwinism with Neo-Lamarckism under the Banner of the Inclusive Evolutionary Synthesis." *Philosophical Transactions of the Royal Society B: Biological Sciences* 374: 1–13.
- Darwin, C. R. n.d. *Notebook B Zoonomia #3: [Transmutation of species (1837-1838)]*. CUL-DAR121. Transcribed by Kees Rookmaaker. *Darwin Online*.
<http://darwin-online.org.uk/content/frameset?itemID=CUL-DAR121-&pageseq=38&viewtype=side>
- . 1875. "The Variation of Animals and Plants Under Domestication." *Gutenberg Project Second Edition*, Volumes One and Two. London. <https://www.gutenberg.org/files/3332/3332-h/files/chap27.html>
- . 1958. "Origin of Species; Chapter 1 'Variation under Domestication 1859'." *Mentor edition*, New York 6th edition: 35.
- Dawkins, Richard. 1976. *The Selfish Gene*. New York: Granada Publishing House.
- Deichmann, Ute. 2014. "The Concept of the Causal Role of Chromosomes and Genes in Heredity and Development: Opponents from Darwin to Lysenko." *Perspectives in Biology and Medicine* 57: 57–77.
- Dejong-Lambert, William and Nikolai Kremontsov. 2012. "On Labels and Issues: The Lysenko Controversy and the Cold War." *Journal of the History of Biology* 45: 373–388.
- De Winter, Willem. 1997. "The Beanbag Genetics Controversy: Towards A Synthesis of Opposing Views Of Natural Selection." *Biology and Philosophy* 12: 149–184.
- Dronamraju, Krishna. 2010. *Haldane, Mayr, and Beanbag Genetics*. Oxford, UK: Oxford University Press.
- Engels, Frederick. 1936; "Letter to Marx July 14, 1858." In *Marx and Engels; Select Correspondence*, edited by Donna Torr. Moscow: Progress Publishers.
- . 1987a. "Anti-Duhring." In *Marx and Engels Collected Works*, Vol. 25. Moscow: Progress Publishers.
- . 1987b. "Dialectics of Nature." In *Marx and Engels Collected Works*, Vol. 25. Moscow: Progress Publishers.

- . 1987c. “Preparatory writing for Anti-Duhring.” In *Marx and Engels Collected Works*, Vol. 25. Moscow: Progress Publishers.
- Fernandez-Twinn, Denise S., Miguel Constância and Susan E. Ozanne. 2015. “Intergenerational Epigenetic Inheritance in Models of Developmental Programming of Adult Disease.” *Seminars Cell & Developmental Biology* 43: 85–95.
- Fok, Ezio T., Laurianne Davignon, Stephanie Fancucchi and Musa M. Mhlanga. 2019. “The lncRNA Connection Cellular Metabolism and Epigenetics in Immunity.” *Frontiers Immunology* 9(3184): 1–11.
- Foster, John Bellamy. 2020. *The Return of Nature*. New York: Monthly Press.
- Galhardo, Rodrigo S., P. J. Hastings and Susan M. Rosenberg. 2007. “Mutation as a Stress Response and the Regulation of Evolvability.” *Critical Reviews in Biochemistry and Molecular Biology* 42(5): 399–435.
- Getty, J. Arch, Gábor T. Rittersporn and Viktor N. Zemskov. 1993. “Victims of the Soviet Penal System in the Pre-War Years: A First Approach on the Basis of Archival Evidence.” *The American Historical Review* 98(4) :1017–1049.
- Graham, Loren. 2016. *Lysenko’s Ghost*. Cambridge Mass: Harvard University Press.
- Goldberg, Aaron D., C. David Allis and Emily Bernstein. 2007. “Epigenetics: A Landscape Takes Shape.” *Cell* 128: 635–638
- Hahn, Werner G. 1982. *Postwar Soviet Politics: The Fall of Zhdanov and the Defeat of Moderation 1945–53*. New York: Cornell University Press.
- Halfmann, Randal and Susan Lindquist. 2010. “Epigenetics in the Extreme: Prions and the Inheritance of Environmentally Acquired Traits.” *Science* 330: 62–64.
- Harris, Jonathan. 2008. *The Split in Stalin’s Secretariat, 1939-1948*. Plymouth, UK: Lexington Books.
- Hemberger, Myriam and Roger Pedersen. 2010. “Epigenome Disruptors.” *Science* 330: 598–599.
- Hudson, P.S and R.H. Richens. 1946. “The New Genetics in the Soviet Union.” In *Imperial Bureau of Plant Breeding and Genetics*. England: Cambridge.
- Hyldig-Nielson, Jens Jorgen, Erik O. Jensen, Kirsten Paludan, Ove Wiborg, Roger Garrett, Poul Jorgensen and Kjeld A. Marcker. 1982. “The Primary Structures of Two Leghemoglobin Genes from Soybean.” *Nucleic Acids Research* 10(2): 689–701.
- Jablonka, Eva and Marion J. Lamb. 2020. *Elements in the Philosophy of Biology Inheritance Systems and the Extended Evolutionary Synthesis*. Cambridge University Press.
<https://doi.org/10.1017/9781108685412>.
- Joravsky, David. 1986. *The Lysenko Affair*. University of Chicago Press.
- Kangal, Kaan. 2020. *Friederich Engels and the Dialectics of Nature*. Cham, Switzerland: Palgrave Macmillan.
- Keller, Evelyn Fox. 1983. *A Feeling for the Organism, The Life of Barbara McClintock*. San Francisco: W.H. Freeman.
- . 2000. *The Century of the Gene*. Harvard Press.
- Kempe, Katja, Myroslava Rubtsova and Mario Gils. 2014. “Split-Gene System for Hybrid Wheat Seed Production.” *Proceedings of the National Academy of Sciences of the United States of America* 111: 9097–9102.
- Koonin, Eugene V. 2009. “The Origin at 150: Is a New Evolutionary Synthesis in Sight?” *Trends in Genetics* 25(11): 473–475.
- Lecourt, Dominique. 1977. *Proletarian Science? The Case of Lysenko*. London, UK: New Left Books.
- Lenin, V.I. 1962. “Materialism and Empirocriticism.” In *Lenin Collected Works* Vol. 14. Moscow: Progress Publishers.

- Lewin, Roger. 1982. "Can Genes Jump between Eukaryotic Species." *Science* 217(4554): 41–42.
- Levins, Richard and Lewontin, Richard. 1985. "The Problem of Lysenkoism." In *The Dialectical Biologist*. Cambridge Mass: Harvard U Press.
- Lewontin, Richard. 1992. "The Dream of the Human Genome: Doubts About the Human Genome Project." *New York Rev Books* May 28, 39(10):31-40.
- . 2000. *The Triple Helix: Gene Organism and Environment*. Harvard University Press.
- Lewontin, Richard and Richard Levins. 2000. "Schmalhausen's Law." *Capitalism, Nature and Science* 11(4): 103–108
- Lukács, Georgy. 1993. *History and Class Consciousness*. New Delhi.
- Lysenko, Trofim D. 1935. "History of the Problem of Vernalization." In *Agrobiolgy: Essays on Problems of Genetics, Plant Breeding and Seed Growing 1954*. Moscow: Foreign Languages Publishing House (FLPH).
- . 1936. "Two Trends in genetics." In *Agrobiolgy: Essays on Problems of Genetics, Plant Breeding and Seed Growing 1954*. Moscow: Foreign Languages Publishing House (FLPH).
- . 1943. "Heredity and its Variability." In *Agrobiolgy: Essays on Problems of Genetics, Plant Breeding and Seed Growing 1954* Moscow: Foreign Languages Publishing House (FLPH).
- . 1948. "Session of Lenin Academy of Agricultural Sciences: 'The Situation in Biological Sciences - Concluding Remarks July 31, 1948'." In *Agrobiolgy: Essays on Problems of Genetics, Plant Breeding and Seed Growing 1954*. Moscow: Foreign Languages Publishing House (FLPH).
- Marx, Karl. 1976a. "Preface to First German Edition." *Capital* Vol. 1: 93, translated by Ben Fowkes. London: Pelican Books.
- . 1976b. "The Poverty of Philosophy: Response to Proudhon's *Philosophe de la misere* [The philosophy of poverty] 1847." In *Marx and Engels Collected Works*, Vol. 6. Moscow: Progress Publishers.
- . 1989. "Letter to Editor (Saltykov-Schedrin) of the Otecestvenniye Zapisky [Notes on the Fatherland] regarding Marx's Critic N.K. Mihailovsky." In *Marx and Engels Collected Works*, Vol. 24. Moscow: Progress Publishers.
- Mayr, Ernst. 1976. *Evolution and the Diversity of Life*. Cambridge Mass: Belnap Press.
- . 1982. *The Growth of Biological Thought*. Cambridge Mass: Belnap Press.
- McCagg, William O., Jr. 1978. *Stalin Embattled 1943–1948*. Detroit, Michigan: Wayne State University Press.
- Meaney, Michael J., and Anne C. Ferguson-Smith. 2010. "Epigenetic Regulation of Neural Transcriptome: Meaning of Marks." *Nature Neuroscience* 13(11): 1313–1318.
- Morgan, Thomas Hunt. 1926. "Genetics and the Physiology of Development." *The American Naturalist* 60: 489–515.
- . 1934. "The Relation of Genetics to Physiology and Medicine." *Nobel Lecture*. <https://www.nobelprize.org/uploads/2018/06/morgan-lecture.pdf>
- Mosini, Valeria. 2013. "Proteins, the Chaperone Function and Heredity." *Biology & Philosophy* 28: 53–74
- Noble, Raymond and Denis Noble. 2017. "Was the Watchmaker Blind? or Was She One-Eyed?" *Biology* 6: 47–66.
- Orel, Vitezslav. 1984. *Mendel*. Oxford University Press.
- Peterson, Erik L. (2017). *The Life Organic: The Theoretical Biology Club and the Roots of Epigenetics*. PA: University Pittsburgh Press.
- Peng, Jamy C. and Haifan Lin. 2013. "Beyond Trosposons: The Epigenetic and Somatic Functions of The Piwi-pirna Mechanism." *Current Opinion in Cell Biology* 25(2): 190–194.

- Pollock, Ethan. 2006. *Stalin and the Soviet Science Wars*. PA: Princeton University Press.
- Prinzing, Andreas, Wim A. Ozinga, Martin Brändle, Pierre-Emmanuel Courty, Françoise Hennion, Conrad Labandeira, Christian Parisod, Mickael Pihain and Igor V. Bartish. 2017. "Benefits from Living Together? Clades Whose Species Use Similar Habitats May Persist as a Result of Eco-Evolutionary Feedbacks." *The New Phytologist* 213: 66–82.
- Priyadarshan, P.M. 2019. *Plant Breeding: Classical to Modern*. Springer.
- Prusiner, Stanley B. 1995. "The Prion Diseases." *Scientific American* 272: 48–51, 54–57.
- Radman, Miroslav. 1999. "Enzymes of Evolutionary Change." *Nature* 401: 866–869.
- . 2001. "Fidelity and Infidelity." *Nature* 413: 115.
- Radman, Miroslav, François Taddei and Ivan Matic. 2000. "Evolution-Driving Genes." *Research in Microbiology* 151: 91–95.
- Robert, Jason Scott. 2004. *Embryology, Epigenesis and Evolution*. Cambridge, UK: Cambridge University Press.
- Roll-Hansen, Nils. 1985. "A New Perspective on Lysenko?" *Annals of Science* 42(3): 261–278.
- . 2015. "On the Philosophical Roots of Today's Science Policy: Any Lessons from the 'Lysenko Affair'?" *Studies in East European Thought* 67: 91–109.
- Rose, Steven P.R. 2002. "The Biology of the Future and the Future of Biology." *Journal of Molecular Biology* 319: 877–884.
- Rose, Steven, Leon J. Kamin and R.C. Lewontin. 1984. *Not in Our Genes. Biology, Ideology and Human nature*. London: Pelican Press.
- Sandler, Iris and Laurence Sandler. 1985. "A Conceptual Ambiguity that Contributed to the Neglect of Mendel's Paper." *History and Philosophy of the Life Sciences* 7: 3–70.
- Sapp, Jan. 1987. *Beyond the Gene. Cytoplasmic Inheritance and the Struggle for Authority in Genetics*. New York: Oxford University press.
- . 2009. "'Just' in Time: Gene Theory and the Biology of the Cell Surface." *Molecular Reproduction and Development* 76: 903–911.
- Shapiro, James A. 1999. "Genome System Architecture and Natural Genetic Engineering in Evolution." *Annals of the New York Academy of Sciences* 870(1): 23–25.
- Sharp, Phillip A. 1994. "Split genes and RNA Splicing-Nobel lecture." *Cell* 77: 805–815
- Sheehan, Helena. 1993. *Marxism and the Philosophy of Science – A Critical history*. New Jersey: Humanities Press International.
- Schlegel, Rolf H.J. 2018. *History of Plant Breeding*. Taylor & Francis Group: CRC Press.
- Schmidt, Alfred. 2014. *The Concept of Nature in Marx*. London Verso Books.
- Smocovitis, V.B. 1992. "Unifying Biology: The Evolutionary Synthesis and Evolutionary Biology." *Journal of the History of Biology* 25: 1–65;
- Soyfer, Valery N. 1994. *Lysenko and the Tragedy of Soviet Science*. New Jersey: Rutgers University press.
- Stahl, Titus. 2018. "Georg [György] Lukács." In *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. <https://plato.stanford.edu/archives/spr2018/entries/lukacs/>
- Stalin, J.V. 1972. *Marxism and Problems of Linguistics [1954]*. Peking: People's Publishing House.
- Stegemann, Sandra and Ralph Bock. 2009. "Exchange of Genetic Material Between Cells in Plant Tissue Grafts." *Science* 324: 649–651.
- Temin, Howard M. and Satoshi Mizutani. 1970. "RNA-dependent DNA Polymerase in Virions of Rous Sarcoma Virus." *Nature* 226: 1211–1213.
- Waddington, C. H. 2012. "The Epigenotype." *International Journal of Epidemiology* 41(1): 10-13. <https://doi.org/10.1093/ije/dyr184>
- Wahl, Mary E. and Andrew W. Murray. 2016. "Multicellularity Makes Somatic Differentiation Evolutionarily Stable." *Proceedings of the National Academy of Sciences of the United States of America* 113(30): 8362–8367.

- Weaver, Ian C.G., Nadia Cervoni, Frances A. Champagne, Ana C. D'Alessio, Shakti Sharma, Jonathan R. Seckl, Sergiy Dymov, Moshe Szyf and Michael J. Meaney. 2004. "Epigenetic Programming by Maternal Behavior." *Nature Neuroscience* 7(8): 847–854.
- Quammen, David. 2018. *The Tangled Tree*. New York: Simon & Schuster.
- Wang, Jing, Libo Jiang and Rongling Wu. 2017. "Plant Grafting: How Genetic Exchange Promotes Vascular Reconnection." *The New Phytologist* 214: 56–65.
- Woese, Carl R. and Nigel Goldenfeld. 2009. "How the Microbial World Saved Evolution from the Scylla of Molecular Biology and the Charybdis of the Modern Synthesis." *Microbiology and Molecular Biology Reviews* 73: 14–21.
- Weiner, Douglas R. 1999. *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev*. Berkeley: University California Press.
- Yang, Jida, Zhiming Zhang, Dawazhaxi, Bin Wang, Qiang Li, Qiaochu Yu, Xiaokun Ou and Kashif Ali. 2019. "Spatial Distribution Patterns and Intra-Specific Competition of Pine (*Pinus Yunnanensis*) in Abandoned Farmland under the Sloping Land Conservation Program." *Ecological Engineering* 135: 17–27.
- Zirkle, Conway. 1949. *Death of a Science in Russia*. Philadelphia: University Pennsylvania Press.



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On the Differences between the Classical and the “Western” Marxist Conceptions of Science

Zeyad el Nabolsy

ABSTRACT: This essay aims to provide an account of the differences between what I call the “Classical Marxist” conception of science which was adhered to by Marx and Engels and further developed by Boris Hessen and others on the one hand, and the conception of science which characterizes “Western Marxism” as it developed through the work of the theorists of the Frankfurt School on the other hand. I argue that Western Marxists such as Herbert Marcuse and Max Horkheimer did not in fact successfully criticize the logical positivist account of the modern natural sciences. Instead I argue that they implicitly accepted the positivists’ characterization of the modern natural sciences (as they interpreted it) and then proceeded to devalue the modern natural sciences on this basis. I also show that Marcuse and Horkheimer, even though they presented themselves as revolting against the alleged “economism” of Classical Marxism, ended up endorsing a view of science which is functionally equivalent to a reductive economic conception of science. I argue that the Classical Marxists’ conception of science is far richer and far more interesting than either a stereotyped “economic” conception of science or the Western Marxist conception of modern science as merely an element in a historical process centered on the oppressive universalization of instrumental reasoning.

KEYWORDS: History and philosophy of science, Marxist philosophy of science, Hegel, Marx, Engels, Western Marxism.

*Time was when man had a heaven, decked and fitted out with endless wealth of thoughts and pictures. The significance of all that is, lay in the thread of light by which it was attached to heaven; instead of dwelling in the present as it is here and now, the eye glanced away over the present to the Divine, away, so to say, to a present that lies beyond. The Spirit’s gaze had to be directed under compulsion to what is earthly, and kept fixed there; and it has needed a long time to introduce that clearness, which only heavenly realities had, into the crassness and confusion shrouding the sense of things earthly, and to make attention to the immediate present as such, which was called Experience, of interest and of value. (Hegel, preface to *The Phenomenology of Spirit*)*

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THIS BRIEF ESSAY WAS OCCASIONED by my encounter with a self-identified Polish “critical theorist” at a conference on Hegel in the summer of 2018. After pointing out to him that his views were incompatible with any kind of respect for the epistemic authority of modern natural science, I was told that “we [presumably meaning “progressive scholars” or “leftists,” or something of that sort] should just give up on science.” This essay is an attempt to understand this point of view, especially in relation to what I regard as the “Classical Marxist” conception of science. I do not intend to dogmatically present the standpoint of “critical theory” or “Western Marxism” as a heterodox degeneration from the “lofty standards of classical Marxism,” even if it is clear that my sympathies are with the latter. However, I do intend to point to the chasm which separates the standpoint of Classical Marxism with respect to science from the standpoint of some tendencies of “critical theory” or “Western Marxism” with respect to science.¹ The aim of this article is not to provide an exhaustive account of what the first generation of Frankfurt School theorists thought of science. Instead, I aim to contrast the standpoint of Classical Marxism with certain tendencies in the writings of Horkheimer and Marcuse, which can lead one to adopt reductive views about modern science and technology.²

It is clear that Marx and Engels took themselves to be engaged in some form of science [*Wissenschaft*]. Hence, the claim that “we [Marx and Engels] know only a single science, the science of history” (Marx and Engels 1976a, 28). However, from the fact that Marx and Engels took themselves to be engaged in some kind of *Wissenschaft*, we cannot make direct inferences about their views regarding the relationship between their science of history and the natural sciences. For the German word ‘*Wissenschaft*’ can be used to refer to organized bodies of knowledge in general (Beiser 2011, 6). I.e., it does not necessarily carry the connotations of a body of knowledge that deals with natural phenomena and which seeks to describe them in terms of quantitative relations (which I take to be the connotations of the English word ‘science’ today). More evidence is needed in order to grasp

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1. Critical theory insofar as it has historically been associated with the Frankfurt School has been sometimes referred to as “Western Marxism,” hence the use of the interchangeable labels (Kautzer 2017). Although some scholars have also argued that Frankfurt School theorists eventually brought about a break with “Western Marxism”, see the overview in Kautzer 2017, 59–60.
 2. This claim does not apply to the most prominent member of the second generation of Frankfurt School theorists; Jürgen Habermas. For Habermas, “it is not science per se that legitimates domination, but science mediated by technology” (Ray 1979, 170).

Marx and Engels’ view. This evidence comes in the form of Marx and Engels’ attachment to the unity of science thesis.³ For the quotation reproduced above continues:

[...] we know only a single science, the science of history. One can look at history from two sides and divide it into the history of nature and the history of men. The two sides are, however, inseparable; the history of nature and the history of men are dependent on each other so long as men exist. (Marx and Engels 1976a, 28)

Further support for the claim that Marx adhered to the unity of science thesis is to be found in *The Economic and Philosophical Manuscripts of 1844*: “natural science will in time incorporate into itself the science of man, just as the science of man will incorporate into itself natural science: there will be one science” (Marx 1975a, 304). As Helena Sheehan (2017 [1985], 50) has noted, it is quite ironic that Marx expresses himself so clearly in relation to the unity of science thesis in the text which has been taken by “critical theorists” (and/or “Western Marxists”) to give us the “anti-positivist” Marx who did not think that there was a place for the natural sciences in the articulation of a critical social theory.⁴ The dispute about to what extent Marx and Engels (especially the latter as depicted by the “anti-Engels literature”,⁵ which has become a kind of cottage industry and which depicts Marx as a Jesus of Nazareth figure whose doctrines have been corrupted by Engels, who in this narrative gets cast as a modern St. Paul) were “positivists” is important in relation to this discussion, but I do not intend to take it up here at any great length.⁶ However, I will note that the Frankfurt School theorists (specifically Marcuse and Horkheimer) did not attempt to refute logical positivism qua philosophy of science. Indeed, its members largely accepted the logical positivist view of science (and a very simplistic version of that as well),⁷ and then proceeded to reject or at least devalue natural science on this basis (Sheehan 2017 [1985], 400; Honneth 2005, 302). As Habermas puts it: “Adorno and Horkheimer are convinced

3. In this regard, Marx and Engels are closer to someone like Neurath than to someone like Horkheimer.

4. Also, see the critique in Saito 2017, 32–35.

5. For a critical assessment of this “anti-Engels” literature, see Sheehan 2017[1985], 53–60.

6. The Jesus and St. Paul analogy comes from (Sedgwick 1966, 183) who also criticizes the anti-Engels cottage industry.

7. The question of whether they adequately understood logical positivism will not be dealt with extensively here. However, there is good evidence to suggest that they misunderstood the views of at least some of the members of the Vienna Circle. See the brief discussion in footnote 10.

that *modern science* came into its own in logical positivism” (Habermas 1990, 111). They did not seriously raise the question of whether the logical positivist account of the natural sciences was correct in the first place. As the scholar of the Frankfurt School, J.C. Berendzen (2017) notes, Horkheimer often tended to conflate what he took to be the logical positivists’ theory of science with the actuality of scientific practice. We can briefly compare this approach to Lenin’s response to logical positivism (in its embryonic Machian form) in order to outline the different strategy which was pursued by Lenin. Lenin, far from conceding that positivism provides a correct account of natural science, argues that positivist anti-realism is incompatible with the history and actuality of modern science. Thus, for example, Lenin writes of Mach that “in his philosophical wanderings the physicist Mach has completely strayed from the path of ‘modern science’” (Lenin 2021, 40).⁸ Whether Lenin is correct or not in his critique of Mach is not the issue here. What is important is that Lenin unlike Horkheimer does not take the positivists’ word as the truth about the natural sciences. Horkheimer, by contrast, does not really criticize the logical positivist conception of science. He merely surrenders to the logical positivist conception of science, and then proceeds to reject any emancipative potential that can be attributed to modern natural science on this basis.⁹

With respect to the question of Marx and Engels’ alleged positivism, it is an unfortunate fact that much of this debate conflates scientific philosophy qua genus of philosophy that arose in the late nineteenth and early twentieth centuries (Richardson 1997), with logical positivism which was merely one species of philosophy of that genus (Viola 2013).¹⁰ Marxism in

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8. Lenin is also concerned with showing that the Machian understanding of the philosophical presuppositions of natural science is not shared by other physicists, e.g., Ludwig Boltzmann (Lenin 2021, 72).
 9. This idea was first suggested to me several years ago by Richard T. W. Arthur in the course of a conversation on the history of philosophy of science in the 20th century.
 10. Moreover, we can note that that there was tremendous diversity in logical empiricism as a movement, and that some of the members of the “Left-Wing” of the Vienna Circle thought that an adequate philosophy of science required the development of an adequate sociology of science, e.g., Otto Neurath and Philip Frank (Reisch 2005, 29; Reisch 2014, 374; Reisch 2017, 239). Hence, strictly speaking, Frankfurt School theorists such as Horkheimer oversimplify when they present positivism as only concerned with a second-order theory of the logical structure of scientific theories: “it [positivism] removed thought from philosophy and reduced the latter to the technique of organizing, by reproduction and abridgement, the matters of fact given in the world of of sense. In positivism, reason sustains itself through self-liquidation” (Horkheimer 1992, 39).

its classical form was also a species of that genus (Howard 2003; Omodeo 2016). Hence, to show that Marx and Engels were positivists of some sort it is not sufficient to claim that they held some thesis that was also held by several scientific philosophers (e.g., the unity of science thesis) whom we customarily subsume under the label of “logical positivism,” for this approach does not allow one to differentiate between different species of philosophy within the genus of scientific philosophy.¹¹

For now, we must deal with an obvious objection: how can one reconcile Marx’s admiring attitude towards science with his claim that by the eighteenth-century “big industry” had successfully made “natural science subordinate to capital and took from the division of labour the last semblance of its natural character” (Marx and Engels 1976a, 73)?¹² Moreover, did Marx not explicitly claim that science insofar as it is subordinated to capital contributed to human alienation [*Entfremdung*], which is the result of “this fixation of social activity, this consolidation of what we ourselves

Andreas Vrahimis (2020, 580–581) has shown that Horkheimer misattributed certain views to members of the Vienna Circle, such as the claim that they all subscribed to the ideal of value-free science and the claim that they were all committed to methodological individualism. On the manner in which the theorists of the Frankfurt School misconceived the project of the Vienna Circle as involving epistemology in the traditional sense, see Sachs 2020.

11. Hence, the Russian Machians whom Lenin argued against were not wrong in thinking that there were metaphysical overlaps between Marxism and logical positivism. However, they were wrong to think that scientific philosophy requires us to abandon scientific realism, because they were unable to see that empiricist philosophies of science simply cannot make sense of scientific practice. For a convincing critique of empiricist philosophies of science, see Arthur 1977.
12. This question also shows that Habermas is not quite correct when he says that “science and technology” are “for Marx an unambiguous potential for liberation” (Habermas 1990, 66). Marx and Engels were clearly aware that we cannot think of technology independently of its relation to specific class structures of domination (Miller 1983, 188–195). This view is essentially in agreement with the view enunciated by Marcuse in his 1941 essay, *Some Social Implications of Modern Technology*: “technology, as a mode of production, as the totality of instruments, devices and contrivances which characterize the machine age is thus at the same time a mode of organizing and perpetuating (or changing) social relationships” (Marcuse 1992 [1941], 138–139). However, we should note that Marcuse later deviates from the view of technics (qua instruments and machines) which is found in this essay. For in this essay, he writes of technics as neutral, a view which he would later abandon: “technics by itself can promote authoritarianism as well as liberty, scarcity as well as abundance, the extension as well as the abolition of toil” (Marcuse 1992 [1941], 139).

produce into an objective power above us, growing out of our control, thwarting our expectations [...]” (Marx and Engels 1976a, 43)?¹³

There are several possible responses to this objection. The first is to recognize that what Marx meant by natural science being rendered subordinate to capital is that science, under capitalism, becomes a branch of the productive forces in a given social formation (Rose and Rose 1976a, 6). On this interpretation, science qua productive force will eventually come into conflict with existing capitalist relations of production.¹⁴ This conflict model is outlined by Marx in his *A Contribution to the Critique of Political Economy*:

[...] at a certain stage of development, the material productive forces of society come into conflict with the existing relations of production or – this merely expresses the same thing in legal terms – with property relations within the framework of which they have operated hitherto. From forms of development of the productive forces these relations turn into fetters. (Marx 1986, 263)

In relation to this point, we must recognize that Marx made a conceptual distinction between the fact that a thing x is subordinated to capital and the possibility that this same thing x can be a contributing factor in the demise of capitalism. The most obvious example of this distinction is Marx’s claim that even though there is a clear sense in which the working classes in different European social formations have been subordinated to capital, they can also be a contributing factor in the demise of capitalism (indeed for Marx they are the main agent which will bring about the process that will lead to the demise of capitalism). Hence, the sense in

13. This account of the development of social forces and social phenomena (especially commodities) which then come to control and structure the lives of their creators is quite similar to Max Weber’s account of what ascetic Protestantism inadvertently brings about: “as asceticism began to change the world and endeavored to exercise its influence over it, the outward goods of this world gained increasing and finally inescapable power over men, as never before in history” (Weber 2002 [1905], 121). In this respect, both Weber and Marx can be characterized as theorists of unintended consequences. Although Weber’s pessimism is much more pronounced and differentiates him from Marx.

14. This classical Marxist view was also upheld by J.D. Bernal and others (Rose and Rose 1976b). We also find it expressed in some of Horkheimer’s early writings, e.g., his 1932 essay, *Notes on Science and the Crisis*: “society in its present form is unable to make effective use of the powers it has developed and the wealth it has amassed. Scientific knowledge in this respect shares the fate of other productive forces and means of production: its application is sharply disproportionate to its high level of development and to the real needs of mankind” (Horkheimer 2002 [1932], 4). However, as I argue below, this model of science as a branch of productive forces is not the most fecund Marxist model of science.

which Marx and Engels speak of capitalism as creating its “own grave-diggers” (Marx and Engels 1976b, 496). One distinction between the view of science in the writings of Marx and Engels on the one hand, and the view of science in the writings of some members of the first generation of the Frankfurt School, is that the latter tend to underplay the importance of understanding science as a domain of struggle between different ideological, political, and social lines. By this I mean that instead of depicting science as a terrain of struggle, they have a tendency in some of their writings to reify science and forget that science is done by individual scientists, e.g., when Marcuse writes, under the influence of Husserl, that “the empirical reality constitutes, in a specific sense, the very concepts which science believes are pure theoretical concepts” (Marcuse 1992 [1965], 470). Horkheimer also tends to write in this manner: “the social genesis of problems, the real situations in which science is put to use and the purposes which it is made to serve are all regarded by science as external to itself” (Horkheimer 2002 [1937], 244). Strictly speaking “science” does not believe anything. It is individual scientists who are the bearers of propositional attitudes and who believe propositions. This is not merely a pedantic point, because when one begins to speak of science as believing (or disbelieving) certain things about its relation to its wider socio-historical context, then one obscures the fact that there are intellectual struggles carried out by individual scientists who adhere to opposing ideological orientations which represent different social groups with opposing interests.¹⁵ Marcuse and Horkheimer’s manner of writing about science can also lead to the conflation of what scientists think of themselves with what scientists do (and surely any “critical theory” worth the name cannot simply assume, without argument, that these two things are identical). What are needed are empirical studies which reveal the inner workings of the natural sciences, something which the first generation of Frankfurt School theorists never provided (Collin and Pedersen 2015, 49).

Another way to respond to the objection above (with respect to Marx’s admiring stance towards science) is to point out that Marx made a distinction between science as such and the self-understanding of scientists. Marx made this distinction when he pointed out that the limitations of mechanical or abstract materialism become evident “from the abstract and ideological conceptions expressed by its spokesmen whenever they venture

15. For a relatively contemporary example, we may point to Stephen Jay Gould’s intervention in the debate about IQ and biological determinism (Gould 1996).

beyond the bounds of their own specialty” (Marx 1975b [1867], 494 fn.4).¹⁶ In other words, Marx thinks that the dominance of capitalist relations of production can lead to distortions in terms of how scientists understand the relationship between their results in relation to a narrow domain of inquiry and the significance of those results for wider social issues. Moreover, it can lead to distortions regarding how they conceive of the relationship between science and its social context, i.e., thinking of science as completely insulated from its social context (Rose and Rose 1976b, 23–34). On this Horkheimer would agree with Marx and Engels: “in traditional theoretical thinking, the genesis of particular objective facts, the practical application of the conceptual systems by which it grasps the facts, and the role of such systems in action, are all taken to be external to the theoretical thinking itself” (Horkheimer 1992 [1937], 208). However, arguably, it is not a necessary condition for being a good scientist that one should also be a good historian, philosopher, or sociologist of science.¹⁷ Arguably Newton, for example, misunderstood or at least misrepresented his own method.¹⁸ While a critique of the sciences in a manner that emphasizes the socio-historical genesis of science qua social activity is necessary, it is not clear that this should be a task for scientists and that they should be criticized for failing to do so. Herbert Marcuse does not seem to make a distinction between the content of scientific activity and the self-understanding of scientists (Sedgwick 1966, 175). To this extent, Marcuse’s critical account of science is not critical enough, in so far as it takes scientists at their word (i.e., if some of them say that they are positivists and that positivism is the most appropriate philosophy of science, then he just simply assumes that modern science is indeed positivist).

My suggestion is that the key issue here is the theory of ideology as understood by Marx and Engels (and those who upheld the classical Marxist view). For one could argue, as Marcuse and Horkheimer have argued in some of their writings that the very methods and results of science are ideological distortions that reflect the dominant capitalist relations of productions with their attendant universalization of instrumental rationality

16. For contemporary examples, we can point to someone like Richard Dawkins.

17. Although it may very well be the case that some knowledge of the history and philosophy of science can help a practicing scientist improve qua scientist.

18. As Mario Bunge puts it, “Newton praised inductivism in the same book, his monumental *Principia*, where he expounded the earliest fruit of the hypothetico-deductive method in natural science” (Bunge 2012, 29).

(Honneth 2005, 302).¹⁹ If one believes that “science in our own time is more closely related than in the past to production” (Ciccotti, Cini, and de Maria 1976, 47), and that under capitalism, the extent to which science becomes ideological both in its methods and its results is a function of the extent of its ties to production, then one can come to believe that science has become completely ideological (in the strict negative Marxist sense). Thus, we can see how some tendencies in the writings of the first generation of Frankfurt School theorists depict science as irredeemably oppressive.²⁰

The key issue which must be brought to light in order to understand the differences between the pessimistic view of the emancipatory potential of science which is found in some of the writings of the Frankfurt School and the relatively optimistic view which was upheld by those who we can subsume under the label of “Classical Marxism” revolves around the theory of ideology and its scope. We must begin by noting that theory of ideology as applied to science under capitalism cannot merely mean that science is conditioned by socio-economic conditions. For the distinctive feature of classical Marxist philosophies of science was that they held that all knowledge, including scientific knowledge, was conditioned by socio-economic conditions, without believing that this fact by itself is sufficient to cast doubt on the rationality of science or the truth of specific theories (Sheehan 2017 [1985], 5).²¹ I have argued elsewhere that the classical Marxist version of the theory of ideology is not (despite some rhetorical abuses) a theory of refutation, i.e., it does not seek to establish the falsehood of the view/theory that is being labeled as ideological. Instead it was used in order to *explain* why the false theory/view in question was held, despite its obvious falsehood (relative to the evidence that the people who

19. The influence of Weber on the members of the Frankfurt School is clear in the manner in which they center the notion of instrumental reason, as well as their often remarked upon pessimism.

20. However, it would be misleading to think that this is the entire story. For as Honneth (2005, 302) has noted, a key transformation was the manner in which the Frankfurt school came to see knowledge engendered by labour in negative terms. For example, the claim that “the man of science knows things to the extent that he can make them” (Horkheimer and Adorno 2002, 6) becomes an indictment of the epistemological framework of science in the writings of Horkheimer and Adorno. This, of course, involves a complete turn away from Marx’s claim that labour (humans acting on nature) is in some sense the very foundation of human knowledge (Bloch 1971, 151).

21. Horkheimer was, of course, aware of this: “it is not for social interests to decide what is or is not true; the criteria for truth have been developed, rather, in connection with progress at the theoretical level” (Horkheimer 2002 [1932], 3).

held it had available to them).²² The falsehood of the view/theory that was being labeled as ideological was to be established using *independent arguments prior to the application of the theory of ideology* (El Nabolsy 2019, 245). The key point here is that claims to the effect that a given theory is ideological must take into consideration the evidence that the individual (in this case, the scientist) who held that theory had available to her. This involves taking into consideration the internal logic of her theory as a whole, as well as the standards which were used to evaluate what counted as evidence in her specific scientific field, which again involves taking into consideration the internal logics which governed that specific scientific field at a specific point in history and in a specific place.²³ From a methodological standpoint, we may offer a critique of at least some of the first generation Frankfurt School theorists for not taking immanent critique seriously enough when it comes to the natural sciences. One of the hallmarks of the Frankfurt School theorists is their commitment to immanent or internal critique, which ultimately has its origins in Hegel's metaphilosophical reflections. Internal critique is a critique of some claim which shows that the claim in question is illegitimate based on standards of normative or epistemic justification that are adhered to by the person who is advancing the claim. Thus, Hegel claims that: "the refutation must not come from outside, that is, it must not proceed from assumptions lying outside the system in question and that do not correspond to it" (Hegel 1969, 580). Hegel points out that if we attempt to refute a system (or in our case, a claim) by adopting standards of justification which are not recognized by the proponents of the system (or claim) in question, then "the [proponents of the] system need only refuse to recognize those assumptions" in order to reject our refutation (Hegel 1969, 580–581). The first generation of Frankfurt School theorists presented their critical theory of society as an internal critique of bourgeois society. For instance, Marcuse writes:

[...] critical rationality derives from the principles of autonomy which individualistic society itself had declared to be its self-evident truths. Measuring these

22. Some interpreters miss this point completely, e.g., Kwasi Wiredu (1980, 74) who writes that "the bite that that the theory of ideology seems to have derives from just this implication: that if and when one has shown that a set of ideas are determined by a definite development of productive forces and of the relations corresponding to them, one has thereby shown them not to have any independent claims to truth."

23. For example, Marcuse hardly ever refers to any work from physics or biology in his account of science (Sedgwick 1966, 175).

principles against the form in which individualistic society has actualized them, critical rationality accuses social injustice in the name of individualistic society’s own ideology. (Marcuse 1992 [1941], 147)

Methodologically speaking this internal approach to critique avoids begging the question. However, Marcuse and Horkheimer do not seem to have extended this approach to their critique of the natural sciences (Delanty and Harris 2021, 97). I suggest that we can undertake an internal critique of Marcuse and Horkheimer’s arbitrary delimitation of the scope of the method of internal critique when it comes to the natural sciences, i.e., we can criticize them on their own terms for failing to criticize the natural sciences in an immanent manner.²⁴

The application of the theory of ideology cannot be generalized to speak of all science (or science as such) as being ideological, as some of the adherents of the Frankfurt school’s approach to science and their contemporary followers seem to do.²⁵ If the label ‘ideological’ is indiscriminately used to describe both “race science” and “general relativity”, then it becomes clear that the very concept of ideology is not very useful for the study of the history of science. In other words, through depicting all of modern science as an ideological reflection of the capitalist mode of production, some of the writings of the first generation of the Frankfurt School and their epigones, empty the concept of “ideology” of any specific meaning. The assumption of the complete triumph of ideology, which leads to general claims such as “all men have become empiricists” (Horkheimer 1992 [1941], 30), is put forward without adequate justification.²⁶

24. Andreas Vrahimis (forthcoming) argues that the debate between Neurath and Horkheimer can be understood in terms of different answers to the question: is there a standpoint outside (and above) the empirically oriented sciences from which they can be critiqued? Horkheimer’s answer is yes, whereas Neurath’s answer is no. Framing the debate in these terms also leads to questions about the extent to which a Kantian notion of critique is compatible with a Marxist notion of critique. Especially if we understand the Frankfurt School theorists as attempting to synthesize Marxism with Kantianism (or a neo-Kantianism that has already historicized the *a priori*). For a discussion of the importance of Kant for the first generation of the Frankfurt School theorists, see McNulty forthcoming.

25. We may note that such assumptions are also carried forward in much of the contemporary “decolonial” discourse, e.g. (Grosfoguel 2009, 14), and the same criticism applies there as well.

26. It is Horkheimer who also writes that “since Descartes, philosophy was one great attempt to place itself as science in the service of the prevailing mode of production, an attempt opposed only by very few thinkers” (Horkheimer 1992 [1941], 39). This way of speaking

Moreover, this way of speaking of science in general, which neglects the internal logic of specific scientific theories, and specific scientific fields, is problematic in another way. For it involves the rejection of what we can call “the relative autonomy thesis.” According to this thesis, while the social relations of production exercise a causally determining effect on intellectual discourses (science, religion, philosophy, etc.), those discourses also have their own internal logics which cannot be ignored when attempting to understand, for example, the relationship between science and capitalism. The most well-known formulation of the “relative autonomy thesis” was made by Engels in a letter to Conrad Schmidt (October 27, 1890). It is worth quoting at some length:

As concerns those ideological realms which tower still higher in the clouds – *religion, philosophy*, etc. – they all possess from pre-historical days an already discovered and traditionally accepted fund of – what we would today call nonsense [*was wir heute Blödsinn nennen würden*].²⁷ All of these various mistaken ideas of nature, of the very creation of man, of spirits, magical forces, etc., have as their basis, in the main, negative economic grounds. The primitive economic development of the pre-historical period is supplemented by false ideas of nature, but in places it is often also conditioned and even caused by them. However, even if economic need has been the chief driving force in the advance of natural knowledge, and has become even more so, it would be altogether pedantic to want to seek economic causes for all this primitive nonsense [*Und wenn auch das ökonomische Bedürfnis die Haupttriebfeder der fortschreitenden Naturerkenntnis war und immer mehr geworden ist, so wäre es doch pedantisch, wollte man für all diesen urzuständlichen Blödsinn ökonomische Ursachen suchen*]. The history of science is the history of the gradual elimination of this nonsense, i.e., its replacement by new, but always less absurd, nonsense [*Die Geschichte der Wissenschaften ist die Geschichte der allmählichen Beseitigung dieses Blödsinns, resp. seiner Ersetzung durch neuen, aber immer weniger absurden Blödsinn*]. The people who supply it belong again to special spheres in the division of labor and imagine that they are working up an independent domain. And in so far as they constitute an independent group within the social division of labor, their products, inclusive of their errors, exert a *counter-acting influence* upon the entire social development, even upon the economic. Nonetheless they still remain under the *dominant influence of economic development* [...] But as a definite domain within

of an “attempt” leaves one open to the accusation of imputing intentions where there is no sufficient evidence. A proper application of the theory of ideology should avoid this highly psychological approach.

27. The term *Blödsinn* can also be rendered as ‘idiocy’ or ‘rubbish.’ Although Engels clearly did not think that falsified scientific theories were just rubbish, so it seems that his choice of *Blödsinn* is not really appropriate.

the division of labor, the philosophy of every age has as its presuppositions a certain intellectual material which it inherits from its predecessors and which is its own point of departure. That is why philosophy can play first violin in economically backward countries: France in the eighteenth century as opposed to England upon whose philosophy her own was based; and later Germany as opposed to both. But in France as in Germany, philosophy, like the general outburst of literary activity of that time, was a result of an economic upswing. The final supremacy of economic development even in these realms is now established but it takes place within the conditions which are set down by the particular realm: in philosophy, e.g., through the effect of economic influences (which in turn exert influence through disguised political, etc., forms) upon the existing philosophical material which our predecessors have handed down. Of itself *economics* produces no effects here directly; but it determines the kind of change and development the already existing intellectual material receives, and even that, for the most part, indirectly, since it is the political, jural and moral reflexes which exercise the greatest direct influence upon philosophy. (Engels 1934 [1890], 81).²⁸

It is clear from this passage that while Engels thinks that one can assign a dominant causal influence to economic factors (after all this is the very core of historical materialism as a theoretical framework for the study of history) when attempting to understand the history of science, one must not discount the internal logics of the given scientific theories that are being explained. Moreover, the fact that the economic element is assigned the dominant causal weight does not imply that it acts *directly* on science. The Hessen-Grossmann thesis as reconstructed by Gideon Freudenthal and Peter McLaughlin (2009) is an excellent example of this point. For according to this thesis, technology was developed in order to facilitate economic development, and early modern (seventeenth-century) science was able to make the advances that it did by studying the technology that was developed in order to facilitate economic development (*ibid.*, 4). Note that even if we think of the economic factor as ultimately causally decisive,

28. Note that in this context Engels is using the word ‘ideological’ [*ideologischen*] as a synonym for ‘intellectual world view’ (which is also how people often use the word today, i.e., when they speak of “competing ideologies”), and not in the narrow sense in which I have used it above. We may also note Engels’ anti-inductivist conception of the history of science. Unlike inductivist historians of science, Engels was not afraid to point out that the history of science is the history of the falsification of previous theories. For a critical account of standard inductivist histories of science in the nineteenth and twentieth century, see Agassi 2008, 129–174.

this thesis does not imply that it *acted directly on science*.²⁹ For according to this thesis, the purpose of early modern science was *not* the development of technology per se (let alone contributing to economic development), but rather the analysis of idealized structures as models of natural phenomena (Rosenthal and McLaughlin 2009, 16).³⁰ This point is of crucial importance because it undermines the view of science which is found in the writings of Marcuse. For Marcuse, “pure science has an inherently instrumental character prior to all specific application; the Logos of pure science is technology and is thus essentially dependent on external ends” (Marcuse 1992, [1965], 473). If by this Marcuse means to say that early modern science was developed with the aim of manipulating nature for the sake of commercial interests, then he is vastly oversimplifying.

29. This point is completely missed by some anti-Marxist philosophers of science, e.g., Agassi (2008, 148–150).

30. Horkheimer (2002 [1937], 195) references the work of Henryk Grossmann, however, it seems to me that he did not grasp its significance, insofar as he does not recognize that the debate was about whether one could provide a historical materialist explanation of the rise of early modern science that recognizes that early modern science dealt with idealized structures and was not primarily oriented towards the improvement of the means of production. Grossmann’s solution is to try to show that the key concepts of modern mechanics emerged from reflection on actually existing machinery: “L.B. Alberti, Leonardo da Vinci, Nicolo Tartaglia, Girolamo Cardano [...] derived their mechanical concepts and theorems not from the division of labor in manufacture, but from the analysis and observation of machines and their performance” (Grossmann 2009, 141). Jake McNulty (forthcoming) has attempted to provide a sympathetic reconstruction of Horkheimer’s views on science in his *Critical and Traditional Theory*, and while I am deeply sympathetic to McNulty’s project of showing the relevance of historical materialism to debates in philosophy of science, I do not share his view that Horkheimer’s approach represents a promising starting point for such a project. McNulty convincingly shows that Horkheimer held a version of Quine-Duhem thesis, e.g., (Horkheimer 2002 [1937], 194–195). However, McNulty does not in my view successfully show that the underdetermination of theory by data is a necessary condition for a historical materialist account of science to get off the ground. The Hessen-Grossmann thesis, for instance, does not presuppose any version of the underdetermination of theory by data thesis. Furthermore, it is not clear that a strong version of the underdetermination of theory by data thesis would hold if we abandon the assumption of radical empiricism (Okasha 2000, 290) and Horkheimer himself is a critic of empiricism. Moreover, McNulty does not adequately question whether Horkheimer’s account of the relationship between science and technology is historically accurate. According to McNulty, Horkheimer thinks that “scientific research and its applications in the various sectors of industry are inseparable” (McNulty forthcoming, 33). However, this claim taken as a claim that applies to the history of modern science and technology in general is, as we have seen, not accurate.

The technological basis of early modern science (e.g., the instruments that made early modern science possible), may have been brought into being as a result of commercial interests, but in the hands of natural philosophers these instruments were often turned towards less immediately utilitarian purposes. For example, the telescope was invented in the Netherlands in 1608, and it had a clear military application, and of course, a commercial one, insofar as Dutch economic prosperity was dependent on their ability to control key naval routes (Wootton 2015, 214–215).³¹ However, when Galileo set about making his telescope, he was invested in creating a telescope that would be pointed towards the heavens. This explains why he put so much effort into making telescopes that were far too powerful for military use. Galileo created ten telescopes with a magnification of 20x or better (Wootton 2015, 214–215). In the Netherlands, there were no telescopes with this magnifying power, not because the Dutch could not make them, but because telescopes of such magnifying power were useless for military purposes. We can understand the development of the technological basis for early modern science in the context of the development of capitalism, however, this does not imply that early modern natural philosophers were primarily interested in fulfilling the functional requirements of the capitalist mode of production (through applying theories in order to refine technology). The example of the telescope also illustrates another mistake in the approach of some of the first generation theorists of the Frankfurt School when it comes to their discussion of science, namely the conflation of formalization for the sake of predictive power with the pursuit of domination of nature (e.g., Horkheimer 1992 [1941], 47). In the case of early modern astronomy increased predictive power was not tied to increased manipulative power over the phenomena whose motions were being predicted, let alone the domination of nature.³² A historical materialist account of science does not in fact require that we should explain early modern science as developing to fulfill the needs of early capitalists. However, it does require that we should establish causal connections between the technological advances which were pushed forward by the needs of a new economic system and the technology which made early modern science possible (whether directly through instruments or through conceptual models which became psychologically

31. On the structure of the Dutch early capitalist system, see Arrighi 1994, 127–143.

32. And we note here that the manipulation of natural phenomena is a necessary condition for the pursuit of a grand project aimed at the “domination of nature,” but it is not by itself sufficient. Hence, the two must not be seen as identical.

possible only through material transformations in early capitalist societies).³³ The danger with overemphasizing the instrumental aspects of the early modern sciences (and modern science in general) is that we neglect the representational aspects of modern science in a manner that provides support, albeit inadvertently, for the discourse of contemporary neo-liberal university administrators who take the allocation of resources for the natural sciences to be justified only insofar as they serve business interests.³⁴

Whether the relative autonomy thesis is coherent (and whether if coherent, it is correct) is another issue altogether. However, one must point out a final irony in some of the writings of some of the members of the first generation of the Frankfurt School with respect to science and its relation to capitalism. For at least some of the first generation Frankfurt School theorists and their followers took themselves (and are often understood) as rebelling against the alleged economism of classical Marxism, i.e., its alleged reduction of history to economic factors (Kautzer 2017). Although, one can argue that by portraying science as irredeemably ideological insofar as it has come to completely reflect the demands of the capitalist mode of production, and by effectively abandoning the “relative autonomy thesis” in relation to science,³⁵ their position on science ends up being more functionally equivalent to the “economistic standpoint” than the position of the classical Marxists. For while it is true that Marcuse and Horkheimer often frame their position in terms of the universalization of instrumental reasoning as opposed to economism *per se*,³⁶ the universalization of instrumental reasoning ends up being functionally equivalent to economism in relation to how science and its history are understood. This is ironic insofar as they took themselves to be rebelling against the “economism” of the classical Marxists. In fact, the latter’s position on science, by recognizing the relative autonomy of science, is far less reductive than

33. I.e., we can ask under what social and economic conditions does it become psychologically possible for several thinkers to conceive of the universe as a machine (rather than as an organism, for instance)? Without the real concrete proliferation of machines, a mechanistic worldview cannot emerge as a dominant worldview. Note that here we are engaging in a descriptive investigation. I.e., this does not have anything to do directly with showing that the mechanistic worldview is false (or true).

34. For a more detailed discussion of this point see Collin and Pedersen 2015.

35. Yet, some of them, like Adorno, maintained a version of the relative autonomy thesis with respect to other cultural domains such as art (Zuidervaart 2015).

36. As Gerard Delanty and Neal Harris (2021, 90) note, “instrumental rationality” is “the master concept” through which early critical theorists understood domination in capitalist societies.

the position of Horkheimer and Marcuse. The standpoint of Horkheimer and Marcuse is closer to the Weberian account of the universalisation of instrumental rationality than it is to the classical Marxist conception of science as described above.³⁷ The Western Marxist position erases important distinctions which Classical Marxism preserves. In fact, despite the Hegelian pretensions of the former, it is characterized by a most un-Hegelian “one sidedness.” Thus, when Herbert Marcuse in the course of his exposition of Hegel in *Reason and Revolution* writes that “the form and content of scientific concepts [referring to ordinary first-order science undertaken from the standpoint of the understanding/*Verstand* in Hegelian terms] remain bound up with the prevailing order of things; they are static in character even when they express motion and change” (Marcuse 1955, 157), he neglects to note that Hegel was too knowledgeable about European intellectual history to simply believe that ordinary or first-order natural scientific discourse only led to a passive attitude towards the prevailing order of things, without recognizing its revolutionary significance at certain points in history.³⁸ In fact, for Hegel the key distinguishing feature which differentiates early modern European philosophy from ancient

37. The influence of Weber is evident in Marcuse’s account of the course of development of rationality and individual freedom from the early modern period to the present (see Marcuse 1992 [1941], 157).

38. The quotation from the preface to the *Phenomenology of Spirit* which serves an epigraph for this essay, continues: “Now we seem to need just the opposite: sense is so fast rooted in earthly things that it requires just as much force to raise it. The Spirit shows itself as so impoverished that, like a wanderer in the desert craving for a mere mouthful of water, it seems to crave for its refreshment only the bare feeling of the divine in general. By the little which now satisfies Spirit, we can measure the extent of its loss” (Hegel 1977, 5). To this extent Hegel obviously thinks that while the standpoint of the understanding is necessary, it is not sufficient. However, it seems that Marcuse neglects the world-historical significance that Hegel attributes to what later came to be called the Scientific Revolution qua progressive development. Hegel was first and foremost an Enlightenment thinker and he understood the significance of the Scientific Revolution in making the Enlightenment possible. When Hegel speaks of the medieval period he speaks as an Enlightenment philosopher. Hegel even says that in the middle ages “that which is most irrational, coarse and vile, [was] established and strengthened by the religious sentiment—this is the most disgusting and revolting spectacle that was ever witnessed” (Hegel 1900, 382). The key to understanding Hegel’s very critical attitude towards the middle ages is to recognize that Hegel was responding to the Romantic reaction to the Enlightenment’s rejection of everything that was medieval. By the beginning of the nineteenth century a kind of reactionary romanticism had developed in response to the alleged shallowness, coldness, individualism, and destructiveness of Enlightenment reason (read *Verstand* in Hegelian terms). If the Enlightenment as embodied in the French Revolution had attempted to erase the existence of anything that was remotely medieval, reactionary

Greek philosophy is the rise of early modern science: “without the working out of the empirical sciences on their own account, philosophy could not have reached further than with the ancients” [*ohne die Ausbildung der Erfahrungswissenschaften für sich hätte die Philosophie nicht weiter kommen können als bei den Alten*] (Hegel 1995, 176).³⁹ Hegel thinks that in studying early modern figures such as Descartes it is important to note that “philosophy

romanticism would attempt to revive the medieval past by celebrating medieval culture as it was embodied, for example, in Gothic art and architecture (Blanning 2010, 131–132; Fritzsche 2004, 123). Hegel observed this reactionary romanticism with alarm and much of what he says about the middle Ages should be read as a defence of the Enlightenment’s negative assessment of medieval culture against this reactionary romanticism. Hegel himself is almost explicit about this: “So self-contradictory, so deceptive is this medieval period; and the polemical zeal with which its excellence is contended for [by reactionary romantics], is one of the absurdities of our times” (Hegel 1900, 382). Hegel is here clearly taking romantics like Friedrich Schlegel and Novalis to task for idealizing the medieval period. For example, in 1815 Friedrich Schlegel claimed that “for very many of the best and noblest productions of modern genius, we are entirely obliged to the inventive spirit of the middle age” (Schlegel 1861, 160). Novalis in turn waxes poetical about medieval Europe in his *Christianity or Europe*: “those [i.e., the middle ages] were beautiful, magnificent times, when Europe was a Christian land, when *one* Christianity dwelled on this civilized continent, and when *one* common interest joined the most distant provinces of this vast spiritual empire” (Novalis 1996, 61). Hegel obviously did not think much of “the inventive spirit” of medieval Europe and he probably thought that only someone who lacked any sense of historical reality could have thought that serfs, for example, experienced the middle ages as “magnificent times.” Hegel’s negative attitude towards medieval culture provides the wider context within which to understand his attitude towards medieval philosophy (and his negative characterization of medieval culture should be understood as a defence of Enlightenment historiography against reactionary romanticism, though it should be added that the late Romantics never really took an active interest in scholasticism as such, though they certainly took an active interest in medieval Catholicism). For Hegel, medieval philosophy is barbaric to the extent that it expresses a barbaric culture. It should also be added that the use of the word ‘barbaric’ to describe scholastic philosophy has a very long history in humanist and in Enlightenment thought. For example, in 1520, Erasmus published a critique of scholasticism entitled *Book against the Barbarians*. When Hegel uses the word ‘barbaric’ (*barbarische*) he is invoking this history of criticisms of scholastic philosophy and situating himself within a specific historical polemical context. What is at stake in Hegel’s polemic with the romantics is giving the understanding (*Verstand*) its due. Hegel did not think that *Vernunft* could accomplish much without the understanding, despite the latter’s limitations.

39. It is interesting to note that this Hegelian point about what is distinctive about early modern European philosophy has been recently reiterated by Justin E. H. Smith (2016, 178) in his account of the differences between early modern European philosophy and early modern Indian philosophy: “one very significant difference between European and Indian modern philosophy is the fact that in the former case the shape philosophy took, indeed the self-consciousness of philosophy as modern, was largely, or nearly entirely, a consequence of the emergence of modern science.”

and exact science were not yet separated, and it was only later that this separation took place” (Hegel 1995, 221).⁴⁰

Early modern natural science, far from being “bound up with the prevailing order of things” led to a profound transformation in how humans understood their place in the world. The new astronomy made it possible to think of the universe as infinite, e.g., in Giordano Bruno’s work (Drake 1973, 15). It also made it possible to de-center the Earth and to think of other planets as potentially hosting life (Wootton 2015, 234). The emancipative moment in the development of the natural sciences cannot be ignored without distorting the history of science.⁴¹ It is important to recognize that we should not think of the first generation of Frankfurt School theorists as completely oblivious to this point. For example, in some his early writings Marcuse recognizes the emancipative consequences of modern science: “matter-of-factness animated ancient materialism and hedonism, it was responsible in the struggle of modern physical science against spiritual oppression, and in the revolutionary rationalism of the Enlightenment” (Marcuse 1992 [1941], 143). However, in his later writings, Marcuse does veer quite close to some anti-modernist orientations, such as that expressed in Frank Raymond Leavis’s thought (Collin and Pedersen 2015).⁴²

40. Hegel’s emphasis on the importance of the connection between modern philosophy and modern science differentiates him from some of his contemporaries. For example, Christian August Brandis (1790–1867) in his *Von dem Begriff der Geschichte der Philosophie* (1815) did not think that narrating the history of philosophy (and especially the history of modern philosophy) requires understanding its relation to the natural sciences or to other disciplines (Catana 2013, 127).

41. As Gramsci (2016, 107) notes, “undoubtedly, the promulgation of the experimental method [in early modern science] separates two worlds in history, two epochs, and begins the process of the dissolution of theology and metaphysics and the development of modern thought, whose crowning is Marxism.” It was also the assimilation of some of the discoveries of the life sciences and of chemistry that made it possible for some eighteenth-century materialists such as Diderot to, in the words of Lenin (2021, 19), “come very close to the standpoint of contemporary materialism.” On Diderot’s championing of the life sciences and of chemistry, neither of which was of great interest to his friend and collaborator d’Alembert, see Furbank 1992, 85–99.

42. In general, if we interpret Adorno and Horkheimer as thinking of Nazism as the product of Enlightenment/ *Aufklärung* (e.g., in Ray 1979, 156), then we would have to say that Adorno and Horkheimer were engaged in self-deception. Germany on the eve of the Nazi takeover was not an “enlightened and developed” society (and of course, we can contest the meanings of these terms, but this is beyond the scope of this essay). In fact, Germany was characterized by the social and economic backwardness which obtained (and still obtains) in societies which possess dual economies (Anievas 2014, 286). As Jeffrey Herf observes, “Horkheimer and Adorno’s view of modernity during World War II was a very

Moreover, even in the early writings of Horkheimer we encounter oversimplifications in his recounting of the history of science. Horkheimer makes the assumption that the rise of early modern mathematical physics which abstracts from “secondary properties” involves a tendency to manipulate nature without care: “the less human beings think of reality in qualitative terms, the more susceptible reality becomes to manipulation. Its objects are neither understood nor respected” (Horkheimer 1992 [1941], 31). This is essentially a version of the familiar thesis that mechanistic theoretical orientations lead to practices which involve the degradation of nature. While there is some truth to this claim, we should also note that the historical record indicates that some Newtonians such as Stephen Hales (1677–1761) applied Newtonian “ideas about motion and the conservation of energy within systems to plant-atmosphere relations [...] [thus laying] the groundwork for critiques of the human impact on air quality and changes in vegetation” (Grove 1995, 159). Hence, it is unjustified to claim that “Enlightenment stands in the same relationship to things as the dictator to human beings” (Horkheimer and Adorno 2002, 6). To this extent it is important not to overstate the manner in which thinking of nature in terms of quantitative relations leads to ecologically unsound practical orientations. At any rate, some of the most well developed formulations for a solution to the current crisis generated by anthropogenic climate change, e.g. (see Ajl 2021), do not reject quantitative analysis but rather use it for emancipatory purposes.

German caricature” (Herf 2012, 84). Certainly if one wanted to observe “the wholly enlightened earth [which] is radiant with triumphant calamity” (Horkheimer and Adorno 2002, 1) during the 1930s and 1940s, one would not go to Germany, since it was not even close to being “wholly enlightened,” at best it was only “partially enlightened.” This would also explain why there was much resistance towards the reception of the work of the first generation of Frankfurt School theorists by Marxists in the global South who had to confront underdevelopment, e.g., in Egypt (Haggag 2019, 107). Marxists in Egypt like Mahmoud Amin Al Alem were right to think that the depiction of Enlightenment and modernity in the work of the first generation of Frankfurt school theorists was a caricature (and here we note that Ali Haggag misunderstands this point) which had to do with the peculiarities of Germany’s modern history and German intellectuals’ systematic self-deception about the real conditions of German culture before World War II. From the early nineteenth century to the mid-twentieth century, what took place in Germany was not the elevation of the formal instrumental reasoning that Adorno and Horkheimer associate with the Enlightenment over all other forms of cognition, instead what happened was that poetry came to be elevated over the “cold reason” of the Enlightenment (see Gay 2001, 46–69).

With respect to the analysis of the natural sciences and their place in their wider social and historical context, Hegel is closer to Engels and Marx, than he is to the Western Marxists.⁴³ To this extent, it is not even true that the critical theorists represent a return to Hegel. With respect to their stance towards the modern natural sciences, the Western Marxists and their contemporary epigones owe more to Nietzsche (and perhaps Weber) than they do to Hegel, or Marx and Engels.⁴⁴ It has been suggested by some that Western Marxism essentially expresses defeat (i.e., the defeat of revolutionary projects in Western Europe and North America). With respect to its stance on modern natural science, we may say that Western Marxism represents a defeat to positivism (as interpreted by the first generation of Frankfurt School theorists). Instead of attempting to refute positivist conceptions of science, the Western Marxists simply surrendered the field to the positivists. This surrender continues to be felt today in the attitude of some self-identified progressive thinkers and critical theorists towards the natural sciences.

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REFERENCES

- Agassi, Joseph. 2008. *Science and its History: A Reassessment of the Historiography of Science*. Dordrecht: Springer.
- Ajl, Max. 2021. *A People's Green New Deal*. London: Pluto Press.
- Anievas, Alexander. 2014. “Reassessing the Nazi War Economy and the Origins of the Second World War: An Introduction to a Symposium on Adam Tooze’s *The Wages of Destruction*.” *Historical Materialism* 22(3–4): 281–297.
<https://doi.org/10.1163/1569206X-12341375>
- Arrighi, Giovanni. 1994. *The Long Twentieth Century: Money, Power, and the Origins of Our Times*. London: Verso.
- Arthur, Richard T.W. 1977. “The Empiricist Account of Scientific Knowledge—A Polemical Evaluation.” *Poznan Studies in the Philosophy of Science and the Humanities* 3(1–4):125–141.
<http://www.autodidactproject.org/other/poznan3.html>
- Beiser, Fredrick. 2011. *The German Historicist Tradition*. Oxford: Oxford University Press.

43. I have argued for this point at length in (El Nabolsy 2020).

44. On Nietzsche’s influence on Adorno and Horkheimer, see Habermas 1990, 122.

- Berendzen, J.C. 2017. "Max Horkheimer." *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. Last modified August 30, 2017.
<https://plato.stanford.edu/archives/fall2017/entries/horkheimer/>
- Blanning, Tim. 2010. *The Romantic Revolution*. London: Weidenfeld & Nicolson.
- Bloch, Ernst. 1971. *On Karl Marx*. Translated by John Maxwell. New York: Herder & Herder.
- Bunge, Mario. 2012. *Evaluating Philosophies*. Dordrecht: Springer.
- Catana, Leo. 2013. "Philosophical Problems in the History of Philosophy: What are they?" In *Philosophy and its History: Aims and Methods in the Study of Early Modern Philosophy*, edited by Mogens Laerke, Justin E.H. Smith, and Eric Schliesser, 115–133. Oxford: Oxford University Press.
- Ciccotti, Giovanni, Marcello Cini, and Michelangelo de Maria. 1976. "The Production of Science in Advanced Capitalist Society." In *The Political Economy of Science: Ideology of/in the Natural Sciences*, edited by Hilary Rose and Stephen Rose, 32–58. London: The Macmillan Press.
- Collin, Finn and David Budtz Pedersen. 2015. "The Frankfurt School, Science and Technology Studies, and the Humanities." *Social Epistemology* 29(1): 44–72.
<https://doi.org/10.1080/02691728.2013.782588>
- Delanty, Gerard and Neal Harris. 2021. "Critical Theory and the Question of Technology: The Frankfurt School Revisited." *Thesis Eleven* 166(1): 88–108.
<https://doi.org/10.1177%2F07255136211002055>
- Drake, Stillman. 1973. *Copernicus–Philosophy and Science: Bruno–Kepler–Galileo*. Norwalk, Conn.: Brundy Library.
- El Nabolsy, Zeyad. 2019. "Aristotle on Natural Slavery: An Analysis Using the Marxist Concept of Ideology." *Science & Society* 83(2): 244–267.
<https://doi.org/10.1521/asiso.2019.83.2.244>
- . 2020. "Hegel's Proto-Modernist Conception of Philosophy as Science." *Problemata: Revista Internacional de Filosofia* 11(4): 81–107.
<https://doi.org/10.7443/problemata.v11i4.52207>
- Engels, Friedrich. 1934 [1890]. "Four Letters on Historical Materialism." *New International* 1 (3): 81–85.
<https://www.marxists.org/history/etol/newspape/ni/vol01/no03/engels.htm>
- Freudenthal, Gideon and Peter McLaughlin. 2009. "Classical Marxist Historiography of Science: The Hessen-Grossmann-Thesis." In *The Social and Economic Roots of the Scientific Revolution: Texts by Boris Hessen and Henryk Grossmann*, edited by Gideon Freudenthal and Peter McLaughlin, 1–40. Berlin: Springer.
- Furbank, P. N. 1992. *Diderot: A Critical Biography*. New York: Alfred A. Knopf.
- Fritzsche, Peter. 2004. *Stranded in the Present: Modern Time and the Melancholy of History*. Cambridge, MA: Harvard University Press.
- Gay, Peter. 2001. *Weimar Culture: The Outside as Insider*. New York: W.W Norton & Co.
- Gould, Stephan Jay. 1996. *The Mismeasure of Man*. (2nd Edition). New York: W. W. Norton & Co.
- Gramsci, Antonio. 2016. "The Modern Prince." In *The Modern Prince and Other Writings*, edited and translated by Louis Marks, 135–188. New York: International Publishers.
- Grosfoguel, Ramon. 2009. "A Decolonial Approach to Political Economy: Transmodernity, Border Thinking and Global Coloniality." Special Issue, *Epistemologies of Transformation: Kult* 6:10–38.
- Grossmann, Henryk. 2009. "The Social Foundations of the Mechanistic Philosophy and Manufacture." In *The Social and Economic Roots of the Scientific Revolution: Texts by Boris Hessen*

- and Henryk Grossmann, edited by Gideon Freudenthal and Peter McLaughlin, 103–156. Berlin: Springer.
- Grove, Richard H. 1995. *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860*. Cambridge: Cambridge University Press.
- Habermas, Jürgen. 1990. *The Philosophical Discourse of Modernity: Twelve Lectures*. Translated by Frederick Lawrence. Cambridge: Polity Press.
- Haggag, Ali. 2019. “The Frankfurt School at Egyptian Universities.” *Contemporary Arab Affairs* 12(4): 104–120. <https://doi.org/10.1525/caa.2019.12.4.104>
- Hegel, G.W.F. 1900. *The Philosophy of History*. Translated by John Sibree. London: The Colonial Press.
- . 1969. *Science of Logic*. Translated by A.V. Miller. Atlantic Highlands, NJ: Humanities Press International, Inc.
- . 1995. *Lectures on the History of Philosophy, Volume 3: Medieval and Modern Philosophy*. Translated by E. S. Haldane and Frances H. Simson. Lincoln: University of Nebraska Press.
- Herf, Jeffery. 2012. “Dialectic of Enlightenment Reconsidered.” *New German Critique* 117: 81–89.
- Honneth, Axel. 2005. “Bisected Rationality: The Frankfurt School’s Critique of Science.” In *Continental Philosophy of Science*, edited by Gary Gutting, 295–305. Oxford: Blackwell Publishing.
- Horkheimer, Max. 1992 [1941]. “The End of Reason.” In *The Essential Frankfurt School Reader*, edited by Andrew Arato and Eike Gebhardt, 26–48. New York: Continuum.
- . 2002 [1932]. “Notes on Science and the Crisis.” In *Critical Theory: Selected Essays, Max Horkheimer*, translated by Matthew J. O’Connell, 3–9. New York: Continuum.
- . 2002 [1937]. “Traditional and Critical Theory.” In *Critical Theory: Selected Essays, Max Horkheimer*, translated by Matthew J. O’Connell, 188–252. New York: Continuum.
- Horkheimer, Max and Theodor W. Adorno. 2002. *Dialectic of Enlightenment: Philosophical Fragments*. Edited by Gunzelin Schmid Noerr and translated by Edmund Jephcott. Stanford: Stanford University Press.
- Howard, Don. 2003. “Two Left Turns Make a Right: On the Curious Political Career of North American Philosophy of Science at Midcentury.” In *Logical Empiricism in North America*, edited by Gary Hardcastle and Alan Richardson, 25–93. Minneapolis: University of Minnesota Press.
- Kautzer, Chad. 2017. “Marx’s Influence on the Early Frankfurt School.” In *The Palgrave Handbook of Critical Theory*, edited by M. J. Thompson, 43–65. London: Palgrave Macmillan.
- Lenin, V.I. 2021. *Materialism and Empirio-Criticism*. London: Wellred Books.
- Marcuse, Herbert. 1955. *Reason and Revolution: Hegel and the Rise of Social Theory*, 2nd ed. London: Routledge.
- . 1992 [1941]. “Some Social Implications of Modern Technology.” In *The Essential Frankfurt School Reader*, edited by Andrew Arato and Eike Gebhardt, 138–162. New York: Continuum.
- . 1992 [1965]. “On Science and Phenomenology.” In *The Essential Frankfurt School Reader*, edited by Andrew Arato and Eike Gebhardt, 466–476. New York: Continuum.
- Marx, Karl. 1975a. “The Economic and Philosophical Manuscripts of 1844.” In *Marx and Engels Collected Works*, Vol. 3. London: Lawrence and Wishart.
- . 1975b [1867]. *Capital: A Critique of Political Economy*, Vol. 1. Translated by Ben Fowkes. London: Penguin.
- . 1986. “A Contribution to the Critique of Political Economy.” In *Marx and Engels Collected Works*, Vol. 29. London: Lawrence and Wishart.

- Marx, Karl and Friedrich Engels. 1976a. "The German Ideology." In *Marx and Engels Collected Works*, Vol. 5. London: Lawrence and Wishart.
- . 1976b. "Manifesto of the Communist Party." In *Marx and Engels Collected Works*, Vol. 6. London: Lawrence and Wishart.
- McNulty, Jake. (forthcoming). "From Analytic Pragmatism to Historical Materialism: Frankfurt School Critical Theory and the Quine-Duhem Thesis." *Journal of European Philosophy*.
- Miller, Richard W. 1983. *Analyzing Marx: Morality, Power and History*. Princeton, NJ: Princeton University Press.
- Novalis. 1996. "Christianity or Europe: A Fragment." In *The Early Political Writings of the German Romantics*, edited by Frederick Beiser, 59–79. Cambridge: Cambridge University Press.
- Okasha, Samir. 2000. "The Underdetermination of Theory by Data and the 'Strong Programme' in the Sociology of Knowledge." *International Studies in Philosophy of Science* 14(3): 283–297. <https://doi.org/10.1080/026985900437782>
- Omodeo, Pietro D. 2016 "After Nikolai Bukharin: History of Science and Cultural Hegemony at the Threshold of the Cold War." *History of the Human Sciences* 29(4–5):13–34. <https://doi.org/10.1177%2F0952695116667866>
- Ray, L.J. 1979. "Critical Theory and Positivism: Popper and the Frankfurt School." *Philosophy of the Social Science* 9: 149–173. <https://doi.org/10.1177%2F004839317900900202>
- Reisch, George A. 2005. *How the Cold War Transformed Philosophy of Science: To the Icy Slopes of Logic*. Cambridge: Cambridge University Press.
- . 2014. "When Structure Met Sputnik: On the Cold War Origins of The Structure of Scientific Revolutions." In *Science and Technology in the Global Cold War*, edited by Naomi Oreskes and John Krige, 371–392. Cambridge, MA: MIT Press
- . 2017. "Pragmatic Engagements: Philipp Frank and James Bryant Conant on Science, Education, and Democracy." *Studies in East European Thought* 69: 227–244. <https://doi.org/10.1007/s11212-017-9289-6>
- Richardson, Alan. 1997. "Towards a History of Scientific Philosophy." *Perspectives on Science* 5(3): 418–451.
- Rose, Hilary and Stephen Rose. 1976a. "The Problematic Inheritance: Marx and Engels on the Natural Sciences." In *The Political Economy of Science: Ideology of/in the Natural Sciences*, edited by Hilary Rose and Stephen Rose, 1–13. London: The Macmillan Press.
- . 1976b. "The Incorporation of Science." In *The Political Economy of Science: Ideology of/in the Natural Sciences*, edited by Hilary Rose and Stephen Rose, 14–31. London: The Macmillan Press.
- Sachs, Carl. 2020. "Why Did the Frankfurt School Misunderstand Logical Positivism?" *Journal of Intellectual History Blog*, August 5th: <https://jhiblog.org/2020/08/05/why-did-the-frankfurt-school-misunderstand-logical-positivism/>
- Saito, Kohei. 2017. *Karl Marx's Ecosocialism: Capital, Nature, and the Unfinished Critique of Political Economy*. New York: Monthly Review Press.
- Schlegel, Friedrich. 1841. *Lectures on the History of Literature, Ancient and Modern from the German of Frederick Schlegel*. New York: J & H.G. Langley.
- Sedgwick, Peter. 1966. "Natural Science and Human Theory: A Critique of Herbert Marcuse." *The Socialist Register* 3: 163–192: <https://socialistregister.com/index.php/srv/article/view/5972>
- Sheehan, Helena. 2017 [1985]. *Marxism and the Philosophy of Science: A Critical History*, 2nd ed. London: Verso.

- Smith, Justin. E. H. 2017. *The Philosopher: A History in Six Types*. Princeton: Princeton University Press.
- Viola, Enrico. 2013. “The Specificity of Logical Empiricism in the Twentieth-Century History of Scientific Philosophy.” *HOPOS: The Journal of the International Society for the History of Philosophy of Science* 3: 191–209. <https://doi.org/10.1086/670135>
- Vrahimis, Andreas. 2020. “Scientism, Social Praxis and Overcoming Metaphysics: A Debate Between Logical Empiricism and the Frankfurt School.” *HOPOS: The Journal of the International Society for the History of Philosophy of Science* 10: 562–597. <https://doi.org/10.1086/710184>
- . (forthcoming). “Neurath’s Debate with Horkheimer and the Critique of Verstehen.” In *The History of Understanding in Analytic Philosophy: Before and After Logical Empiricism*, edited by Ákos Sivadó and Adam Tamas Tuboly. London: Bloomsbury.
- Weber, Max. 2002 [1905]. *The Protestant Ethic and the ‘Spirit’ of Capitalism, and Other Writings*. Translated and edited by Peter Baehr and Gordon Wells. London: Penguin.
- Wiredu, Kwasi. 1980. *Philosophy and an African Culture*. Cambridge: Cambridge University Press.
- Wootton, David. 2015. *The Invention of Science: A New History of the Scientific Revolution*. New York: Harper.
- Zuidervaat, Lambert, 2015. “Theodor W. Adorno.” In *The Stanford Encyclopedia of Philosophy*. Edited by Edward N. Zalta. Last modified October 26, 2015. <https://plato.stanford.edu/archives/win2015/entries/adorno/>

**ESSAY**

Variations on Themes Composed by Engels¹

Ömer Er

MY MUSICAL PIECE IS A COMPOSITION created by giving references to the small musical forms found in the letters of Engels mainly written to his sister Maria (Lindley, 2010). These musical notations were dated 1838 and further. Among these notations, I realized several songs and pieces of Engels, structured in choral forms. In fact, Engels also mentioned in these letters that he felt inadequate because he did not have enough knowledge of notation and composition.

In these letters, Engels also mentions about concerts and operas that he watched, such as *Night in Granada* and *The Magic Flute* of Wolfgang Amadeus Mozart. He had told his sister Maria that the orchestration of these operas was not so good, and it was very difficult for him to analyze the composition of these musical pieces. In another letter he also tells his younger brother Herman Engels that he still regularly works on compositions and songs (ibid.).

Frankly, when I read his letters, I was struck by the fact that he often stated that he felt a deficiency to work in these compositions. This made me surprised. When I started to analyze his compositions, I also saw that he always worked on compositions having small forms. Then, I decided to develop these small structures through larger forms. So, I developed my own compositions within these forms by empathizing with Engels and trying to develop a bond with him.

When this work was commissioned to me for the symposium, 7th Marxist Inquiries on Science-The School of Marxism and Sciences, titled

1. This essay is mainly based on the speech I made before the performance of my musical piece at the symposium, 'Actuality of Friedrich Engels at his 200th Birthday' premiered on youtube in December 18, 2020.

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'Actuality of Friedrich Engels at his 200th Birthday' by the organizing committee, it was planned as "variations on piano". But when I started to focus on my composition with piano, I felt that sounds of piano wouldn't be enough to express my feelings. That's why I started with a classical orchestration and then I harmonized this with new age sounds.

To sum up, my composition can be considered as a collage of Engels' little melodic musical pieces. This can be also seen as a new designed version of Engels' pieces including my own melodies. Addition to that, my composition also carries new orchestrations carrying the resonance of Engels' period and the spirit of that time. However, as an individual living in this century, I tried to mash up melodies of my own age through his time.

In my work, which generally begins in a classical way, I tried to express Engels and reflect his feelings as much as I could. Therefore, I hybridized my own experience, soul, and my feelings for Engels with this collage of my composition. As I mentioned before, I wanted to reinforce the emotion, the thought, the power, universality and eternity of Marxism and communism by using different effects towards the end of my composition, which started as classical and simple way. Therefore, at the end of the composition, I wanted to create an effect of a powerful public reception, as if Engels were entering to an arena while meeting with people. In this way, I wanted to express his messages and tried to convey such a great philosophy and worldview in the conditions of that day.

My profound thanks to great master whom I'm eternally grateful.

REFERENCES

- Lindley, Mark. 2010. "Marx and Engels on Music." *MR Online*. August 18.
<https://mronline.org/2010/08/18/marx-and-engels-on-music/>



WORK

Variations on Themes Composed by Engels

OMER ER

Handwritten musical score for Violin and Cello. The score is written on five systems of staves. The first system shows the beginning of the piece with a treble clef and a key signature of one sharp (F#). The second system includes the instruction "1. Violin II Cello" and a "Tema" section. The third system features dynamic markings "decresc." and "mp". The fourth system includes "cresc.", "mf", and "decresc." markings. The fifth system shows two first endings, labeled "1" and "2", with a "dim." marking. The score concludes with a double bar line and a large flourish.



VIDEO

Video recording of the *Variations on Themes Composed by Engels* performed by the composer is available at:

<https://www.youtube.com/watch?v=zog-ZOCJl7A&t=1s>


ESSAY

Die Produktion des Bewusstseins for Soprano & Trumpet¹

Mert Morali

IN THE EARLY DAYS OF 2018, I CAME across an announcement of a composing competition honouring Karl Marx's 200th birth anniversary, organised by Birmingham Contemporary Music Group with the cooperation of Trier Municipality. The competition had three categories, namely duo with or without a singer, ensemble with or without a singer, and electroacoustic, for composers to submit pieces that are linked to Karl Marx and his work.

Before moving on to explaining the compositional process of my piece *Die Produktion des Bewusstseins*, I would like to open relatively long parentheses on the topic of competition. I apply for composition competitions quite rarely. Although I do not underestimate the positive role of winning a competition on a composer's career, I believe that the idea of competition carries a set of very problematic elements:

1. In my opinion, competition is an inherently patriarchal way to posit value on artistic works. According to this logic, particular works have to be chosen by a competent or incompetent body of authority to be considered valuable.
2. I do not believe that we can compare artistic works qualitatively. However, to understand, we can break them down by critical comparison.
3. The competition itself excludes any idea of solidarity. Since winning a contest is a prestigious way to present competency in a certain

1. 1st Prize in Duo Category of *Wilde Lieder Marx*. Music International Composing Competition, Premiered by Salome Kammer (soprano) and Markus Schwindt (trumpet), 2nd September 2018, Kurfürstliches Palais, Trier, Germany.

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branch, it already presents the given field as merely based on the principle of survival of the fittest.

Yet, I controversially decided to participate in this competition due to the excuse of being deeply inspired by diverse aspects of Marxian thought and methodology. I also considered the competition an opportunity to merge my musicianship with my political and intellectual background.

When I came across the announcement of the competition, I was seeking a new compositional challenge to reflect on my overall compositional approach. After discussing with a colleague, I decided to compose a piece for voice. When a primarily acoustic composer writes music for singers or electronics, namely for an unfamiliar medium, she has to reevaluate her compositional skills and reinvent her musical idiom on another platform. Thus, by that strategy, I thought I could prevent myself from composing the way I do under normal circumstances via working intensively on a piece for voice. So, to work on a piece for voice, I needed a text that I was moved by.

The text I picked was a quotation from the *German Ideology* of Karl Marx and Friedrich Engels. Alongside the rhetorical and philosophical beauty of the text, it was also the very first text I read from Marxist literature. Before thinking about the music, I worked only on the text at least for a month. I read the original German version of the text many times. I even asked other people with diverse mother tongues to read that passage and asked what they understood. I mapped the rate of repetition of certain words and their context changes caused by the rhetoric structure of the text.

I regarded the original German text as the primary source. During the compositional process, I also worked on the English and Turkish translations of the text. I considered the English translation a source of intellectual inspiration since it is the language that widens my intellectual spectrum the most. I was inspired by the political and emotional vibrancy of the Turkish version, mainly due to Turkish being the language I began to develop my political sensitivities and consciousness. So, I used the multitude of emotional, rhetorical, and intellectual output of the different versions to dramatise the text.

When music and text are presented in the body of a musical work, they fight against each other for attention. This is why many contemporary composers prefer to deconstruct or musicalise the language they use in their pieces. However, I decided not to deconstruct the text to the point it was not understandable because I had a passionate attachment to the text's rhetoric, beauty, and intellectual violence. For that reason, I had to manage

a musical flow that did not weaken the text nor let the text's presence damage the music.

After deciding on the text, I decided on the instrumentation and competition category. First, I chose to apply for the duo category because soprano and instrument would enable more detailed handling of the text due to economical usage of musical apparatus. Then, I decided on working with soprano instead of baritone to present that the text was not to be sung by a reenactor of Karl Marx or Friedrich Engels. Later, I decided to work on the trumpet along with the soprano. As evident in the piece, the character that soprano somehow reenacts obtains an upper-class stance. In the text, Marx and Engels comment on the ruling ideology and the ideologues of the ruling classes. So, an artist can also be occasionally considered an ideologue of a ruling class. In that way, I wanted to present the singer as an ideologue of a ruling class who can perform opposition, collaboration or indifference to the ruling class. In the piece, the singer claims all of the roles presented above.

There are a couple of reasons why I picked trumpet. The voice ranges of the soprano and the trumpet are alike. Additionally, they have similar timbral features. Both soprano and trumpet produce intense and penetrant timbre in their upper registers, whilst they are particularly breathy and weak on their lower registers. Thus, they blend very well together.

About the time I was intensifying my work on the piece, there was the wedding ceremony of the royal family, between Meghan Markle and Prince Harry. At the beginning of the ceremony, the royals were accompanied in the church by "Eternal Source of Light Divine" of G.F. Handel, performed by soprano, trumpet, and strings. So, I believe this event legitimised my instrumentation choice for a piece that speaks about the ruling classes and their ideologues.

After deciding on the voice and the instrument, I started producing musical materials mainly based on words of the text. For instance, I created rhythmical or timbral translations of the words such as *Gedanken*, *herrschende*, *Produktion* on the trumpet. Besides text-based materials, there are also materials such as fast upwards gestures and covered mouth/wah-wah effect do have important form building roles. Although I mainly placed the musical ideas by respecting the formal syntax of the text, I did not take the text as a limiter; rather, I considered it as a guideline for taking artistic liberties.

Here I would like to comment on some musical materials I used to illustrate how I evaluate them. I often use musical figures similar to the fast

upwards scale at the very beginning of the piece. It is a flautistic figure perhaps found a place in my music because of my flautist background. It is an effective opener to focus on a pitch region. A fast upward motion tends to climb and reach a certain determined, concentrated peak region. Conversely, downward motions tend to stop or die away. This relationship between upwards and downwards motions can be compared with gravity. Later, when the laughter of the singer substituted the airward motion on the trumpet, the consistent linearity of the figure is broken, somehow humanised and recontextualised.

The covered mouth on the voice and closed Harmon mute on the trumpet form perhaps the most homogenous sound combination. Also, I liked the dramatic effect of this kind of filtering because covering the mouth has a clear visual and dramatic output on the stage. Body implies referentiality. So, the referentiality of the gesture directs at specific political imagery and metaphors such as self-censorship, repression or expressing a filtered reality.

I can give one last example of the word *Produktion*. The repetition of the word *Produktion* employs word-painting, which can be understood as a reference to Fordist production. I want to conclude without presenting a real conclusion.

I wanted to reflect and present how I understood the text's musicality and intellectual depth by composing this piece. To achieve that, I tried to let my musical imagery confront the philosophical output of the text. So, by composing this piece, I encouraged myself to merge and even contravene my musical intuition and critical stance. Since then, this dialectical process has been the primary source of energy in my work.



WORK

Die Produktion des Bewusstseins
(The Production of Consciousness)
for Soprano & Trumpet

Instrumentation: Soprano and Trumpet in C

Duration: Ca. 10 minutes

Text:

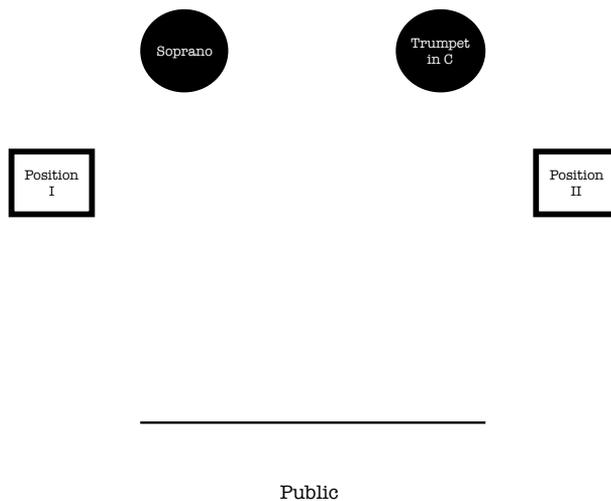
Original:

Die Gedanken der herrschenden Klasse sind in jeder Epoche die herrschenden Gedanken, d.h. die Klasse, welche die herrschende *materielle* Macht der Gesellschaft ist, ist zugleich ihre herrschende *geistige* Macht. Die Klasse, die die Mittel zur materiellen Produktion zu ihrer Verfügung hat, disponiert damit zugleich über die Mittel zur geistigen Produktion, so daß ihr damit zugleich im Durchschnitt die Gedanken derer, denen die Mittel zur geistigen Produktion abgehen, unterworfen sind. Die herrschenden Gedanken sind weiter Nichts als der ideelle Ausdruck der herrschenden materiellen Verhältnisse, die als Gedanken gefaßten herrschenden materiellen Verhältnisse; also der Verhältnisse, die eben die eine Klasse zur herrschenden machen, also die Gedanken ihrer Herrschaft. Die Individuen, welche die herrschende Klasse ausmachen, haben unter Andern auch Bewußtsein und denken daher; insofern sie also als Klasse herrschen und den ganzen Umfang einer Geschichtsepoche bestimmen, versteht es sich von selbst, daß sie dies in ihrer ganzen Ausdehnung tun, also unter Andern auch als Denkende, als Produzenten von Gedanken herrschen, die Produktion und Distribution der Gedanken ihrer Zeit regeln; daß also ihre Gedanken die herrschenden Gedanken der Epoche sind. (Marx & Engels, *Die Deutsche Ideologie*)

Translation:

The ideas of the ruling class are in every epoch the ruling ideas, i.e. the class which is the ruling material force of society, is at the same time its ruling intellectual force. The class which has the means of material production at its disposal, has control at the same time over the means of mental production, so that thereby, generally speaking, the ideas of those who lack the means of mental production are subject to it. The ruling ideas are nothing more than the ideal expression of the dominant material relationships, the dominant material relationships grasped as ideas; hence of the relationships which make the one class the ruling one, therefore, the ideas of its dominance. The individuals composing the ruling class possess among other things consciousness, and therefore think. Insofar, therefore, as they rule as a class and determine the extent and compass of an epoch, it is self-evident that they do this in its whole range, hence among other things rule also as thinkers, as producers of ideas, and regulate the production and distribution of the ideas of their age: thus their ideas are the ruling ideas of the epoch. (Marx & Engels, *German Ideology*)

Stage Layout:



Performance Notes:

General Notes:

- # slightly sharper than sharp
 - # slightly flatter than sharp
 - ♯ slightly sharper than natural
 - ♯ slightly flatter than natural
 - ♭ slightly sharper than flat
 - ♭ slightly flatter than flat
 - gradual switch from one technique to another
 - limit of a specific action (used only when it looks not clear)
 - ^ long fermata
- Unless otherwise is stated every note should be played non vibrato. Only the passages with musical expressions could be performed with natural vibrato.

-hand trem. (hand tremolo) stands for hand vibrato

Soprano:

IPA symbols used:

[ɑ]	English: hot	[d]	English: dash
[e]	English: may	[h]	English: high
[o]	German: voll	[g]	German: Lüge
[ø]	English: bird	[k]	English: kiss
[u]	English: boot	[r]	Spanish: perro
[w]	Turkish: sağ		

	the lowest pitch possible
	speaking
	distorted guttural sound
	using hands like a megaphone
	cover mouth with hand
	mouth covered
	mouth open (only indicated in a context of covering mouth)
	gradually from closed to open mouth (vice versa is also included)
	Sprechgesang

Trumpet in C:

-molto vib. molto vibrato

-mutes: wawa mute & cup mute

“Slide” stated on the score refers to slide *glissando*. When the passage with “slide” alteration ends slide must be moved back to the original position.

	open
	hand over bell (with wawa)
	half valve
	air noise
	slap tongue
	split tone
	flutter tongue
	bisbigliando (colour trill)

Die Produktion des Bewusstseins The Production of Consciousness

Mert Morah
14.VI.2018
Berlin

$\text{♩} = 64$ *p* *sfz-p* *sfz-p* *espress.* *f-p*

Soprano

Trumpet in C
wawa mute
p *sfz-p* *sfz-p* *sfz-p* *gliss.*

6

S. *psffz p sub.* *f* *pppp* *softly fp*

C Tpt. *p* *sfz-p* *sfz-p* *ppp* *pp* *p* *split tone*

"Laugh" in the piece always meant to be parodic.

12

S. *sfz* *p sub.* *mf* *sfz* *f* *laugh* *sarcastically* *sfzz*

[a] [ha] [ha] [ha] [ha] [ha] [ha]

C Tpt. *ff* *mf* *sfz* *flz.* *pp* *flz.* *pp*

15

S. *ffp* *sfzz* *p*

C Tpt. *gliss.* *p* *pp* *flz.* *p* *sfz*

37 speak *f* seriously, clearly, like giving a speech

S. Die Ge - dan - ken der herr - schen - den Klas - se, sind in je - der E - po - che die

C Tpt. *mf* *p* *mf* *p*

41 *f* *sffz* *p dolce*

S. herr - schen - den Ge - dan - ken, das heißt die

C Tpt. *mf* *mf* *p* *brillante* *p* *sf:p* *f* *p*

bisbig, (fast) +12-123

46 *sffz* shout () *f > p* *p dolce* *f* *sffz* *mf* *sffz-p*

S. Klas - se wei - che die ma - te - ri - el - le Ma -

C Tpt. *mf* *pp* *p* *sffz* *p* *mf* *pp*

trem. (mod.) (pedal tone)

52 *sffz* *p* *f* *sffz* *p* *sffz* *mf*

S. - ch - t der Ge - sell - schaft ist, ist zu - glei - ch ih - re

C Tpt. *mf* *sffz* *p* *fp* *ppp* *f* *ppp* *f* *mf*

flz. flz. slide

57 *f* *p* *f* *p* *pp*

S. he - rr - schen - de_ geis - ti - ge [e]

C Tpt. *sf:p* *sf:p* *mute off*

62 *p* Ma ch t. *distort.* *mf* *sfz*

air noise 123 (pedal tone) *pp* *p dark* *mf* *p*

68 *f* die

air noise 13 *p*

Neurotically ♩=70

72 *sfz* shout *mf* *f* *p* *f* *p* *mechanically* *mf* *sfz*

Klas-se, die die Mit-tel zur ma-te-ri-el-len Pro-duk-ti-on

air noise 123 23 air noise slap t. bisbig. (mod.) 12-123 *flz.*

pp *<mf* *sfz* *ff* *mf* *>pp* *f* *sfz* *ppp* *ff* precisely

76 *mf* *sfz* *mf* *sfz* *mf* *sfz* *mf* *sfz* *mf* *sfz*

Pro-duk-ti-on Pro-duk-ti-on Pro-duk-ti-on Pro-duk-ti-on Pro-duk-ti-on

flz. 123 *flz.* *ff* *ff* *ff* *ff* *ff* *ff* *sfz* *mechanically*

82 *f* *mf* *f* *sfz* *mf* *ff*

zu ih-rer Ve[r]fü-gung hat

air noise slap t. *flz.* air noise slap t. vib. 12

mf *<f* *f* *sfz* *p* *f* *sfz* *pp softly* *f* *>p* *mf* *>pp* *f* *>p* *fff* *>* *espress.*

87 *f* *sfz* *f* *ff* *p* *sfz* *f* *f* *f* *ff*

S. dis - po - niert_ da - mit zu - glei - ch ü - ber die Mit - tel zur geis

C Tpt. 13 air noise slap t. 12 air noise slap t.

p *f* *mf* *fp* *f* *sfz* *ff* *p* *f* *sfz* *p* *<f*

91 *mf* *mf* *fff* *mf* *fff* *mf* *fff*

S. - ti - ge n Pro - duk tion Pro - duk tion, Pro - duk tion

C Tpt. 12 *pp* *sub p* *pp* *pp* *sfz* *f* *pp* *sfz* *f* *pp* *sfz* *f*

mechanically

97 *mf* *fff* *mf* *fff* *ff* *ff* *f* *wildly*

S. Pro - duk tion_ Pro - duk tion_ Pro - duk tion, [gw] [du] [gw] [du] [gw] [du] [gw] [du]

C Tpt. *flz.* *pp* *sfz* *f* *mf* *f* *sfz* *ffp* *ffp* *p*

102 *sfz* *ff* *amoroso* *mf* *f* *mf*

S. [tə] so dass ihr da - mit zu - gleich im

C Tpt. air noise 12 slap t. 0 123 bisbig. (fast) 12-123 *flz.*

ff *f* *sfz* *f* *sfz* *f* *sfz* *fp* *fp* *>pp* *ff* *>p*

106 *f* *p* < *ff* > *mf* *f* *f* *fff*

S. Durch - schnitt die Ge - dan - ken de - rer, de - nen die Mit - tel zur geis -

C Tpt. *p* *f* *pp* *mf* *f* *sfz* *f* *sfz* *pf* *mp*

air noise slap t. 0 3 flz. 123 slide *ritss.*

111 *mf* *f* *mechanically* *sfz* *f* *sfz* *f* *sfz* *f* *sfz* *f* *sfz*

S. - ti - gen_ Pro - duk - tion_ Pro - duk - tion_ Pro - duk - tion_ Pro - duk - tion_ Pro - duk - tion_

C Tpt. *ff* *sfz-p* *sfz-p* *sfz-p* *sfz-p* *sfz-p*

flz. flz. flz. flz. flz.

117 *f* *sfz* *p* *lirico* *p* *mf* *p*

S. Pro - duk - tion_ ab - geh'n, un - ter - wor - fen

C Tpt. *sfz* *mf* *f* *sfz* *mf* *f* *sfz* *mf* *f* *sfz* *f* *sfz* *f* *sfz* *f*

flz. air noise 0 slap t. 2 2 1 1 12 23 13 123

122 *p* *softly* *sfz*

S. sin d.

C Tpt. *sfz*

148
 S. **||** $\frac{3}{4}$ Move towards to "Position I"
 act **p** *whimperingly but gradually towards full sound till "excited"*
 "Die Klasse, die die Mittel zur materiellen Produktion zu ihrer Verfügung hat, disponiert damit zugleich über |

C Tpt. $\frac{3}{4}$
 air noise flz. slap t. 0 3 13 0 0 flz. 123 13 23 12 1 2
f sffz f sffz f sffz f sffz f sffz p f

152 **||** *fff excited*
 die Mittel zur geistigen Produktion, so dass ihr damit zugleich im Durchschnitt die Gedanken derer, denen die Mittel zur geistigen |

C Tpt. $\frac{3}{4}$
 air noise flz. slap t. 0 0 flz. random fingerings 0 air noise flz. 0
f sffz pp f sffz p sffz sffz f

155 **||** Produktion abgehdn, unterworfen sind." | | | |

C Tpt. $\frac{3}{4}$
 2 0 2 flz. 23 0 23 flz.
ff > mf f sffz f sffz f sffz ffp p < sfz > p sffz pp sfz p sfz mf

160 **||** $\frac{3}{4}$ $\frac{3}{4}$ Try to be on "Position I" by here

C Tpt. $\frac{3}{4}$
 bisbig (fast) 2-23 flz. 23 (23) (23) 7
f sffz sffz sffz f sffz

Keep eye contact with the public through the passage.

164
fff [In this passage, keep trying to be more powerful than the trumpet.]
agitatively
 S. "Die herrschenden Gedanken sind weiter Nichts als der ideale Ausdruck der herrschenden materiellen Verhältnisse, die als

C Tpt. *mf eroico* *f p* *f p* *fff > p* *f* *p* *fff*

168
 S. Gedanken gefaßten herrschenden materiellen Verhältnissen also der Verhältnisse, die eben die eine Klasse zur herrschenden

C Tpt. *p* *f* *f* *fff p* *mf f* *ff p* *ff p* *fff*

Move towards to the original position

172
 S. machen, also die Gedanken ihrer Herrschaft." *f* *fff*
 laugh [ha] [ha] [ha] [ha]

C Tpt. *mf* *pp* *mf* *f* *fff* *fff* *f* *p* *f*
improvisatorially

176 Original Position

S. _____

C Tpt. *bisbig. (fast)* *flz.* *flz.*
6 p pp f p pp sfz > ff > p mf > pp f > fff f

181 *rit.*

C Tpt. *bisbig. (fast)* *flz.* *flz.*
pp f p f p f mp f pp f fff p

185 Exhausted $\text{♩} = 64$ (pedal tone)

C Tpt. *pp exhausted* *mf* *pp*

192

S. *mf* *seriously* speak
 Die Ge - dan - ken der herr - schen - den Klas - se,

C Tpt. *p* dark, background *mf* cup mute (closed) *pp*

198

S. *mf* *calmly* *f* *mf*
 Die herr - schen - den Ge - dan - ken sind wei - ter nichts als der i - de - el - le

C Tpt. *p* *pp* *p*

204

S. *f* *mf* *ff* *seriously* *mf* *agitatively*
 Aus - druck der herr - schen - den ma - te - ri - el - len Ver - hält - nis - se, die als

C Tpt. *mf* *p*

209

S. *ff* *mf* *mf* *tired*
 Ge - dan - ken ge - faß - ten herr - schen - den ma - te - ri - el - len Ver - hält - nis - se;

C Tpt. split tone 123 *p* *mf*

232 *mf* *mf* *f*

S. - ner Ge-schichts-e-po-che bes-tim-men, ver-steht es sich von selbst,

C Tpt. *pp* *mf < sfz* *fff* *fluently* *p* *p* *f*

237 *mf* *ff* *f*

S. dass sie dies in ih-rer gan-zen Aus-deh-nung tun, al-so un-

C Tpt. *fff* *p* *mf* *f* *pp* *p*

241 *fff* *sfz* *fff persuasively* *mf*

S. ter An-derm auch als Den-ken-de, als Pro-du-zen-ten

C Tpt. *mf p* *f* *p* *f* *sfz* *pp* *ff* *p* *ff* *p*

245 *mf* *fff* act *fff* actively

S. von Ge-dan-ken herr-schen, die Produktion und Distribution der

C Tpt. *ff* *fff* *p* *fff* *fff* *p* *fff > p* *fp* *fff > p* *fp*

mechanically

244 *espress.*

S. || Gedanken ihrer Zeit regeln;*

C Tpt. *fff > p* *fp* *fff > p* *fp* *fff > p* *fp* *fp* *fp*

246

S. $\text{||} \frac{2}{4}$ $\text{||} \frac{3}{4}$ $\text{||} \frac{3}{4}$

C Tpt. *fffz* *mf* *sfz* *pp*

Calmly $\text{♩} = 64$

253 *f expressionless* *mf* *mf* *f*

S. dass al - so ih - re Ge -

C Tpt. *mf* *f sfz* *f sfz* *p*

air noise 0 slap t. air noise 0 slap t.

258 *mf* *ff* *mf* *mf*

S. dan - ken die herr-schen-den Ge-dan - ken

C Tpt. *mf > pp* *f sfz* *f* *p*

air noise 0 slap t. flz.

263 *mf* *mf*

S. der E - po - che

C Tpt. *mf* *ppp* *p*

268 *P longingly* *sfz*

S. sin d.

C Tpt. *ppp*

0

28.VI.2018
Berlin



VIDEO

Video recording of the '*Die Produktion des Bewusstseins* for Soprano & Trumpet' performed by Camila Mandillo (soprano) and Xukun Tong (trumpet) is available at:

<https://www.youtube.com/watch?v=ljrBgIeeuec>

Zoom+Focus Konzert

Date: 09.02.2020

Place: HfM Hanns Eisler Berlin, Charlottenstraße 55, Studiosaal



AUDIO

Audio recording of the '*Die Produktion des Bewusstseins* for Soprano & Trumpet' performed by Camila Mandillo (soprano) and Xukun Tong (trumpet) is available at:

<https://soundcloud.com/mert-morali/die-produktion-des-bewusstseins2018>

**ESSAY****Electric Bass Improvisations on Engels***İlker İsabetli*

MUSICOLOGIST MARK LINDLEY (2010) TRIES to answer the question “If Marx and Engels had written a comprehensive article about aesthetics, what would it have said about music?” mainly on the basis of letters of Engels. Engels often writes about his interest in music, his curiosity and even his amateur composition exercises in his letters especially written during his youth.

In my musical work, I focused on one of Engels' composition exercises which is based on the first two lines of “A Mighty Fortress is Our God”¹ (*Ein feste Burg ist unser Gott*) (see Figure 1), in my musical work. The composition is quite sincere and in line both with the spirit of its time and the basic standards of classical Western music. The tonal structure and tensions are at an acceptable level, rhythmically it arouses a 'marching' feeling and the harmony of the dyads used with this rhythmic feeling are all reasonable. On the other hand, Engels sincerely confesses that he could write only dyads, and thus the polyphony is still quite difficult for him. Nevertheless, his enthusiasm for music is obvious. him to analyze the composition of these musical pieces. In another letter he also tells his younger brother Herman Engels that he still regularly works on compositions and songs (*ibid.*).

1. “A Mighty Fortress is Our God” is one of the hymns written and composed by Martin Luther and used also by composers such as Johann Sebastian Bach Felix Mendelssohn in their works.

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 - *Available online:* 27.01.2022



Figure 1. First two lines of “A Mighty Fortress is Our God” composed by Engels (Engels quoted in Lindley 2010).

I thought for a while about this musical material and decided to consider it as an achievement of Engels' sincerity. The shadow of Engels never left me alone while working on his composition exercise which belongs to one of the two most influential figures that have changed the world. I should confess that I have tried to follow the same kind of sincerity.

First, I have tried to follow the harmonic progress at the beginning of the composition based on a free rhythm, as I completely feel it. The rest comprises of disrupting ‘marching’ snare drums corresponding to the spirit of the streets today, rhythmic distortions tending to rebel and finally the resolve of the healing pentatonic scales in this carnival in a coherent way with respect to the harmony of the piece.

I am not sure how my work would be evaluated in terms of musical quality but at least I hope that I could follow the sincere path Engels pawed.

REFERENCES

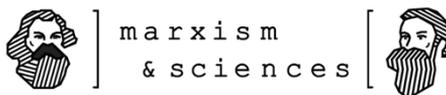
- Lindley, Mark. 2010. “Marx and Engels on Music.” *MR Online*. August 18.
<https://mronline.org/2010/08/18/marx-and-engels-on-music/>



AUDIO

Audio recording of the *Electric Bass Improvisations on Engels* performed by İlker İsbetli is available at:

https://soundcloud.com/marxism-and-sciences/ilker-isabetli-electric-bass-improvisations-on-engels?si=bf85972d4b764c73a89648fb06a67847&utm_source=clipboard&utm_medium=text&utm_campaign=social_sharing



***How the World Works: The Story of Human Labor from Prehistory to the Modern Day* by Paul Cockshott. Monthly Review Press, 2019.**

Tiago Camarinha Lopes

INTENDED TO BE AN INTRODUCTION to the materialist theory of history, *How the world works: from prehistory to the modern day* by Paul Cockshott is a controversial book. Its message: humans labor to guarantee their survival and the equipment at disposal plays the decisive role in the way society reproduces economically. “Technology and population constrain everything else” (Cockshott 2019, 12). Cockshott’s book is an attempt to put natural sciences back into the heart of the Marxist analysis of the history of human societies, and to defend materialist determinism.

Since Marx’s ([1859] 1977) days there has always been an attack against materialist determinism. I agree with Cockshott’s explanation as to why the technologically determinist view of society became “something of an embarrassment” (ibid., 11). During the twentieth century in the West, there was a separation between social and natural sciences. As a result, many Western Marxists have little training in physics, chemistry, or biology. Against this problematic development, the book argues that the historical development of human socioeconomic systems can only be understood based on the crude laws of “hard” sciences.

However, I feel that this important correction cannot be properly developed in a work directed to beginners. It deals with an immense volume of material that deserves profound reflection. Advanced readers might become both disappointed and instigated, because the density is too high and should have been dispersed along more pages.

The book is divided into unbalanced seven chapters. Chapter 1 (Introduction) explains well that any social formation must perform various tasks to survive. Humans are just another specific case of the more abstract

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notion of animal society. Cockshott explains the differences between abstract/social labor and concrete/individual labor in an original way. Since labor here always means labor in the energetic/physiological sense, he establishes a clever parallel between the colonies of termites and humans. In both cases there is a total social workload that is distributed among the individual members. Termites are eusocial insects. Labor division follows a natural dynamic. Like with ants and honeybees, they have caste differences such as the queen and reproductive males, soldiers and workers, etc. In polymorphic animals, such as termites, these ‘social’ differences are embedded in the bodies of the individuals (one is giant, the other tiny, another one can fly, etc.). Each living organism is naturally prepared to perform narrow tasks. Humans have only one structural significant difference: that of between male and female. Cockshott implicitly indicates that this difference is at the root of the first division of labor between humans as Engels ([1884] 2010) argued.

Chapter 2 (Pre-Class Economy) revolves around the first great technological step that explains the end of egalitarian economies, the Neolithic Revolution. The challenge here is to explain the transition to a division between a laboring and a non-laboring class. Cockshott points to two aspects in the transition from nomadic life to agricultural civilization. First, the substitution of hunting and gathering by agriculture and animal husbandry signifies that humans descend to a lower trophic level. The main technological innovation responsible for this is fire, which amplifies the possibilities of nutrition by enlarging the digestible material under control of society. This is good news, because it is easier to live in a settlement than to move around constantly looking for means of subsistence. Second, the bad news: this transition is associated with the possible rise of a ruling class.

Cockshott’s argument clearly indicates that there is no obvious positiveness or negativity in the Neolithic Revolution. Empirical data shows that the life of an agricultural population was harder than the life of hunters, because people had to work longer after productivity had *risen*. Moreover, although Cockshott did not mention it, archeological investigation (see Harari 2015, chapter 5: “History’s Biggest Fraud”) indicates that the general level of health of the average human *diminished* after the Neolithic Revolution. The main reason for that seems to be that the forces of natural selection act with greater ferocity when humans struggle in the wilderness in small groups. This relevant step of humankind means that the average diet and conditions of life of the individual can *decrease* while

the population *grows*. This reveals an ambiguous outcome. Massive civilizations rest on human exploitation but at the same time they can protect the disabled and sick better than the nomad tribe. Food surplus does not automatically generate an exploiting class, but once the possibility is there, “misfortunes” like “war, patriarchy, and religion” seem to be responsible for dividing humans into social classes. Hence “we have a problem with explaining the rise of class stratification as a direct result of rising productivity” (Cockshott, 2019, 44).

After leaving the deep mysteries of the transition from *Urkommunismus* to the epoch of class struggle, Cockshott deals with the Slave Economy in Chapter 3. There are two main characteristics common to all Slave Economies. First, they have well developed mercantile relations. Second, they have an external source of workforce. Both characteristics are entirely dependent on the technology of transportation of goods and workers. Here we notice a tremendous effort of synthesis and generalization that, although necessary, is also polemical. Vastly different societies dispersed in time and space (Asian, Ancient Rome, merchant colonies) are classified in the same category. In Cockshott’s definition, Slave Economies are structured around certain common features to suck labor from imprisoned people. So it becomes almost identical to capitalism itself or to any other class society, even if the ‘imprisoning system’ is different.

In Chapter 4 Cockshott tries to justify the effort of theoretical generalization by explaining his option to talk about Peasant Economy and not feudalism. For him, feudalism is Peasant Economy for the territorial and cultural delimitations of Europe. So, Peasant Economy is the correct concept and we find it in different epochs and locations outside Europe. The most important argument here is that this kind of economy cannot be described as a system without economic rationality. Against the usual claim that non-capitalist societies rests on extra-economic coercion, Cockshott argues with help of historical evidence that the same sort of disbalance between the indebted and the creditor are to be found in the obligations established between lord and servant.

In the technological determinism approach proposed by Cockshott, all differences between modes of production tend to be reduced to quantitative differences only. Qualitative transformations are conceived indirectly as the result of cumulative quantitative changes. Here, again, the Peasant Economy becomes similar to capitalism. The main difference seems to be the size of the economy, the scale of production. If quantity is the only parameter to differentiate socioeconomic systems, then, in fact, technology

is the ultimate determinant of everything. That is why Cockshott treats “[...] a mode of production as being irreducibly determined by technology, so that the capitalist mode of production is machine industry, and the feudal mode of production is peasant agriculture.” (footnote 55, 354).

I notice at least one problem with this reductionist perspective. It seems that there is an intrinsic and a-historical economic rationality in the behavior of the agents. It is as if humans could not be ideologically dominated and make irrational choices from the standpoint of productivity. Is there a universal protocol of human action guiding economic decisions, like what Mises proposes when he summons praxeology? The challenge of theoretical generalization to compress logic into history is that we need to deal with two fields of laws, as Oskar Lange lectured: those valid for all types of economy and those valid only to specific historical social formations. Unfortunately, the book does not enter these details.

Chapter 5 on the Capitalist Economy is the largest one. Let us focus on only one aspect. What are the technical conditions that make capital govern the entire economy? In other words, what is the first spark that ignites capitalism as an “auto-catalytic system?”

The traditional Marxist answer for the beginning of capitalism lies at the possibility of systematic reproduction of the worker deprived from means of production and without a specific master. When the worker has no equipment and is not a slave, he needs to continuously sell his/her commodity, labor power, at the labor market. So, it is not some technical device which is directly responsible for the emergence of capitalism as a mode of production, but the social fact that there is a population who can only survive if it can continuously transform its labor power into money. Industry is the adequate method of production for capitalism, but it is not the primary generator of capitalist relations. The potential of capital has always been there, behind the logic of the interest rate. The Industrial Revolution is what allowed it to move freely.

Cockshott looks in another direction, implying that the machine industry creates capitalism and not the other way around. He argues that the capitalist technological innovations depend on science that is generated *outside* mercantile relations. So, here, scientific revolution and the rise of capitalism are not so closely related as in the traditional Marxist historiography. There is a contradictory relationship between capitalism and science, but there is no room to explore this feature in the book.

Finally, how do Socialist Economies work? In chapter 6 Cockshott presents his views based on real existing experiences. Again, due to the

fundamentals of technology as the ultimate factor, these societies do not diverge so much from capitalism. Since industry is a common feature, the similarities between the opposing political systems are striking. Hence, there is a competent initial discussion on the parallel between socialism and state-owned capitalism. Cockshott remembers Lenin's notion that electricity was one strong pillar of the soviet project and puts every hope in the development of technical novelties to trigger social change.

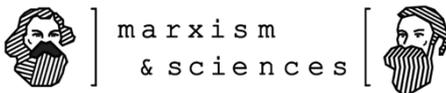
In the last chapter 7 (Future Economics) Cockshott presents the ITER (International Thermonuclear Experimental Reactor) experiment. This could be the starting point for a new type of energy generator that would put a gigantic amount of energy under control of humanity. He emphasizes that these and other technologies are so huge that no private capital could ever support them. That is why social planning is necessary to allow further development of the productive forces.

The book reveals too little of a project with huge potential. I believe that Cockshott could explore more his relative advantage as a Marxist with solid formation on hard sciences. There is no need to rely so closely on the standard literature of Political Economy, because this leads to tricky debates, such as that about the continuity and rupture between Marx and Adam Smith or that about the validity of the law of value in non-capitalist economies. I think the structure of the work could have developed around two great transformations only: the Neolithic and the Industrial Revolutions. The traditional scheme of successive forms of economy (primitive/hunters/gatherers → despotic → modern society) restricts the potentialities of the technologically determinist approach because it reinforces a standard for classification that could have been modified here according to Cockshott's own definition of mode of production.

The weakest feature to my view is the invisibility of the political organization of the working class. There is too much hope in technique as if the improvement of technology were a conscious effort with the purpose to amplify our control over nature. Unfortunately, I think modern science has always been dominated by capital, as everything else. That is why there is no clear trend as to whether we are progressing or regressing in terms of technology since the 1970s, as the book indicates. What we have is a notorious use of all accumulated scientific knowledge that does not match the interests of the working class. In any case, readers will not find it difficult to understand that non-primitive communism is not only a political flag of the working class, but also a necessity for the wellbeing of the whole human species on planet Earth.

REFERENCES

- Engels, Friedrich ([1884] 2010). *The Origin of Family, Private Property and the State*. Marx and Engels Selected Works, Vol. 3. <https://www.marxists.org/archive/marx/works/1884/origin-family/index.htm>
- Harari, Yuval N. (2015). *Sapiens: a Brief History of Humankind*. New York: Harper.
- Marx, Karl ([1859] 1977). *Preface. A Contribution to the Critique of Political Economy*. Moscow: Progress Publishers. <https://www.marxists.org/archive/marx/works/1859/critique-pol-economy/preface.htm>



***Trajectories and Themes in World Popular Music: Globalization, Capitalism, Identity* by Simone Krüger Bridge.
Equinox, 2018.**

Ali C. Gedik

THIS COMPREHENSIVE BOOK does not only present trajectories and themes in world popular music as promised in the title. It also examines the fundamental tenets of recent scholarship on popular music. This review investigates the book within the context of these recent trends, consisting of a set of shifts in terminology and focus such as from ‘world music’ to ‘world /global popular music’ and from musical identities in culture to musical identities in capitalism, respectively.

These shifts naturally have implications for both ethnomusicology and popular music studies. It is known that the phrase ‘world music’ initially emerged as a “friendlier” alternative term to ethnomusicology and was included in curriculums as of the early 1960s. It reflected a quest for the usage of the correct terminology to avoid and overcome the effects of the domination of Western art music in the academy (Feld 2000, 146). However, the introduction of the term as a musical genre by the music industry in early 1980s reproduced a binary division between the musics of ‘the west’ and ‘the rest’ (ibid.) that it had intended to dissolve.

It was around this period that popular music gradually became an important topic of study in the field of ethnomusicology thanks to the development of popular music studies. Peter Manuel’s *Popular Musics of the non-Western World* (1988) was no doubt a milestone, which paved the way to this recent trend.

Recently, new terms instead of ‘world music’ have been utilized to address this contemporary coverage: ‘global popular music’, ‘world popular music’ or ‘popular music of the world’ are among such terms, as epitomized by the titles of the reference books published such as *Bloomsbury*

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Continuum Encyclopedia of Popular Music of the World (2003–), *Routledge Global Popular Music Series* (2015–), *The Oxford Handbook of Global Popular Music* (2021–), etc. This new terminology corresponds to a crucial step for the dissolution of binary opposition between the west and the rest.

The author, Simone Krüger Bridge writes in line with this new trend and thus covers traditional and art music practices as well as popular music practices, from Latin America, the Middle East, Africa, United States and Europe, which were hitherto studied rather within distinct disciplinary boundaries.

Another recent trend of situating the musical identities within the context of the dynamics of capitalism, makes it possible to relate these ‘distinct’ musical practices to each other and approach them as a whole. Until recently, capitalism has never been referenced in such an explicit way within either popular music studies or ethnomusicology. For a long time, ethnomusicology, which appeared as a mainly American enterprise during the Cold War, has never included Marxism and thus political economy in its scope. Even though ethnomusicology joined to popular music studies in the early 1980s, which has clear roots in Western Marxism, political economy approaches continued to be out of the scope of scholarly discussions. The reason is that popular music studies inherited a phobia of economic determinism from Western Marxism, and the political economy is conceived of as the hallmark of a reductionist and vulgar understanding of Marxism.

The Political Economy of Music (1985) by Attali, already a political economist not a music scholar, breaks the long silence haunting us since the works of Adorno in mid-twentieth century. *Music and Marx* (2002) edited by Qureshi was not only a groundbreaking study in the sense of bringing together ethnomusicologists, musicologists and popular music scholars together studying on Marx, but also in the sense of having a special focus on political economy. Finally, *Music and Capitalism* (2015) by Taylor became a new milestone since it considers capitalism as a cultural system, as well. In particular, the chapter, ‘Marxist Approaches to Music, Political Economy, and the Culture Industries: Ethnomusicological Perspectives’ by Manuel (2019) is a unique source. Furthermore, *The Oxford Handbook of Economic Ethnomusicology* (2020) edited by Morcom and Taylor reveals this trend powerfully. Nevertheless, neither the kind of Marxism nor the political economy approaches are orthodox in these studies. Krüger Bridge also clearly follows this second trend.

While the book shares some strengths and weaknesses of this new trend of scholarship, it also possesses certain characteristics that need to be evaluated in its own right. In this sense, it would be fair to review the book primarily in terms of its own promises, which is stated as “a concise introduction to modern popular music studies” (xi). Similarly, the content of the book is expressed as author’s “culmination of fifteen years of teaching modules on world music cultures, world music, gender and sexuality, race and ethnicity, music censorship, and musical globalization” (ibid.).

The chapters are mainly historically organized. The background of this historical narrative is presented with regard to several periods of globalization corresponding to different stages of capitalism such as market capitalism (ca. 1700–1850), monopoly capitalism (ca. 1850–1945), organised capitalism (1945–1980/90), neoliberal capitalism (1980/90–2008) and finally, after globalization (2008–2018). Globalization is mainly considered as a strong discourse that “helps to conceptualize globalizing processes and effects, and that it was used obscure and disguise ‘capitalism’ since the Cold War” (ibid. 1).

The book connects the technological, social, and cultural aspects of globalization to the economic logic of capitalism and its historical dynamics. Moreover, this holistic approach per se and its theoretical underpinnings are noteworthy as it embraces contrasting theories in a challenging way. It is thanks to this holistic approach that Krüger Bridge discusses the theories both against and in favour of globalization—similarly the top-down and bottom-up theories of culture—in the context of such music-related issues as ethnicity, race, gender, feminism, democracy, technology, fascism, neoliberalism, cultural imperialism, racism, nationalism, resistance, branding, expressive isomorphism, authentic hybridity etc.

However, the author’s approach is more than a simple eclectic collection of these contrasting positions, reminding the approach of Stuart Hall (1981, 228) who theorizes cultural processes as neither top-down nor bottom-up but as “the double movement of containment and resistance”. Furthermore, the political position of the book reminds us of political commitment of early cultural studies as clearly expressed by Hall (1981, 239): Popular culture “[...] is one of the places where socialism might be constituted. That is why ‘popular culture’ matters. Otherwise, to tell you the truth, I don’t give a damn about it”.

Similarly, Krüger Bridge expresses her motivation as follows: “the book challenges issues of social stratification, used to order society into hierarchies of people for the purpose of privileges, and seeks to understand social

injustices, such as discrimination, stereotyping, and disadvantage” (Krüger Bridge 2018, 3). In this sense, it seems that the author gives a positive answer to the question once asked by Lawrence Grosberg related to his disappointment about popular music studies, more than a decade ago: “Where are the outraged and articulate voices that attempt to make sense of, give voice to, and intervene into these struggles?” (Grosberg 2002, 30). Especially, the final chapter, ‘Popular Music in Postdemocracy,’ which considers more recent times, is dedicated to the resistance to global capitalist hegemony in popular music.

Consequently, the comprehensiveness of the book is threefold; historically, theoretically and musically. As the author acknowledges, the theoretical background of the book is based on critical social theory, which embraces a very wide range of musical practices from famous to non-famous ones, from European classical music to traditional and popular musics of both ‘near’ and ‘remote’ geographies within a long period, from eighteenth century up to date. Afropop, Latin American pop, Art Music of the Arab Middle East, Rock Music in Paraguay, Nazi Rock, Orientalist Pop, Global Hip Hop, Global Bollywood and a special emphasis on feminist and subversive musical practices could be briefly listed to give an idea of comprehensiveness of the musical practices covered in the book.

It could be argued that these challenging qualities of the book ‘suffer’ partly from its comprehensiveness and partly from the recent trends it follows. While plenty of contemporary theoretical concepts and approaches are presented and applied to musical cases, a considerable part of them are either superficially explained or left unexplained. Concepts central to the book such as capitalism, hegemony, musical commodification and social democratic citizenship are not even defined; defining these controversial concepts could reveal the theoretical position of the author, respectively. Similarly, while some theoretical sources such as Appadurai’s and Robertson’s studies on globalization are skipped, some recent theoretical concepts such as Robertson’s ‘glocalization’ or Anderson’s ‘long tail’—used to explain characteristics of post-fordist cultural production and consumption—are simply ignored.

Given the ‘concise’ nature of the book, it would clearly be unfair to expect to see in-depth theoretical explanations or all relevant musical practices. However, it is surprising to see the absence of musical practices which are explicitly counter-hegemonic such as Inti-Illimani and Victor

Jara in Chile, Rock Against Racism (RAR) movement in Britain, Composer's Collective in United States or Hanns Eisler in Germany, in such a book with a rather clear political position.

Another surprising point is almost the absence of 'class' which is not peculiar to the book but a common feature of the relevant literature considering music in capitalism. The retreat from class has a long history within cultural studies, from Stuart Hall, who takes into account the class relations but with a caution of not reducing the cultural identities to class formations to simply ignoring it wholesale due to the hegemony of post-modernist theories. It seems reasonable that the return of capitalism and political economy to popular music studies soon recalls 'class,' which is supposed to be at the core of any conception of capitalism per se.

Last but not least, the final chapter and afterwords that are devoted to recent period, discuss the end of neoliberalism and the emergence of a new uncertain era, 'after globalization,' respectively. It is ironic that the current growing interest on the part of popular music studies in contemporary crisis-ridden neoliberalism was almost absent in its "heydays" (Gedik 2017). At this point we have rights to expect that current discussions on neo-fascism or authoritarian neoliberalism defining the state of contemporary social formations will find their place in popular music studies soon, before they further damage our lives, like the "decaying" neoliberalism.

REFERENCES

- Attali, Jacques. 1985. *Noise: Political-Economy of Music*. Translated by Brian Massumi. Minnesota Univ. Press.
- Feld, Steven. 2000. "A Sweet Lullaby for World Music." *Public Culture* 12(1): 145–171.
- Gedik, Ali C. 2017. "Mapping Popular Music Studies in Turkey onto Studies in the Anglophone World." In *Popular Music Studies Today. Systematische Musikwissenschaft*. Edited by Julian Merrill, 119–128. Springer VS, Wiesbaden.
- Grossberg, Lawrence. 2002. "Reflections of a Disappointed Popular Music Scholar." In *Rock Over the Edge: Transformations in Popular Music Culture*. Edited by R. Beebe, D. Fulbrook & B. Saunders, 25–59. London: Duke University Press.
- Hall, Stuart. 1981. "Notes on Deconstructing 'the Popular'." In *People's History and Socialist Theory*. Edited by R. Samuel, 227–240. London: Routledge & Kegan Paul.
- Manuel, Peter. 1988. *Popular Musics of the Non-Western World: An Introductory Survey*. Oxford University Press.
- . 2019. "Marxist Approaches to Music, Political Economy, and the Culture Industries: Ethnomusicological Perspectives." In *Theory for Ethnomusicology: Histories, Conversations, Insights*, Second Edition. Edited by Ruth M. Stone and Harris M. Berger, 51–70. New York: Routledge.

Morcom, Anna and Taylor, Timothy D. Eds. 2000. *The Oxford Handbook of Economic Ethnomusicology*. Oxford University Press.

<http://dx.doi.org/10.1093/oxfordhb/9780190859633.001.0001>

Qureshi, Regula B. Ed. 2002. *Music and Marx: Ideas, Practice, Politics*. New York: Routledge.

Taylor, Timothy D. 2015. *Music and Capitalism: A History of the Present*. University of Chicago Press.



Actuality of Friedrich Engels at his 200th Birthday: 7th Marxist Inquiries on Science & The School of Marxism and Sciences

Mesut Yüce Yıldız

THE SEVENTH MEETING OF THE *Marxist Inquiries on Science* was held on 18-20 December 2020 with the theme of ‘Actuality of Friedrich Engels.’¹ First of all, I would like to share my reason for writing in an international journal on the last meeting of a symposium that has been organized in Turkey since 2012.

‘The Actuality of Friedrich Engels’ has been the most recent symposium of the series *Marxist Inquiries on Science*, that has been held since 2012. I have taken part in these events as both a member of the organizing committee and a presenter since 2015 when I was still a young graduate student. This last symposium, however, has been a turning point on the way of formation of the journal and its first special issue. More specifically, the decision to establish this journal and to publish the first issue with the main theme of the symposium was taken at the meeting of the organizing committee after the symposium.

Precisely for this reason, the history of the symposium has also been presented as the background of the journal at its website:

The seeds of *Marxism & Sciences* were planted at the first symposium of *Marxist Inquiries on Science* held in İzmir in 2012. The theme of the symposium, *Is Marxism Alien to Science?* was discussed in 20 paper presentations by different comrades from arts and humanities, applied, social and natural sciences. Around 60 participants attended the 3-day symposium.

1. <https://www.youtube.com/c/MarxismandSciences>

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We have organized seven annual meetings since 2012 and the papers presented at the first three symposiums have been published as three separate volumes. *The School of Marxism and Sciences* aiming to discuss Marxist approaches in each branch of science, was also organized in 2017, alongside the symposium.

2012- *Is Marxism Alien to Science?*

2013- *Marxism and Two Cultures*

2015- *Marxist Interventions to Mainstream Science*

2017- *The School of Marxism & Sciences*

2018- *Understanding the World Today: Tendencies, Nodes and Exits in the 21st Century*

2019- *Looking at Today from the Interwar Period*

2020- *Actuality of Friedrich Engels at his 200th Birthday*

So far 155 papers in total have been presented in the symposiums and the school; and the topics of political science, political economy, sociology, general philosophy, physics, mathematics, biology, philosophy of science, medicine, neuroscience, engineering, agriculture, architecture, literature, arts, musicology, ecology, religion, technology, international relations, film studies, theatre, cultural studies, fashion, history, anthropology, psychology and law have been discussed. Close to 600 people have participated in all these events.

Following the 2020 symposium, we came to the decision to continue organising the symposium internationally and publish an international journal both named *Marxism & Sciences*.²

The symposium began with an opening speech by Ali C. Gedik on behalf of the organizing committee and continued with his own presentation, ‘Actuality of Engels.’ In his presentation, Gedik addressed some of the criticisms raised against Engels as well as the reasons of the loss of connection between natural sciences and Marxism. He further stated that Engels’ approach to methodology and dialectics is still actual as it facilitates the reconstitution of the connection between natural sciences and Marxism as much as it contributes to a holistic understanding of Marxism—similar to Marx’s and Engels’ position.

The next presentation titled ‘Engels the Second Violin: Memories, Letters and Exercises on Music’ was made by Öznur Yılmaz. Yılmaz explained why Engels describes himself the second fiddle. The second fiddle has the task of filling in the gaps that were left by the first fiddle and determining the rhythm, while the first fiddle has the task of dragging the melody in a classical music orchestra. Although Engels considers himself secondary in his relationship with Marx, he also states later—after Marx’s death—that he is uncomfortable with the new situation, expecting him to

2. <https://marxismandsciences.org/history/>

be the first fiddle. Engels remarks the difficulty to accept to be the representative of Marxism in a theoretical sense after Marx's death. Yılmaz pointed out that Engels' second fiddle metaphor was not a coincidence. She pointed out that although Marx and Engels did not study music in a detailed manner, from the letters and writings of Engels, we can come to the conclusion that Engels was very interested in music. Engels constantly attended concerts and musical theaters and conveyed these experiences in letters to his sister and to Marx. Yılmaz stated that it is unfortunate that Marx and Engels did not write specifically on music, but their discussion with Stirner over the uniqueness of art in *The German Ideology* constitutes an important point of reference for a Marxist understanding of art and music.

Yılmaz's presentation was followed by a short concert on Engels' composition exercises. Before the performance of 'Variations on Engels' Compositional Experiments', the composer Ömer Er touched upon the musical difficulties Engels faced. He stated that he internalized Engels and interpreted the work as his own, whilst trying to stay loyal to the compositions.

On the second day of the symposium, Kaan Kangal made a presentation on 'Engels and the *Dialectics of Nature*.' Kangal philosophically evaluated the writing process of *Dialectics of Nature*. Kangal stated that Engels never actually wrote a book titled *Dialectics of Nature*. In fact, the book known to us as the *Dialectics of Nature* is a compilation of Engels' four scrolls of manuscripts about natural sciences and dialectics. He further added that Engels did not use the phrase 'nature's dialectic' or 'dialectic of nature' in the main text of the book. He argued that Engels did not prefer the term, as it could lead to unintended speculations in terms of linguistic and terminological concerns. Engels put dialectics against metaphysics, and materialism against idealism in his notes on the *Dialectics of Nature*. According to Kangal, Engels tested dialectic with nature in *Dialectics of Nature*. Engels sought to answer which parts of objective logic are confirmed in natural movement and evolutionary processes. Engels could not conclude his investigation and left some parts unfinished. One of the reasons for lack of conclusion has been the successive progression of natural sciences. Another reason has been the philosophical terminology and the philosophical position that was adopted by Engels in *Dialectics of Nature*. Engels had to discuss with different variants of idealism that were representatives of Aristotle, Kant and Hegel against materialism in *Dialectics of Nature*. This situation has yielded difficulties and confusions.

In his presentation titled ‘From History and Class Consciousness to Ontology: The Problem of Dialectics of Nature’, Ateş Uslu discussed Lukacs’s part in the criticisms of *Dialectic of Nature* and Engels in his presentation, titled ‘Reading Engels with Lukács: From History and Class Consciousness to Ontology The Problem of Dialectic of Nature.’ Lukacs criticized Engels for allegedly applying dialectics to nature and this situation also influenced the next generation of Marxists. Uslu divided his presentation into two parts. The first part was on how the human subject was grounded from a Marxist perspective for the two different philosophers, and the second part was on how issues such as subjectivity, freedom and will were discussed on a materialist perspective by Engels and Lukacs. Lukacs developed a critique of positivism’s conceptualization of society, which is similar to latter’s conceptualization of nature and extended this criticism to Engels. According to Lukacs, Engels did not take into account the dialectic between subject and object in the historical process, and extended and generalized the dialectic onto nature just like Hegel did. According to Uslu, Lukacs accepted that the dialectic of nature exists, but he was primarily interested in the dialectic of society. Uslu stated that afterwards, Lukacs’s ideas have changed about Engels—especially after he read *Dialectics of Nature*—and the dialectic of nature became important for Lukacs.

Another presentation, titled ‘Dialectics in Thinking and Activity’ was made by Siyaveş Azeri. Azeri discussed that Engels’ *Dialectics of Nature* was misrepresented and misinterpreted, and what Engels really wanted to describe was the dialectic of human activity in nature. Azeri aimed at demonstrating that Engels, in *Dialectics of Nature* as much as in other works, conceptualized human activity (praxis) in concordance with the spirit of materialist dialectics (of Marx and his own) and that this conceptualization particularly preceded Ilyenkov’s later approach to the concept of human activity. Azeri stated that Marx and Engels’ approach consider nature through the prism of human activity *in nature*.

In the last presentation of the second day titled ‘New Nature and Engels,’ Alper Dizdar focused on how Engels’ dialectical method, especially as it is deployed in *Dialectics of Nature* may be evaluated by scientists—particularly in natural sciences. According to Dizdar, it would be possible to progress much faster in scientific terms with the use and knowledge of the dialectical methodology used by Engels in relation to natural sciences. For instance, according to Dizdar, if dialectic method had been used, physicists could advance much faster from the static universe model to the

expanding universe model following the general theory of relativity. In addition, Dizdar addressed Engels' scientific and philosophical understanding of biology and mathematics. According to Dizdar, if we consider movement in nature and society, it is possible to see this relationship as dialectical on the basis of Engels' methodology.

On the last day of the symposium, I started off by mentioning the current negative consequences of the ecological crisis in my own presentation titled 'Engels and Ecology'. I tried to explain the place of ecology in Marxist literature and that Engels—and Marx—was one of the first philosophers to deal with ecological destruction from this point of view. Marxism is often accused by ecologists to not pay attention to ecology and for being anthropocentric. However, this idea has been dissipated and it has become clear that the ecocide is rooted in the capitalist mode of production, thanks to the eco-Marxists. Marx defined the interrelationship between human and nature with the concept of metabolism. However, human and nature have been alienated and have undergone a metabolic rift in capitalism. Nature has value only to the extent that it is dominated and taken into financial relations in capitalism. I tried to remark certain problems in the understanding of ecology of eco-Marxists and in general Marxist literature. I proposed—based on Marxist biologists—that the act of consuming the environment is not exclusive to humans and as an irreversible process includes every organism which is connected to the environment. Furthermore, I stated that the process of human's irreversible consumption of its own environment—unlike other organisms—is rooted in economic and social relations and that it is possible to constitute a more sustainable environment, in both intellectual and practical terms, through changing these same relations. Finally, I stated that human is the embodiment of this relationship, which is established in nature through labour in the ecological sense, as it is expressed by Engels in his *Dialectics of Nature*. According to Engels, human actions on nature had negative consequences on us as well as on nature. The harmony of our relationship with nature is possible not by trying to dominate it, but by accepting that we are a part of nature and recognizing its laws.

Çağatay Tarhan, in his presentation titled 'Engels, Biology and Covid-19' mainly focused on the importance of the *Dialectics of Nature* for the actual biological developments. Tarhan stated that *Dialectics of Nature* served as a guide even though it was scientifically incomplete or outdated due to the limited knowledge of its period. Tarhan stated that the domination of

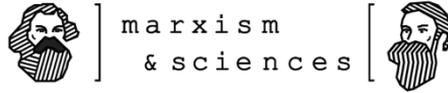
scientific method by empiricism has caused a serious philosophical impoverishment. Therefore, Engels revealed philosophically in the *Dialectics of Nature* the necessity to combine empirical and dialectical methods. Tarhan mentioned that the gradual division of natural sciences into different branches prevents us from understanding accumulation of scientific knowledge from a holistic perspective. This situation—especially in biology—has yielded a gene-centred and reductionist approach. According to Tarhan, biology needs dialectical method in order to reach its aims. This situation coincides with Engels' idea that scientific progress can be accelerated with the use of dialectical method in sciences. Lastly, Tarhan emphasized the importance of the chapter titled 'The Part Played by Labour in the Transition from Ape to Man' in the *Dialectics of Nature* for biology. Engels sees the hand not only as an organ of labor, but also as its product. According to Tarhan, this view is an indication that Engels addresses not only social changes but also biological changes in humans.

The symposium continued with Melda Yaman's presentation titled, 'Looking at *The Origin* of Engels: A Socialist Feminist Perspective.' *The Origin of the Family, Private Property and the State* is presented with a socialist feminist perspective, while following the traces of *The Origin*. Yaman stated that Engels' *The Origin* is a very valuable work for a socialist-feminist perspective, but also has certain aspects to be criticized. Yaman finally stated that despite the drawbacks of *The Origin*, it is still an important work that draws attention to the oppression of women by the male-dominated society in general.

The last presentation of the symposium was made by Şebnem Oğuz titled 'Actuality of the Engels' *Condition of the Working Class in England*.³ Oğuz stated that her main purpose was to discuss the work of *The Condition of the Working Class in England* in relation to current conditions such as precarity, class and immigrant labor. Oğuz stated that Engels' work was the first book dealing with the working class as a whole. According to Oğuz, Engels' work retains its actuality in terms of the existing discussions related to the concept of precariat, the concept of surplus population and migrant labor, digital capitalism, the concept of social murder, working conditions during the pandemic, and finally new forms of organization for the working class. Oğuz has described the current situation of the workers in detail, referring to the similar descriptions in Engels' work.

3. Şebnem Oğuz could not make her presentation on the day of the symposium due to the loss of her mentor Leo Panitch. Therefore, her presentation was published two months after the symposium date.

In 2020, the symposium ‘Actuality of Friedrich Engels at his 200th Birthday’ was held online due to the COVID-19 pandemic. Engels’ actuality, his composition exercises, his bond with nature, his contribution to Marxism, and his connection with natural and social sciences were discussed in the context of many actual issues during the 3-days meeting. Being the online symposium allowed Marxist academics abroad—such as Siyaveş Azeri from Siberia and Kaan Kangal from China—to made presentations. It provided a holistic approach to the actuality of Engels in this way. However, I still think that the fact that this symposium and the previous ones were held in Turkish hindered the participation of international Marxist scholars. In addition, I should state that the symposium could not adequately focus on Engels’ position *vis a vis* natural science. There were not presentations on chemistry or mathematics, for example. This was in part due to the limited number of Turkish speaking academics interested in Engels’ methodology and dialectics. Therefore, it has been decided that the symposium will be held internationally and in English in the following years.



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NOTES ON CONTRIBUTORS

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Sahotra Sarkar is Professor of Philosophy and of Integrative Biology at the University of Texas at Austin. He grew up in Darjeeling, India but then emigrated to the United States to attend Columbia University in the City of New York (BA in Mathematics, Philosophy, and Physics) and the University of Chicago (MA, PhD in Philosophy). He has previously taught at McGill University and has held Fellowships at the Hebrew University of Jerusalem, MIT, and the Wissenschaftskolleg zu Berlin and senior appointments at the Indian Institute of Science at Bangalore and the Max Planck Institute for the History of Science in Berlin. A specialist in Marxism and the philosophy and history of science, he has also worked in conservation biology, disease epidemiology, and mathematical biology. He was a leader of the student anti-apartheid movement in the United States in the 1980s and is associated with Black Lives Matter. He is the author of six books, editor of another twenty, and author of over two hundred papers in philosophical and scientific journals (sahotra-sarkar.org).

Rogney Piedra Arencibia is currently completing his Ph.D. in philosophy at Queen's University in Ontario, Canada, researching the epistemological potential of Activity Theory. In 2014, he obtained his bachelor's degree in philosophy at the University of Havana, as well as a master's degree in social sciences in 2018. From 2015 to 2019, he taught courses on modern philosophy and classical Marxism at the University of Havana. He has published several articles on Marxist philosophy focusing on its epistemological problems and the contributions of the Soviet philosopher E.V. Ilyenkov. Among them, stand out the papers "Kant and Dialectical

Logic” (*Hybris*, 2017, Vol. 8, Issue 1), “The Part Played by Labour in the Development of Human Thought” (*Hybris*, 2018, Vol. 9, Issue 2), and “Dialectics of the Ideal and Engels’s Dialectics of Nature. On Ilyenkov’s Supposed Affinity with Western Marxism” (*Historical Materialism*, 2021, Vol. 29, Issue 2). His book in defense of Engels’ dialectics entitled “Marxism and Dialectics of Nature” has two published editions in Spanish (Editorial de Ciencias Sociales, Havana, 2017; and Edithor, Quito, 2019).

Joost Kircz has a PhD in molecular physics and studied and worked at the Universities of Amsterdam and Utrecht in The Netherlands. After his academic carrier he started working for the international science publisher North-Holland /Elsevier. Among his roles were Publisher of the renowned physics list and researcher in digital publishing. Hereafter he started his own research company in digital knowledge transfer: Kircz Research Amsterdam. From 2006-2014 he was a part time research professor/ program leader on electronic publishing at the Amsterdam University of Applied Sciences. As from his early student years, as part of the national leadership of the student movement of 1968/9, he is involved in socialist politics and activism. He was a board member of the International Institute for Research and Education (1982-2019), founded by the Marxists economist Ernest Mandel: www.iire.org. At present he is in the board of the Dutch Stichting Socialistisch Onderzoekscollectief / Socialist Research Collective Foundation: Socialism in the 21st century. www.soc21.nl. He was chairman of the parliamentary fraction of the local radical party Amsterdam Anders (Different Amsterdam), in the central Amsterdam borough 2004-2010. His present interests are mainly in the interplay of Marxism and Science, and the study in to what extent the contemporary sciences can deepen the understanding and development of so-called scientific socialism, set out by Marx & Engels, now more than a century ago. His publications can be found on the website www.kra.nl

Siyaves Azeri is a professor of philosophy at the School of Advanced Studies, University of Tyumen; he joined the SAS in August 2020. Previously, from September 2018 till August 2020, he was a visiting researcher at the Université de Lorraine, Archives Henri-Poincaré – Philosophie et Recherches sur les Sciences et les Technologies (AHP-PreST) to pursue the project he had started at the École Normale Supérieure -Paris between September 1, 2017 and August 31, 2018. He is also an associate of “Thesis Twelve: Mardin Value-form Circle” that has been active since the summer of 2015. His current research focuses on Marxian critique of epistemology of science drawing on Evald Ilyenkov’s concepts of the “ideal” and “human activity” and Lev Vygotsky’s theory of the process of concept-formation. Azeri is also interested in (Marxist) political philosophy in relation to contemporary social issues with a special focus on political Islam and Islamism.

Melda Yaman graduated from METU Electrical and Electronics Engineering and completed her Ph.D. in Development Economics at Marmara University. She works on women's labour, political economy, and capitalist crises, and has many articles published in national and international journals and books on these topics. She has a book that examined Turkey's 1979 crisis within the framework of Marxist theories of crises under the title of *Geç Kapitalistleşme Sürecinde Kriz (Crisis in the Late Development Process)*. She is co-author (with Özgür Öztürk) of *Metaların Karameti (The Miracle of Commodities)*, and (with Ö. Öztürk and Ö. Narin) of *Grundrisse'den Kapital'e Patikalar (Pathways from the Grundrisse to Capital)*, and (with N. E. Keskin) of *Tütün: Reji'den TEKEL'e TEKEL'den Bugüne (Tobacco: From Regie to TEKEL and From TEKEL to Nowadays)*. She is also one of the editors (with Sanıye Dedeoğlu) of *Kapitalizm, Ataerkillik ve Kadın Emegi (Capitalism, Patriarchy and Female Labour)*, and (with G. Tuna, G. Yarkin and F. Ercan) of *Emegin Kitabı (The Book of Labour)*. She collected her articles on women's labour in her book titled *Ataerkil Kapitalist Tahakküm Altında Kadın Emegi Kadın Bedeni (Female Labour and Female Body Under Patriarchal and Capitalist Domination)*.

Cihan Cinemre was born in Adana, Turkey in 1980. He received his undergraduate degree in 2002 from Istanbul Bilgi University's Department of Economics where he had gained admission in 1997. Then he completed his Master's Degree in Marmara University's Department of Development Economics and Economic Growth in 2005. He received his PhD degree also from Marmara University's Department of Development Economics and Economic Growth in 2012 with his thesis titled *Structural Transformation of Turkey's Manufacturing Industry and Labour Market Stratification*. Since 2015 Cinemre lectures in Mimar Sinan Fine Arts University's Department of Sociology where he gives lectures on ecology, economics, Marxism, and dialectics. He published his book titled *Fascism, State, and the Classes* in which he attempted to elucidate a Marxist view on fascism in 2017 from Belge Publications. The fields of research Cinemre deals with are Hegelian dialectics, materialist dialectics, political violence, and fascism. Cinemre plays bass guitar and has an experimental rock music album named *Agitprop*, which he made with his former band DDR.

Hari Kumar qualified as a physician in the UK. After Thatcher's pruning of the NHS he had to seek a job elsewhere. Now retired from clinical work, he is an emeritus professor of paediatrics in the USA. Kumar's research focused on randomized controlled clinical trials for peer-reviewed journals. His political life began in the UK, where he was influenced early on by the late W.B. Bland, an early anti-Khrushchev anti-revisionist. Bland critiqued Mao, and supported Albania after Mao's attacks of 'The Cultural Revolution'. Kumar's perspective aimed to assist overcoming disunity within Marxist- Leninist camps. To his regret this remains to date an

unfulfilled task. Works by Bland, and of Kumar, can be found on archives at Alliance ML¹; and his newer site at ‘Marxist-Leninist Currents Today’². In 2020 he was one of the founder members of the editorial collective of the ‘Berlin Left Blog’³, and remains in that role. He has followed the biological literature relevant to Lysenko for many years.

Zeyad el Nabolsy is a PhD student in Africana Studies at Cornell University. He works on African philosophy of culture, African Marxism, the history and philosophy of science in the context of modern African intellectual history, and history and sociology of philosophy in the context of global intellectual history. His work has appeared in *Science & Society*, *The Journal of African Cultural Studies*, *The Journal of Historical Sociology*, *Problemata: Revista Internacional de Filosofía*, *Kant Studies Online*, among others.

Ömer Er was born in İzmir in 1966. He was graduated from department of violin, İzmir State Conservatory in 1990. He also studied composition, fugue, counterpoint, orchestration and conducting with Ahmet Adnan Saygun and İlhan Baran during his education. Besides performing violin in many concerts, he also conducted various orchestras for the foremost music competitions in Turkey. He composed various classical music pieces, as well as pop-jazz, new age, jazz and rock music pieces. Recently, he performed with Chick Corea in his concert in İzmir in 2019. His Works: Piano sonata No; 1 (1984) Piano sonata No; 2 (1984) 4 Atonal pieces for piano (1985); “Water Droplets” for symphonic orchestra (1985); Chamber music for strings and winds (1985-1986); Chamber music for eight percussions and two horns (1987) ; Piano Concerto (1988); “Time in Time” 3 Parts for strings chamber music (1988); Quartet for clarinet-bass- drum and piano (1988) ; “Mephisto” 3 Parts for strings orchestra (1991); National Anthem of Northern Cyprus (1997).

Mert Morali (b.1992) is a Berlin-based composer and music worker originally from Izmir, Turkey. His oeuvre consists of music for diverse chamber groups in different sizes ranging from solo to sinfonietta, music for the stage, and electroacoustic music. His music mainly focuses on multi-layered complex processes, executed through the filters of purely musical thinking and social criticism. He studied composition primarily with Tolga Yayalar at Bilkent University and with Eun-Hwa Cho at from “Hanns Eisler” Berlin School of Music. Currently, he is pursuing his Master’s degree in Electroacoustic Music at “Hanns Eisler” Berlin School of Music under the supervision of Wolfgang Heiniger.

1. <http://ml-review.ca/aml/>

2. <http://ml-today.com>

3. <https://www.theleftberlin.com>

İlker İsabetli was born in İstanbul in 1982. He started working as a professional musician at his seventeen. He studied a number of musical instruments such as double bass, clarinet, ney, berimbau, jawarp, Turkish lute, tuba/euphonium, classical guitar and baglama. He studied jazz and modern music with Cem Nasuhoglu in Istanbul and studied Latin American and African music and performed with percussions and bass guitar in the Enrique Maestre orchestra in İzmir. He studied anthropology and musicology personally with Assoc. Prof. Peter Gauthier and Assoc. Prof. Ali Cenk Gedik. He earned music teacher degree from West London University in 2012. He also received teaching diplomas in the fields of music-therapy and psychotherapy from the Swedish Riccon Academy and Medical Faculty at Gazi Osman Paşa University. His main research interests are cognitive-behavioral music therapy, analytical music therapy and free improvisational music therapy.

Tiago Camarinha Lopes teaches Political Economy at Universidade Federal de Goiás, Brazil, and leads a research group on Solidarity Economy accompanying the creation and development of work cooperatives of local waste pickers inspired by the teachings of Paul Singer and Paulo Freire. He obtained a bachelor degree in Volkswirtschaftslehre at the Goethe University in Frankfurt a.M., Germany, where he co-organized with fellow students reading groups of *Das Kapital* in the late 2000s. His PhD thesis called *The Law of Value and the Economic Planning of Capitalist Nature* was written and defended at Universidade Federal de Uberlândia, Brazil, in 2015. He serves as a reviewer for more than twenty academic journals worldwide on Political Economy and related topics and was member of the directory board of the Brazilian Society of Political Economy between 2016 and 2018. He was head of the economics department of the Faculty of Administration, Accounting and Economics at the Universidad Federal de Goiás from 2017 to 2021 and is permanent professor of the Master Program in Political Science of the Faculty of Social Sciences at the same University. His publications on economic theory and class struggle include *Technical or political? The socialist economic calculation debate* (Cambridge Journal of Economics, 2021) and *Sraffa, Leontief, Lange: The political economy of input-output economics*, with Henrique Neder (EconomiA, 2017). His book *Law of Value and Theories of Value: Symmetrical Critique of Classical and Neoclassical Political Economy* is scheduled to be published in the beginning of 2022, by Brill.

Ali C. Gedik is an associate professor of musicology at Dokuz Eylül University (DEU), İzmir. He received B.Sc. degree in electronics engineering from Hacettepe University, Ankara, M.Sc. degree in musicology from DEU and Ph.D. degree in electronics engineering from Izmir Institute of Technology. He is one of the founders of *Journal of Interdisciplinary Music Studies* (JIMS) with Richard Parncutt published since 2007 and currently acts as sciences editor. He was the president of Society for Interdisciplinary Musicology (SIM), between 2016-2018. He has been the editor-in-chief of *yedi: Journal of Art, Design and Science* since 2019. Gedik has been the secretary of *International Association for the Study of Popular Music* (IASPM) Turkey

Branch-since 2009 and a current member-at-large of the IASPM Executive Committee since 2021. He is the editor of two books: *Marxist Inquiries on Science: Marxism and Two Cultures* (2015) in Turkish and *Made in Turkey: Studies in Popular Music* (Routledge Global Popular Music Series) (2017). He is the author of forthcoming chapter, titled 'Popular Music in Times of Neo-Liberalism and Beyond: Marxist Perspectives on Turkish Popular Music' (Oxford Handbook of Global Popular Music) and a forthcoming book, titled *Musical World of Karl Marx* (Jenny Stanford Publishing).

Mesut Yüce Yıldız, graduated from Department of Agricultural Engineering at Mustafa Kemal University and earned his MSc. degree in the Department of Agricultural Economics at Ege University. He is currently a PhD candidate in Department of Agricultural Economics at Ege University. He is the coordinator of symposium "Agroecology as Science, Practice and in Movement" organized in Turkey. He has a book under the titled of *Agroekoloji: Başka Bir Tarım Mümkün* (*Agroecology: Another Agriculture is Possible*). He is one of the coordinators of several agriculture communities to establish direct relationships between consumer-dominated food organizations living in cities and local producers in rural areas. He is interested in community supported agriculture; production, consumption and trade of landrace; agroecology and food sovereignty; ecological crisis within the framework of Marxist theories.

GUIDELINES FOR AUTHORS

The purpose of these guidelines is to ensure a clear, standard format for submissions. Please follow all guidelines as closely as possible.

Marxism & Sciences is an open access journal. Publication of articles/essays and access to accepted and published material is free. The journal does not charge any article/essay submission, processing or publication fees. We have no budget for proof-readers or typesetters. These tasks are therefore the responsibility of the authors.

The basic descriptions and principles about the content of submissions are formally presented here. However, the priority of the journal is to achieve its aims collectively in collaboration with editors, editorial and advisory boards, authors and readers.

Marxism & Sciences accepts submissions only on the condition of contributing to Marxist conception of totality, materialist conception of history and/or materialist dialectics. Submissions satisfying this condition could be on any topic from any branch of sciences. The journal especially promotes submissions which are written collaboratively by more than one author from different and/or remote disciplines, or cover more than one discipline if written by a single author.

Marxism & Sciences welcomes any contribution that falls within the domain of its aims and scope. However, the journal especially encourages submissions with following four qualifications:

- *Class struggles*: Studies covering class struggles in nature, culture, and/or society.
- *Geographical prevalence*: Studies from Africa, Asia, Latin America, Central, Eastern and Southeastern Europe as well as Western Europe and North America.
- *Gender equality*: Studies by non-male authors and/or from Marxist and socialist feminist perspective.
- *Marxist ecology*: Studies which considers human as part of nature, not superior to it.

Each issue of the journal is published based on a specific topic announced publicly at the web page through the Call for Papers (CFP). Submissions on other topics are also welcome.

Marxism & Sciences welcomes a wide spectrum of academic writing styles from articles at one end to essays at the other. *Marxism & Sciences* also welcomes cultural works in fields of arts or traditional and popular culture particularly those related to the specific topic of each issue.

Below are the types of submissions accepted by *Marxism & Sciences*:

- **Articles** (5000-10000 words): Articles are original scholarly manuscripts that contribute to any field of research.
- **Essays** (5000-1000 words): Essays are original contributions with more personal, intuitive and introspective style and do not necessarily have to build on a comprehensive literature review and/or extensive research, unlike scholarly articles. Essays are expected to include critical reflections or political interventions into the past or actual natural/cultural/social issues and/or old or ongoing scholarly and intellectual discussions.
- **Review articles** (6000-12000 words): Critical review of the state-of-art of any topic or any discipline(s).
- **Cultural works** (max. 1200 words of texts or max. 1 GB of audio/visual material): Poem, play, story, music, short film, documentary, video, photographs, graphics design, painting, sculpture etc.
- **Communication** (1500-3000 words): Responses to previously published articles/essays or cultural works in the journal, or actual disciplinary discussions on Marxism.
- **Translations** (6000-12000 words): Works either with an historical or actual significance written and published in languages other than English.
- **Interviews** (1500-3000 words): Interviews with leading Marxist scholars in any discipline.
- **Book, film, music recording, exhibition and performance arts reviews** (1000-2000 words)
- **Conference and symposium reviews** (1000-2000 words)
- **Letters to editors** (500-1000 words): Short communication on any topic that attracts the attention of the readers.

Open Peer Commentary (OPC): *Marxism & Sciences* may choose an accepted manuscript for an OPC process. The process begins once the approval of the author(s) is acquired.

Academic quality: Please consider originality, theoretical and practical significance, and methodological rigor, referring to the usual standards within your specific discipline or subdiscipline.

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**THE FOUNDATIONS OF MARXISM:
PHILOSOPHY, METHOD, AND REVOLUTIONARY VISION**

As stated by many critical scholars and commentators, the Covid 19 pandemic, which still continues to haunt the world, has made capitalism's political and economic crisis more apparent than ever. An abrupt suspension of the "normal" functioning of the global market mechanisms and the inability of the states and capitalists to develop coherent responses to the situation have unraveled once more the fragility of financial capitalism. The now-conspicuous and immediate repercussions of ecological crisis, which manifest themselves with soaring temperatures, unprecedentedly enormous wildfires, floods and droughts are observed worldwide. This situation has also demonstrated how capitalism lacks any effective instruments to at least mitigate the imminent catastrophes stemming from its inherent propensity to commodify all of life to the detriment of life itself. Under these circumstances, contemporary capitalism is characterized no longer by economic growth, further globalization, or an ideological triumph over socialism but by rampant ontological insecurity, a gloomy sense of apocalypse, and bleak future scenarios. In search for the foundational reasons for this "total crisis", even the mainstream intellectuals tend to problematize the intrinsically destructive forces of capitalist production and the devastating consequences it has had on human to human, and, in general, human to nature relations. As the "totality" of life itself, not only the human life but also the life of the earth in general, is at stake today, there emerged, even among the mainstream thinkers, a tendency to discuss the viability of some total solutions for a potential total catastrophe. The urge of the World Economic Forum, the leading capitalist platform of the world, for a total revision, epitomized by the phrase "Great Reset" is a quintessential and telling example of this tendency. Any Marxist would concede that any quest for developing "total" solutions to the total crisis of capitalism from within capitalism itself is not only unavailing but also manipulative, as it is impossible to design any solution for such a massive and all-encompassing crisis by remaining within both the material and ideational confines of capitalism. The totality of the contemporary crisis of capitalism rather invites us to rethink the fundamental premises of Marxism in its totality, as the method of understanding and transcending capitalism and reflecting on the historical, present, and possible future forms of human-human and human-nature relations.

In an age characterized by the urgent need for a "new beginning", the quest for revisiting, rethinking, and clarifying Marxism's foundational premises in different fields of science is crucial. In this vein, in the second issue of Marxism and Sciences, we intend to include scholarly articles or essays and cultural works that discuss and consider the fundamental premises of Marxism as a scientific method, as an epistemology, as a philosophy and as a revolutionary vision and strategy, and assess the extent of actuality and viability of these premises in the wake of "total" crisis of humanity. A number of fundamental questions that could be pursued in the submissions, including, but not limited to:

- What are the common foundations of knowledge-production in different disciplines and how do sciences contribute to/challenge the prolongation of capitalism?
- What is a Marxist approach to and a critique of the processes of knowing nature, culture, human and society?
- What are the fundamental premises of the Marxist conception of nature, culture, human and society and to what extent are they actual and pertinent for understanding the crisis today in its totality?
- What are the foundations for a Marxist conception of totality? What could be its promises to challenge the recent anti-Marxist theoretical trends such as Material Turn, post-humanism and new materialism?
- What are the fundamentals of Marxist class analysis? How could Marxist class analysis be helpful to understand the contemporary crisis in its totality?
- What are the fundamental propositions and thesis of Marxism in regards to the origins of the state, the characteristics of capitalist state? How are they helpful to understand the contemporary crisis in its totality?
- What are the foundations of a Marxist approach to and critique of contemporary social movements and how can it contribute to their emancipatory potentials?

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