

Science has Become Less Innovative

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Science is our best shot at understanding the world, however, it is not infallible, particularly so under capitalism. The less "hard" a science, the more difficult it is to control the variables you aren't testing, and the more room there is for error or for idealism to be inserted; the scientific method is not foolproof. Scientists, like science itself, do not exist in a vacuum – they are influenced by the society in which they exist just like everything else.

"To expect science to be impartial in a wage-slave society is as foolishly naïve as to expect impartiality from manufacturers on the question of whether workers' wages ought not to be increased by decreasing the profits of capital."

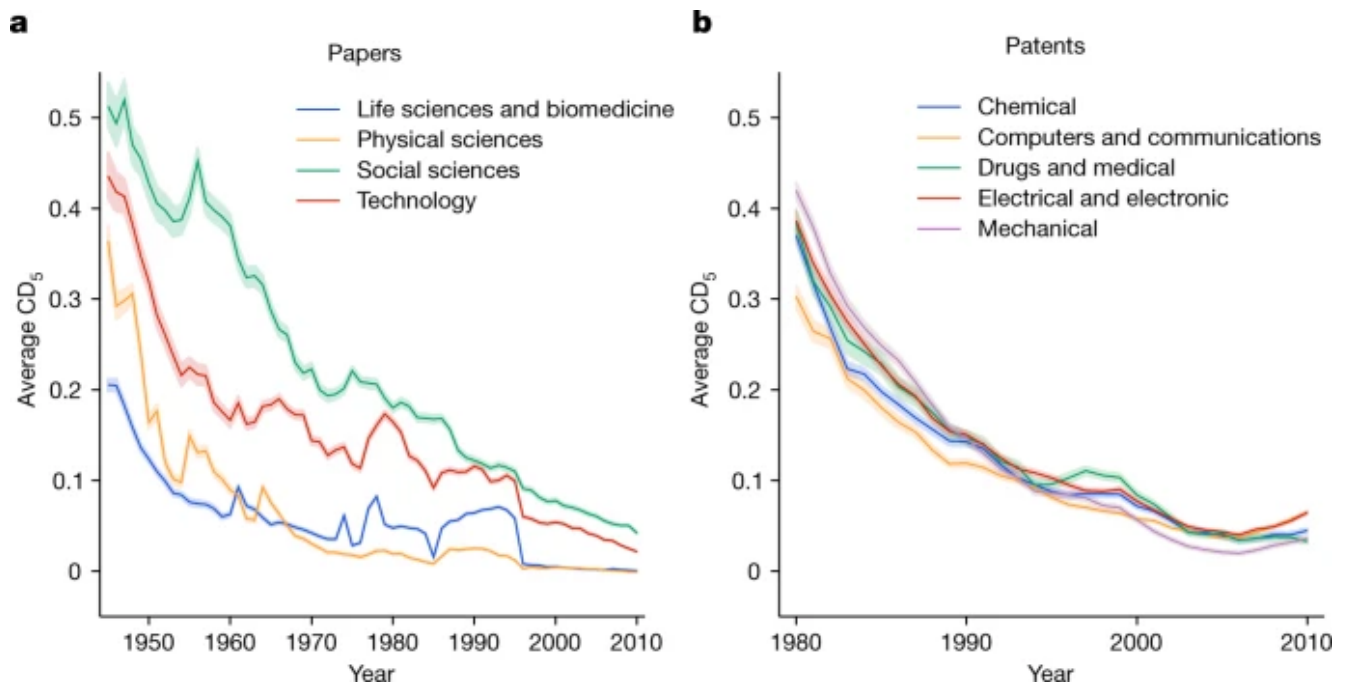
– Vladimir Lenin, "The Three Sources and Three Component Parts of Marxism"

While scientists and engineers sell their labour in exchange for means of subsistence (just like every other worker), this labour is generally not alienated and is creative, although even much of the intelligentsia is becoming more and more proletarianized. The fruits of said labour - the science/research - are expropriated by the bourgeoisie. As such, the science/research produced under capitalism is in the interests of the bourgeoisie. While this is less of an issue when it comes to things like for example simulating fluid dynamics as the bourgeoisie and proletariat have no direct antagonistic class conflict about whether or not a fluid simulation is accurate and optimised, it does become an issue most obviously in fields like economics, where the solutions thought up by our "brightest minds" regarding problems like poverty, inflation, capitalist crisis, unemployment are often more privatisations, subsidies for monopolies, deregulations and effective wage cuts; solutions that completely favour the capitalists. As Engels said in "Outlines of a Critique of Political Economy":

"[Capitalist] Political economy came into being as a natural result of the expansion of trade, and with its appearance elementary, unscientific huckstering was replaced by a developed system of licensed fraud, an entire science of enrichment."

In fact, science as an institution was only made possible by the advance of society, and the division of labour within it. Labour productivity needed to grow to the point where it was possible to have a group of people freed from manual labour and from the work of fulfilling the most basic needs of society to focusing entirely on mental labour. And in these early slaveholding societies, like Ancient Greece, it is no surprise that many of their most prominent intellectuals (notably Aristotle) were apologists for the slavery on whose labour their existence depended.

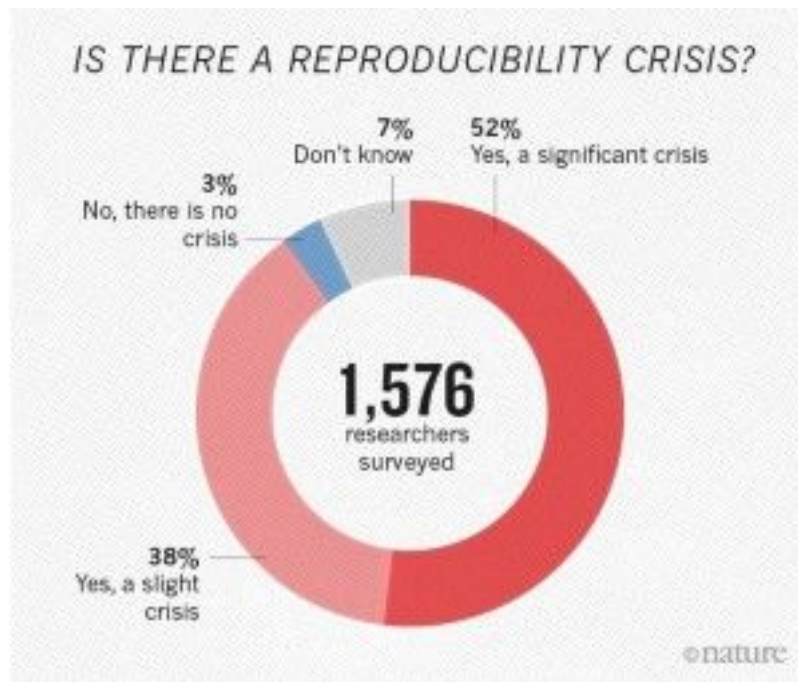
Under capitalism, this trend continues. A recent paper was published, entitled "Papers and patents are becoming less disruptive over time", which outlines the retardation of innovation over the last 60 years, using data on 45 million papers and 3.9 million patents. Its primary method is calculating the "CD index" of each paper, which ranges from -1 indicating that the paper or patent is consolidating, to 1 indicating that the paper or patent is disruptive and contains qualitatively new knowledge. The "CD index" is determined by how many citations of each new paper also cite the paper's predecessors versus how many citations don't cite the paper's predecessors, as a citation of the new paper as well as its predecessors implies that the new paper is merely consolidating on what we already know.



In addition, the paper demonstrates how the use of novel terminology within papers and patents has similarly declined – additional evidence towards the same trend; an ever yet narrower scope of existing knowledge is informing contemporary discovery and innovation.

The paper explores several pro-capitalist explanations for this phenomenon, such as claims that the easiest productivity-enhancing innovations have already been made, or the ever-increasing amount of training required to reach the cutting edge of a field however these “axioms” have been ongoing since the dawn of science, and in fact, the discoveries and research of previous generations are what should help to enable the growth of future discoveries and research and have done so for millennia.

In addition, there is the replication crisis within science which received widespread attention after the paper “Over half of psychology studies fail reproducibility test” was published, where the researchers were only able to produce 39 successful replications for 98 experiments. This paper is exclusively concerned with the field of psychology, however, the paper “1,500 scientists lift the lid on reproducibility” demonstrates that the vast majority of scientists from virtually all fields agree that there is a general crisis of reproducibility.



Results of the survey on the replication crisis

Within science, there are several trends that have led to this decline in quality. Just like the broader working class in its entirety, academic workers can also be split into strata. The upper strata, the so-called “labour aristocracy” also exists within academia, whereupon those who enjoy the best-paid and most prestigious positions are obligated to publish a large volume of papers in order to maintain their position – a process known within the industry as “publish or perish”. This hinders the development of a proper research agenda and incentivises the prioritisation of quantity over quality as a failure to publish the expected volume would lead to a loss of their position and consequently a loss of ability to acquire necessary resources as well as a drop in their standard of living.

In addition, academic publishers, which are either directly privately owned or dependent on capitalists for funding, are subject to the profit motive. This incentivises them to publish what they believe will bring them the most sensation, views, and resultant revenue, leading to a publication bias favourable to the wishes of the publisher. Often this is more malicious than mere sensationalism, and the deliberate manipulation or misuse of data in order to doctor the research to reach a favourable conclusion. A common tactic is “P-Hacking” where an extremely broad number of variables are collected from a sample. Due to the sheer number of variables, some will inevitably correlate leading to the “P-Hacker” retroactively drawing a hypothesis from these correlations. Another tactic of data dredging is using an extremely large sample size and then selectively reducing it to only the data points that support one’s desired conclusion. The process of peer review is supposed to expose this data manipulation, however, it often doesn’t as it would be inconvenient to the publisher who wants their preferred conclusion published.

The trend of the increased socialisation of labour applies equally to mental work. Modern science is a collaborative effort predicated on the discoveries and research of many previous generations (what Newton referred to as “standing on the shoulders of giants”) however it is privately appropriated by the capitalists under the guise of “intellectual property rights” restricting society’s free access and use of it. This private ownership as well as the previously mentioned problems lead to the hindrance of science under capitalism and with it a slowdown in the growth of productive forces as well as technological stagnation in production – an inability to move on to higher and more sustainable techniques.

Today, the political economy of research, dependent on private and capitalist-state investment and grants pulls everything into a spiral of consistent decline; lowered standards and horizons to match the lowering real capabilities of university departments due to decreasing budgets and shrinking employment of staff. Elsewhere, research flourishes in the thrall of military industry funding - the innovative results of which remain partitioned from society by security restrictions like the Invention Secrecy Act, and monopolized for the shared advancement of the technology corporations and state-military bureaucrats in competition and war.

This is in contrast with science under socialism and the example of the Soviet Union which most famously transformed itself from a country predominantly composed of illiterate peasants to the first to split the atom to generate energy for use by the general public and breach the heavens to conquer space in a mere 30 years. This was despite the fact that it was limited by the fact that it was embargoed by the capitalist world, which enjoyed a far greater share of the world's resources and scientific personnel. As Nikola Tesla said in his memoirs:

"In the meantime, with the appearance of the USSR, everything has changed radically, it is now significantly different from the rest of the world. The newspapers pour shit on them, but those who come from there say incredible things. I was most intrigued by the Soviet system of science. Their scientists are provided with a salary and necessary working conditions. They are freed from daily duties, concentrating exclusively on science. They don't have to think about who will finance them. When behind you is the state, a socialist state, and not a rich man who can change his mind at any moment - that is reliable."

Other than not being afflicted by the aforementioned problems endemic to capitalism, which in itself would greatly boost scientific innovation, the Soviet Union was able to direct comparatively more resources as an equivalent capitalist country towards science as it did not need to maintain a class of exploiters, and their parasitic lives of decadence. In addition, the Communist Party of the Soviet Union, especially up until 1956 (i.e., the period where Soviet scientific progress was at its greatest), encouraged scientists to criticise false and unproductive ideas as well as otherwise giving them guidance under and in accordance with the official Soviet and Marxist-Leninist philosophy of science, Dialectical Materialism. This is a big surprise to most bourgeois researchers of the period who struggle to reconcile the impressive advances in science with what they regard as a rigid ideological control of science. Taken from "Normalizing Soviet Cybernetics" from the academic journal Information & Culture:

"Although Soviet science enjoyed reform and looser ideological constraints under Khrushchev, it is worth noting that, strictly speaking, Soviet science may have accomplished more under Stalin...Under Stalin, Soviet physicists and chemists pioneered work for which chemist Nikolai Semyonov, physicist Igor Tamm, economist Leonid Kantorovich, and physicist Pyotr Kapitsa received Nobel Prizes decades later. Other Soviet scientists - including Igor Kurchatov, Lev Landau, Yakov Frenkel... and other world-renowned figures - also developed atomic and thermonuclear bombs, a lynchpin in Stalin's rapid and forceful industrialization of the remnants of the Russian Empire from a backwater country into a global superpower in only a few decades...Many Soviet scientists successfully employed dialectical materialism as a genuine source of inspiration, not a forced ideology, in their scientific work"

Capitalism has long since ceased to be a progressive force in technological growth, becoming instead a rotting leviathan carried on by the weight of its own immensity. Its revolutionary content is dead and gone, replaced by financial speculation, imperialist war, monopolies, and climate destabilisation to create an entrenched world system which can only seek to replicate itself - not innovate threats to its own

socio-technical stability. Therefore socialism is the only forward path for science and humanity. Communism is our destiny, the end of our prehistory, bereft of barbarism and class exploitation, replaced by a Brotherhood of Humankind all working in unison as we expand through worlds and ages.

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