

Ihde's Instrumental Realism and the Marxist Account of Technology in Experimental Science

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Abstract

Edgar Zilsel offers a Marxist account of the rise of experimental science avoiding both crude determinism and the anti-scientific bias of much "Western Marxism." This account supplements Don Ihde's instrumental realism with a social account of the systematic extension of perception by instrumentation. The social contact of non-literate craftspeople with purely intellectual scholars forged the social basis of what became technoscience.

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Don Ihde has engaged profoundly with Husserl's phenomenology and philosophy of science as well as Heidegger's hermeneutics and philosophy of technology. His work, as Mitcham's article in the Ihde tribute emphasizes (Mitcham), parallels and acknowledges Dewey's pragmatism and brings phenomenology closer to pragmatism. In recent decades Ihde has dialogued with postmodernists and incorporated science and technology studies into his work. However, despite acknowledging the positive aspects of Marxism like phenomenology being a praxis-oriented philosophy, neither Ihde nor the contributions to *Postphenomenology* directly or extensively engaged with mainstream Marxism (although there are some references to aspects of Frankfurt School Critical Theory)."

In this comment on Ihde's work I will focus on the social origins of the integration of imagery, instrumentation, and theory in early modern science. I should like to examine the relation of the social roots of the intimate interaction of picturing or visualization through instrumentation in modern science and technology. These are areas where Marxism has something to contribute to the background of Ihde's instrumental realism.

Ihde has granted that his visualization approach can and needs to be supplemented by a social analysis of science, at least with respect to contemporary "big science." Ihde is sympathetic to feminism along with sociologies of science as part of "clearing the field" with recognition of the wider context of science (Ihde 1998, 145-6, 198). However, he has been much less sympathetic and receptive to Marxist approaches to science.

Possible Reasons for Ihde's Lack of Use of Marxism

Perhaps Ihde's relative lack of engagement with Marxism is in part because the most notable continental Marxists such as the critical theorists Adorno, Horkheimer, and Marcuse (especially the first two) have been extreme technological pessimists or dystopians (Ihde 2006, 178). Marx himself and most "orthodox" Marxists, in contrast, often subscribed to an extreme technological utopianism. (Lenin's emphasis on Fordism and Taylorism as the salvation of socialism is an example.) Many of the other continental *philosophical* Marxists (Ernst Bloch, Georg Lukacs, et al) have focused on aesthetics and literature, not on technology, leaving the latter topic to the Marxist economists.

Selinger notes Ihde's rejection of Marxist technological determinism, which would cause rejection of much "orthodox" Marxism (Selinger 2006, 91).

Marx's influential (because brief and relatively comprehensible) epitome of historical materialism in the "Preface" to *A Critique of Political Economy* has inspired generations of "orthodox" Marxists to be technological determinists (Marx 1859, 20-22). Similarly in the prefaces and postfaces to *Capital* Marx writes of "iron necessity" and gives a highly deterministic portrayal of his views. (Marx's critics commonly cite these passages.) In contrast to the rigid determinism in these brief summaries of his views, Marx's much more extensive analysis of factory technology in *Capital* (Marx 1867) emphasizes the role of control over workers in the shaping of technology (as in the social as opposed to the technological division of labor). Maoism as well as much continental Marxism has emphasized the primacy of relations of production (social control relations) over technology.

In this comment I should like to emphasize the Marxist contribution to the social setting of the origin of what Bachelard and Latour later called "technoscience."

Anti-Technological and Idealist History of Science as a Reaction to Marxism

Ihde writes:

Edwin Layton noted that historians, "while correctly repudiating the Marxist thesis that the Scientific Revolution was no more than the systematization of the knowledge of the craftsman, overreacted when they came to the converse conclusion, namely that science was prior to and generative of technology." (Ihde 1991, 9)

In fact the Platonic overreaction that Ihde rightly criticizes was (at least in the English speaking world) very much a strong political rejection of Marxism. Mainstream British historians of science were bewildered, shocked and scandalized by the surprise arrival by airplane of a Soviet delegation of Russian scientific celebrities led by Nikolai Bukharin at the 1931 International Congress on the History of Science in London (Bukharin 1931). The British historians of science were further antagonized by several brilliant, radicalized British scientists (who mainly focused on biology), most notably Joseph Needham, J. B. S. Haldane, and J. D. Bernal. These scientists were inspired by the Bukharin delegation's presentation to write their own Marxist accounts of science (Werskey 1979; Dusek 1990). To oppose Marxism in general and reject the idea that Marxism had any intellectual contributions to their field, historians such as Rupert Hall had to totally deny the technological roots of early modern science. Michael Polanyi reminisced that he also was goaded to his own philosophy of science by reaction to Bukharin's claims (Polanyi 1966; Moleski 2005, 154-5).

The Zilsel Thesis

The position of Marxism on science is more complex and diverse than that in Layton's sketch. Science is not literally reduced to a mere summary of knowledge of the crafts. One theorist of science, Edgar Zilsel has much to contribute to laying the historical and social background to the instrumental realist thrust of modern science. Zilsel's affiliations were with the logical positivists, despite the anti-positivist implications of his sociological and historical theses. (Zilsel's Vienna

Circle connections may account in part for his initial neglect by continental European Marxists). Joseph Needham took up Zilsel's theses on the rise of modern science. Ihde makes use of the work of Joseph Needham on inter-cultural influences on western technology (Ihde 1990, 127-8; 1993, 65), but not of the part of Needham's theorizing influenced by Zilsel on the reasons for lack of experimental and science in traditional China.

The Zilsel Thesis accounts for the rise of modern, Western science in social terms. He accounts for it by the fusion of the work of craftspeople (often initially illiterate) with that of text-oriented intellectuals (often initially ignorant of craft skills and techniques) (Zilsel 1941-1942, Zilsel 2000). Zilsel places this social fusion in the early seventeenth century, the century of the origins of full-fledged modern science. The fusion can be legitimately placed even earlier, in the Renaissance, with the interaction of craftspeople and scholar in the persons of the artist-scientist "Renaissance Men" such as Alberti and Leonardo. (Paolo Rossi emphasizes this earlier dating of the fusion -- with no reference to Zilsel on this topic!) (Rossi 1970). This earlier temporal dating of the social fusion fits with the economic thesis that the social disruption and economic downturns of the Renaissance forced scholars from the university ("wandering scholars") and threw them together with the more lowly artisans.

A less sociological version of the Zilsel Thesis is that the early modern experimental scientists (such as William Gilbert on the magnet) absorbed and incorporated knowledge from the crafts (including the then relatively novel writings by practitioners of the crafts.) A recent, popular development of the Zilsel Thesis and related Marxist social accounts of the origins of early modern science in the crafts is *A People's History of Science* by Clifford Conner (Conner 2005).

Needham's Account of Chinese Science and the Zilsel Thesis

Joseph Needham used Zilsel's thesis to attempt an explanation of the lack of an experimental or technology based science in traditional China in terms of the lack of prestige of craftspeople and the lack of integration of crafts knowledge with scholarly literary culture (with the possible exception of alchemy) (Needham 1969, 134-5, 141-3, 193n1). This lack is all the more surprising given the numerous ancient and medieval Chinese technological achievements far ahead of those of the medieval and Renaissance West as well as numerous observational and natural history records in astronomy and the earth and biomedical sciences not developed or recorded in Europe until much later. These included not only the compass, gunpowder, and printing (that Francis Bacon claimed to show that European moderns had advanced over the ancients), but the rudder, deep wells, iron bridges, sunspots, novae botanical mineral prospecting, seismographs, hormone therapy, and much more as documented in Needham's monumental work (Needham 1961).

Needham's rather romantic identification of Daoism with the Chinese scientific spirit is questionable, given Lao Tzu and Chuang Tzu's opposition to technological innovations. In fact the exception that proves the rule, so to speak, for Needham's thesis is the ancient Mohist School of Chinese philosophers. Their work focuses on optics and mechanics and has many features more resembling Western science than any other Chinese school. (Their ethics: a strange mixture of extreme utilitarianism and Christian-like universal love also has odd resemblances to Western philosophy. Mohists also developed logic, something that no other indigenous Chinese sect did. Their philosophy was only studied again after Buddhism spread in China.) The Mohists were craftspeople, military engineers, and Mo Tzu himself may have been a former slave and is very likely to have worked as a wheelwright. When the empire was consolidated around 200 BCE the independent role of the Mohist sects as military engineering consultants and defensive

mercenaries to various small warring states was eliminated and Mohism disappeared, along with Chinese understanding of Mohist logic and science.

The Instrumentalist-Realist Opposition and the Zilsel Thesis

Zilsel's thesis not only gives a social account of the technological embedding of modern science but also gives a social account of the competing philosophies of science that are synthesized in instrumental realism. Instrumentalism, the treatment of scientific theories as tools for calculation and manipulation was dominant in positivist and earlier idealist empiricist philosophies of science. Realism, in the form of representational realism has been dominant in the self-understanding of many working scientists and replaced the positivist-instrumentalist account around 1960. Karl Popper, a conjectural realist, objects to instrumentalism because instrumentalism makes science indistinguishable from technology. (Of course Popper's purely refutational account of science has great difficulties with technology.) Instrumentalism treats scientific theory as a tool, while traditional realism treats it as a picture. Rossi's social account of Renaissance science describes it as literally a fusion of tool with picture in the work of the Renaissance scientist-artists.

Marxism thus not only contributed to philosophy of technology in its emphasis (or over-emphasis) on the social and political role of technology but also through Zilsel's development of Marxist themes for a social account of the origins of early modern technoscience. Zilsel's version of Marxism can strengthen Ihde's position by filling out an intrinsic social and historical dimension to the account of instrumental realism.

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