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How does science actually develop and make progress, according to Kant?



A new study by two researchers from the UAB and Freie Universität Berlin revisits Immanuel Kant's scientific thinking and examines the conditions that foster or hinder scientific progress. His ideas highlight the role of imagination, instruments, and social freedom, and continue to offer useful insights for understanding scientific research today.

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Immanuel Kant (1724-1804), beyond being one of the most influential philosophers of all time, was also actively interested in the sciences. He viewed them as essential to human social and moral progress. Kant reflected on medicine, human history, and the life sciences, and was even more immersed in cosmology, geology, physics, anthropology, and geography. Here, he contributed innovative ideas, such as the nebular hypothesis concerning the formation of the universe, a correct explanation of the Earth's axial rotation, and a field theory of matter. But did Kant also think about the actual progress of science? Under which conditions can the sciences advance or regress?

This novel study discusses these much-ignored questions. Kant developed wide-ranging psychological, sociological, and historical reflections on research practices and the organization of science. Taken together, they make up his rich and vivid 'pragmatic' account of science, which reveals empirical conditions that "promote" or "hinder" the advancement of science. The first part of our article outlines this account. The second part studies the

"psychological conditions" that play a role in research activities, or the layers of scientific investigation. Kant notes that we make many observations, but we also need to enhance our senses through instruments such as telescopes, scales, air-pumps, or microscopes. We also need "creative imagination" for scientific theorizing and modelling in order to systematize and explain the phenomena we have observed. Simultaneously, Kant warns again the dangers of uncontrolled imagination for research, i.e. its potential to make up flawed theories or models. Standards of reason in science must be applied.

Furthermore, he analyses how a scientist, or even novice, can best start new research: through a "methodical meditation", or the systematic brainstorming of ideas. In addition, a good scientist possesses "sagacity": an innate talent for discovery, for "smelling" which avenues for future research are most promising. Part 3 addresses biological, political, and historical conditions that hinder the progress of science: mortality, lack of liberty, and war.

Already in Kant's time, scientific knowledge is expanding so rapidly that no individual can learn everything in a lifetime. As a result, "science needs collaboration across generations", and "divisions of labour" between people of different disciplines and expertises. Scientific progress also requires a free society so that it can then —through new technologies, education, and enlightenment— become a motor of human progress. Kant's insights transcend his own time: we can learn from them even today when we discuss science and its roles for society.

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