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The Social Process of Science

“Being well-informed about science is not the same thing as understanding science.” Therewith, James Bryant Conant discounted the popular interest in science roused by the thunderclap that ended World War II. Now as then, in a world transformed by the application of scientific knowledge, people put that knowledge in the same category with what they know by revelation or other received authority. What needs to be understood is how, scientifically, we come to know what we know.

Scientists know nothing for certain. The advancement of science is a social process, a public process, and yet an intensely private one. Societies that would enjoy its material benefits must understand science in both its aspects.

“The truth of an idea,” William James perceived at the turn of this century, “is not a stagnant property inherent in it. Truth happens to an idea . . . [by] the process of . . . its verification.” In the private process, the scientist must face the singular loneliness of the sovereign. He can accept no authority but his own conscience and judgment.

The work proceeds in ways very different from that suggested by its impersonality in formal publication. “The process I want to call scientific,” the physicist Percy Bridgman wrote, “is a process that involves the continual apprehension of meaning . . . accompanied by the running act of checking to be sure that I am doing what I want to do, and of judging correctness or incorrectness. This checking and judging and accepting . . . are done by me and can be done for me by no one else. They are as private as my toothache, and without them science is dead.”

The intensity of this private process—its toothache—is raised by the fact that it is integrally public. It is intended for publication. Without publication, science is dead.

Upon publication, verification of the work proceeds. As the sociologist Robert Merton has observed, “Only after the originality and consequence of the work have been attested by significant others can the scientist feel reasonably comfortable about it.” Merton’s term for this public process is “‘Communism’ The substantive findings of science are the product of social collaboration and are assigned to the community The scientist’s claim to ‘his’ intellectual ‘property’ is limited to that recognition and esteem which, if the institution functions with a modicum of efficiency, are roughly commensurate with the significance of the increment brought to the common fund of knowledge.”

The remarkable fact, established by the open public record of science, is that this social process functions with high efficiency. It is not that scientists are more dedicated, honest, and selfless than other citizens; they are disciplined to behave that way by their collaboration. Error and fraud are exposed sooner rather than later by the communal process of verification. With equal reliability the consensus of the community distinguishes the significant from the trivial. This is the more remarkable considering what Merton calls “the basic uncertainty of genuinely independent originality in science.”

Thus Niels Bohr was once prompted to observe of a radical and baffling proposal by the aging Werner Heisenberg: “Yes, it is crazy, but it is not crazy enough!”

It has been said that science will flourish only in a society that cherishes its norms. The reason, openness, tolerance, and respect for the autonomy of the individual that distinguish the social process of science, however, are norms desirable in every human community. They describe a world in which, we can agree, all of us want to live.

Happily, the social process of science brings along the means to realize its values. For it finds convincing verification in the technologies it begets. During the past four centuries science has been liberating increasing numbers, now nearly one-third, of mankind from toil and want and even from submission to received authority. No national constitution written in this century has failed to hold out the promise, at least, of political and economic democracy. The people of the world—if nations can keep the peace—may see this revolution in the condition of man fulfill its promise in the next century.—GERARD PIEL,* Chairman, *Scientific American*, 415 Madison Avenue, New York 10017, and President, AAAS.

*This editorial is excerpted from a public lecture given at Moscow State (Lomonosov) University, Moscow, U.S.S.R., on 25 November 1985, on the occasion of the conferral by the university of the degree Doctor Honoris Causa.