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Emergency science: epistemological insights on the response to COVID-19 pandemics

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Abstract

The response to the current COVID-19 pandemics require reflections on the validity of scientific knowledge. While non-pharmacological measures for disease control are providing a worldwide natural experiment, it is highly advised to submit research findings to the scrutiny of renowned epistemologic theories. One should also consider the loosening of methodological criticism in time when diffusion of results is urgently required. Though criticism is perhaps most precious principle of scientific thinking and practice, scientists must find a way into relative consensus that can be translated into public health policies.

Text

In the year 2,000, South Africa President Thado Mbeki was the spokesman of an organized movement of AIDS denialism, which still echoes in many countries, such as Russia.¹ When facing pandemics, scientific denialism may adopt several faces and disguises. The “common cold” argument against potential severity of COVID-19 spreads through social media. The balance of social/economic versus sanitary achievements of lockdown may be contaminated by global ideological discussions and/or local political interests.² Public health challenges become more intense when decisions depend on mathematical modeling and scarce, suboptimal empirical evidence. Therefore, the epistemological basis of modern public health must be discussed. In the following paragraphs, we submit the scientific basis of the response to the pandemic to critical scrutiny based on ideas from renowned philosophers of science. Additionally, we will discuss the policy of disseminating knowledge in times of global emergency.

“Unlike (...) doctors, the scientist need not choose problems because they urgently need solution”, stated Thomas Kuhn (1922-1996) in his masterpiece *The Structure of Scientific Revolutions*.³ Kuhn was too young to have experienced 1918 influenza pandemics, but he did live the first decade of AIDS emergence. His statement that sciences develop inside or around a historically-determined paradigm was highly praised by sociologists, anthropologists and influenced (non-orthodoxically, we must clarify) eminent epidemiologists.⁴ Different paradigms are incommensurable, an adjective by which Kuhn means that when scientist sees the world from different perspectives their contradictions just cannot be solved by discussion or experiment. Well, we must ask if the germ theory is one of those Kuhnian paradigms. If we put on Kuhn’s glasses, then all the science raised in the pandemic response has a historical, but not epistemological, justification.

Karl Popper (1902-1994) dedicated all his life to explore what he called “the two fundamental problems in the theory of knowledge”, which are: (i) the problem of induction, as described by David Hume (1711-1776), which states that no matter how many observations (which we can translate to scientific evidence) of “A” followed by “B”, a causal association would always be a psychological rather than a logical conclusion; (ii) the problem of demarcation, that is, the need for a clear rule or boundary between what is scientific and what is not.⁵ Agreeing with Hume, Popper refused induction (the cornerstone of “evidence-based medicine”) and proposed that scientists should be creative in imagining theories, then rigorous in testing them both rationally and empirically. Any theory will survive as the fittest while it resists empirically-based refutations. Coherently, science is defined for its possibility of empiric falsification. How does this apply to scientist fighting COVID-

19? From a Popperian perspective, public response would be strengthened by a network of mutually critical researchers. While theoretical discussion and criticism cannot be paralyzing or go on too slow while we count the dead people, the scientific community may be prepared to endorse changes in public policies whenever a theory is refuted and studies point to novel, more adequate strategies.

Of greater concern is Paul Feyerabend's (1924-1994) "anything goes" statement in his famous book "Against Method"⁶, or his criticism on modern medicine achievements in his latter works.⁷ In a similar direction, New York University Philosopher Peter Unger's (born 1942) skeptical argument that "nothing can ever be really known" is in the best hypothesis useless, in the worst scenario highly dangerous if spread all over public opinion.⁸

Finally, an interesting way out of the epistemological puzzle is provided by Imre Lakatos's (1922-1974) insights on "Programs of Scientific Investigation".⁹ Lakatos attempted to reconcile Popper's and Kuhn's ideas, and had a productive dialogue with Feyerabend. Briefly, Lakatos imagined networks of mutual criticism (like Popper) in permanent rivalry. Occasionally, one of those programs gains advantage (becomes "progressive") over others (which become "regressive"). He admits (like Kuhn) some historicity in the balance between them. Still he fiercely stands for a demarcation criterion for science. We must therefore assume that virological-epidemiological programs are progressive, and should not only be heard by government officials, but must be given more expression in scientific journals.

This brings us to the final discussion. Peer-review has provided the basis for continuous Popperian-Lakatosian criticism, and at least in theory it provides a

scientific quality badge to information. Both peer review and editing processes take time, which we do not have in the current pandemics. Hundred of studies are either published in pre-print repositories or submitted to fast-track peer-review.¹⁰ This obviously means loosening of the critical parameters, a choice of speed over rigor. That is totally in accordance with Lakato's predicted privileges for progressive programs. However, this requires a permanent critical attitude from the readers, and a constant state of alert in the scientific community.

In conclusion, the response to COVID-19 does not require consensus. Criticism is perhaps the most precious principle of scientific thinking and practice. By submitting the role of science in responding to COVID-19 to the scrutiny of leading critics of mainstream science, we not only vaccinate our community against nihilistic arguments, but also reinforce the human value of research activity. Research and scientific criticism must be exercised aiming to collaborate with public policies and avoiding messages of uncertainty and insecurity to the already sufficiently frightened population. Furthermore, even if we argue that there is no such thing as value-neutral science,¹¹ we need to move our research away from political and corporate interests. Thus, in an era of extremism, science can rise as the pillar of democracy and as a movement to protect life.

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