

IMPLICATIONS FOR POLICYMAKING

Dealing with the reproducibility crisis will involve doing more than just trying to reform the practice of science itself. The damage already done by irreproducible research will have to be repaired. Some of the most significant damage has been in the area of government policy, where legislation, regulation, and judicial precedent have sometimes been based on inadequate or dubious evidence.

Government Regulations

Federal, state, and local regulatory agencies should adopt strict reproducibility standards for assessing the science that informs the drafting of new regulations. No scientific research that fails to adhere to these reformed standards should be used to justify new regulations without legislative approval. Congress and state legislatures should also consider legislation to require regulatory agencies to adopt these standards. Both legislative and administrative policymakers should institute formal procedures to ensure that regulatory change bases itself solely on research that meets high standards of methodological transparency and statistical rigor.

Some progress is already being made in this direction. Congress is considering a Secret Science Reform Act to prohibit the Environmental Protection Agency (EPA) from “proposing, finalizing, or disseminating a covered action” unless the supporting research is “publicly available in a manner sufficient for independent analysis and substantial reproduction of research results.”¹⁶⁵ This Act could be broadened to apply to a whole range of regulatory agencies within the Federal government.

The Federal government should also consider instituting review commissions for each regulatory agency to investigate whether existing regulations are based on well-grounded, reproducible research. These should establish the scope of the problem by identifying those regulations that rely on unreplicated or irreproducible research, and recommending which regulations should be revoked. Regulatory administrators or Congress should put these recommendations into practice by revoking all regulations that lack a proper scientific basis.

Policymakers should prioritize the review of those regulatory agencies with the greatest effect on the American economy and Americans’ individual lives. We recommend the earliest possible reproducibility assessment of regulations concerning climate change (Environmental Protection Agency (EPA), National

Oceanic and Atmospheric Administration (NOAA)); air pollution (EPA); pharmaceuticals approval (Food and Drug Administration); biological effects of nuclear radiation (Department of Energy); the identification and assessment of learning disabilities (Department of Education); and dietary guidelines (United States Department of Agriculture (USDA)).

The Courts

Federal and state judiciaries should review their treatment of scientific and social-scientific evidence in light of the crisis of reproducibility. While judges generally have maintained a degree of skepticism toward scientists' and social scientists' claims to provide authoritative knowledge, such claims have influenced judicial decision-making, and have helped to weave the nation's tapestry of controlling precedent.¹⁶⁶ This development has proceeded despite the realization that judges must now distinguish between satisfactory and subpar research, even though they usually lack professional knowledge of the technical details of scientific practices.¹⁶⁷

Judges should make future decisions with a heightened awareness that the crisis of reproducibility has produced a generation or more of presumptively unreliable research.¹⁶⁸ More generally, the judiciary should adopt a standard set of principles for incorporating science into judicial decision-making, perhaps as binding precedent, that explicitly account for the crisis of reproducibility. They should also adopt a standard approach to overturning precedents based on irreproducible science. Finally, a commission of judges should recommend to law schools a required course on science and statistics as they pertain to the law, so as to educate future generations of lawyers and judges about the strengths and weaknesses of statistically-driven research. The commission should also recommend that each state incorporate a science and statistics course into its continuing legal education requirements for attorneys and judges.¹⁶⁹

Legislative and Executive Staff

A democratic polity requires representatives who can address the large areas of policy affected by science and social science with informed knowledge of the strengths and weaknesses of the claims made in the name of these disciplines. Legislators who themselves lack specialized training in statistics and the sciences should give hiring preference to legislative assistants with training in these subjects. The employment of statistically proficient personnel will allow these legislators to

oversee policymaking by the administrative bureaucracy, and to judge the scientific claims made in support of campaigns to introduce new legislation. Presidents and governors should also hire special assistants with equivalent training, in order to provide them a similar ability to exercise such judgment.

A Cautious Disposition

In general, legislators, judges, and bureaucrats should all look at scientific research with a warier eye. Science cannot speak with proper authority until it cleans house. Until then, responsible officials in government need not and should not automatically defer to scientists' claims to expert knowledge. Responsible government officials should not make policy on the basis of irreproducible research.

That rule comes with a caveat: not all research can be reproduced. Political science and economics, for example, study historical events—elections, recessions, and so on—that by their nature cannot be replicated. Politicians must continue to make policy informed by research that addresses itself to such unique circumstances. Yet they should be aware that such research, despite its merits, cannot claim the scientific authority of fully reproducible research. The authors of such research, in turn, should make policy recommendations that openly declare their research's limited claims to scientific authority.



Figure 27: An Overconfident Scientist

Responsible government officials should not make policy on the basis of irreproducible research.

Transcending the Partisan Debate

The short-term thrust of these reforms may seem to favor the political agendas of American conservatives. Because many scientific and social-scientific disciplines now contain scarcely any conservatives, the combination of political groupthink with the rest of the crisis of reproducibility very likely has produced more irreproducible science that favors liberal policy. In consequence, reformed scientific standards probably will cull more science with liberal policy implications.

But reformed science isn't "conservative" science. The implementation of new scientific protocols in pharmacology seems likely to diminish the number of test results that justify putting new drugs on the market, and therefore to reduce the profitability of several large pharmaceutical corporations—a real-world consequence that should please liberals who criticize corporate misconduct. Reformed standards may also favor other liberal policies in the end: scientists who worry about climate change have already begun to marshal crisis-of-reproducibility arguments to discredit their skeptical opponents.¹⁷⁰ Science may be affected by liberal groupthink, but any scientist, of whatever political coloration, can rise above such limitations. After all, a great deal of the criticism of liberal groupthink in science comes from scientists who are themselves politically liberal,¹⁷¹ and conservative scientists are not immune to politicized groupthink. No political camp should be entirely pleased by the results of reformed scientific standards—and the reform of science will be carried on by scientists of every political persuasion. Whatever their political affiliation, all scientists and laymen who love truth more than partisan advantage should support scientific reform. Every American who cherishes the scientific pursuit of truth should seek to solve the problems that beset contemporary science.

Whatever their political affiliation, all scientists and laymen who love truth more than partisan advantage should support scientific reform.