Science and Causality in Technology Litigation

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1 Introduction

In October 2023, New York Attorney General Letitia James and a bipartisan coalition of 32 attorneys general from across the United States launched a lawsuit against Meta alleging that its social media platforms Facebook and Instagram harmed young people's mental health (NY State Attorney General 2023). State attorneys general also allege, based on documents revealed by Facebook whistleblower Francis Haugen, that leaders ignored scientific evidence from their own internal research about the mental health crisis and lied about it to the public (NY State Attorney General 2023).

A central issue in the lawsuit is the role of science. The lawsuit claims that Facebook used science as a tool of doubt and delay—demanding the highest standards of evidence that their platform caused mental health harms before taking action (Fung 2023). The documents suggest that internal dissenters at Meta believed it would be negligent for the company to demand causal evidence for the mental health harms publicly, despite possessing evidence of the harms in stories, interviews, and correlations (NY State Attorney General 2023). Courts may agree.

These critical legal, corporate, and public policy controversies concerning Meta parallel equally high-stakes and increasingly expanding scientific inquiries and debates about the alleged harms caused by technologies, from social media platforms (Viljoen 2021) to artificial intelligence (Matias 2023b). Disagreement among scientists about social media's impact on users' mental health, the kinds of harms alleged in the Meta lawsuit, is one high-profile example. One group of widely publicized scientists points to correlations between technology use and suicide rates (Haidt 2024; Du 2022). Others have shown that these correlations are roughly equivalent to the effect of eating potatoes on mental health (Gonzalez 2019). A third group points out that deterministic views about technology and mental health are too simplistic (Caplan, Clark, and Partin 2020). Yet other scientists are publishing consensus statements from many scholars that seek to move beyond the shortcomings of these debates between individuals (Galea and Buckley 2024). Depending on your view, this complex scientific disagreement is either a smoke screen for corporate misconduct or a helpful corrective to mistaken faith in a simple fix for mental health.

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Though scholars have long debated and critically analyzed the role of science in law and litigation (Maslow 1960; Jasanoff 1997, 2005, 2014), the issue has now taken on significant public importance as the general public increasingly demands greater accountability for technology companies and the harms they cause. Due to regulatory gridlock and other weak governance responses, litigation and the judicial process become the "primary" or even sole means of legal and public accountability for powerful technology companies (Metcalf et al. 2023; Heshmaty 2023; Viljoen 2021). This role for litigation will only grow with the spread of artificial intelligence (AI)-driven technologies and platforms in the public and private sector, creating new challenges for technology accountability (Land and Aronson 2020). In particular, questions of scientific causality, technology harms, and the law are at the heart of most high-profile and contentious cases of technology accountability and justice, including social media harms, algorithmic fairness, AI transparency, and beyond (Viljoen 2021; Lazar and Nelson 2023; Matias 2023b; Heimstädt and Dobusch 2020; Metcalf et al. 2023; Kroll 2020; Poechhacker and Kacianka 2021).

Despite the critical importance of causality to science, policy, and justice, few works have explored its role in the context of technology accountability and the legal process, leading to many open questions for litigators on documentation, evidence, legal standing, and causality (Metcalf et al. 2023). Indeed, even where scientists agree, courts struggle to make sense of statistical evidence. Cases are often built around individuals, while statistics describe patterns. It's not enough in many lawsuits to demonstrate the general case, for example, that lead pipes cause harm on average. Instead, lawyers need to identify a specific case where someone was harmed by lead poisoning. And even where the evidence is available, the legal profession often lacks widespread access to the expertise needed to identify and interpret evidence, guided by experts who don't have conflicts of interest with tech firms.

This essay and the project it is based on seek to help fill this void, and better bridge the gap between research and legal practice. Our project aims to systematize approaches to evidence and causality in the legal process and to draw on insights from the scientific method and social and behavioral sciences to support and inform technology accountability efforts in court. For instance, in early 2024, Cornell's Citizens and Technology (CAT) Lab (which the authors are members of), Columbia's Knight First Amendment Institute, and the Coalition for Independent Technology Research held a closed-door workshop on platforms, causality, and the law. Our goal was to identify failure points that have prevented statistical evidence from being consistent and usable to litigators or regulators in cases related to freedom of expression, mental health, and discrimination. Working through those case studies, we sought to imagine and formulate ideas that would better harmonize the provision of reliable, usable statistical evidence in tech accountability cases, and help us train future scientists, litigators, and community scientists to develop usable evidence.

This essay draws on insights from those case studies and aims to address this challenge: What methods and strategies can help bridge the work of lawyers and researchers engaged in technology accountability efforts? To that end, we outline the relationship between causality and the law, then map a list of toolsets to bridge the work of researchers and litigators. We conclude with suggested questions on technology, causality, and the law for further exploration by researchers, lawyers, and advocates.

2 Why is the Law So Uneasy About Statistics?

The law's uneasy relationship with science and with statistics in particular has long been documented and discussed (Shaviro 1989; Berger and Solan 2007; Allen and Smiciklas 2022). A vast literature, for instance, has explored law's "aversion" to statistical/probability evidence in general, and "naked statistical evidence" in particular (Allen and Smiciklas 2022, 179). While there may be both legal and methodological reasons for such aversion (Allen and Smiciklas 2022), the problem is well documented. The commonly taught case of *McCleskey v. Kemp*[1] well illustrates this uneasy relationship (Gross 2011). In that case, ultimately decided by the United States Supreme Court, Warren McCleskey was appealing a death sentence on the basis of discrimination by juries. In doing so, his lawyers relied on a study by social scientists David Baldus, George Woodworth, and Charles Pulaski, which employed statistical analysis to demonstrate racial discrimination in jury sentencing (Baldus, Pulaski, and Woodworth 1983, 1906–7). The researchers analyzed 2,000 murder cases, finding that the odds of defendants receiving the death penalty were 4.3 times greater if they were accused of killing white victims than if they were accused of killing Black victims (Baldus, Pulaski, and Woodworth 1983; Baldus, Woodworth, and Pulaski 1990). Ultimately, the US Supreme Court rejected the Baldus study findings, with Justice Powell writing for the Court:

> [McCleskey] offers no evidence specific to his own case that would support an inference that racial considerations played a part in his sentence. Instead, he relies solely on the Baldus study. McCleskey argues that the Baldus study compels an inference that his sentence rests on purposeful discrimination.
>
> [...]
>
> The Baldus study is clearly insufficient to support an inference that any of the decisionmakers in McCleskey's case acted with discriminatory purpose.[2]

The Court refused to accept general statistical evidence of racial discrimination across the population of jury sentences to draw conclusions about the specific facts and actors in the *McCleskey* case itself. In other words, statistics alone cannot win legal arguments or cases, because courts care about the specific rather than the general.

1. 481 U.S. 279 (1987) (hereinafter "*McLeskey v. Kemp*").
2. *McCleskey v. Kemp*, at 292–293, 297.

The afterlife of the Baldus analysis in *McCleskey* further illustrates the disconnect between the standard of persuasive evidence within courts, science, and public opinion. Michigan law professor Samuel R. Gross reviews this divergent story in a detailed review of the lead-up to and aftermath of *McCleskey v. Kemp*. Though McCleskey lost the case, the Baldus study persuaded scientists and galvanized public opposition to discrimination in the justice system and the death penalty. It inspired decades of new social science to diagnose and address bias in courts and other institutions. Furthermore, multiple justices later changed their minds about the death penalty, with Justice Blackmun crediting the Baldus study for his new position:

> From this day forward, I no longer shall tinker with the machinery of death....Rather than continue to coddle the Court's delusion that the desired level of fairness has been achieved and the need for regulation eviscerated, I feel morally and intellectually obligated simply to concede that the death penalty experiment has failed.[3]

Over the subsequent decades, further statistical evidence of racial bias in sentencing has convinced numerous state legislatures and courts to suspend or abolish capital punishment,[4] even if the US Supreme Court did not find the evidence persuasive at that time. Yet losing in court while raising public awareness for a longer, multi-decade endeavor is an incomplete victory at best, especially when numerous scientific studies already support a clear conclusion. As a result, many lawyers see scientific evidence as a sometimes-necessary, usually insufficient, and often-ignored resource in litigation.

3 Seven Toolsets for Causality and the Law

We see another reason lawyers sometimes doubt the value of statistics in their cases: *McCleskey v. Kemp* only showcases one technique in the wider toolbox of statistical and scientific methods. It's easy to see how this can happen, since law schools rarely teach statistics and standards of scientific evidence. The result is that lawyers and legal scholars don't always know what to ask for, since they haven't learned about the larger toolbox that researchers have at our disposal. As a result, litigators are likely to contact scientific experts after a case has been defined rather than incorporating science into their core arguments—creating a further disconnect with science.

In the following section, we summarize seven toolsets that could act as bridges between statistics and the law—something that we hope sparks creative thinking for researchers and litigators alike as they consider the kind of evidence that could matter in cases involving technology firms, from AI to digital platforms.

3. *McCleskey v. Kemp*, at 354 n.7 (Blackmun, J., dissenting).
4. *State v. Gregory*, 427 P.3d 621 (Wash. 2018).

3.1 Specific versus General Causality

In *McCleskey v. Kemp*, Supreme Court justices argued that statistics can provide information about general patterns but not specific cases—and that evidence of a general pattern was not enough to rule on a specific case, especially without proof that there was an intent to discriminate. This is a classic debate in the science of discrimination—if something happens 99% of the time, it's hard to prove on the basis of statistics alone that it also happened in this one situation. Yet scientists have multiple ways to establish specific causality and general causality alike.

Environmental litigators attempt to overcome this problem by combining general and specific causation in the same case (Schleiter 2009). Imagine, for example, that a specific plaintiff is experiencing a severe disease that research has linked generally to a dangerous chemical. Even where statistical evidence shows that the chemical causes the disease on average, opposing lawyers could cast doubt over whether the chemical was the cause in this specific case. The strongest arguments for causality build a chain of evidence: First, calling on some experts to discuss the general harms from a given chemical and then bringing in other experts to demonstrate exposure to that chemical in the specific case, thus helping to rule out rival causes of the harm. In this epidemiological model of litigation, statistics help establish both general and specific harms. To establish general harms, researchers conduct causal studies on the effect of certain chemicals on health. To establish specific harms, researchers develop reliable measurements and tests that could detect a person's exposure to those chemicals. Some cases have even achieved settlements favorable to plaintiffs before specific causality was fully established—with compensation requiring subsequent testing of those exposed (Bilott 2020).

Some studies can also establish general and specific harms at the same time. To name one example, CAT Lab has developed Conjecture—software for N-of-one trials on technology use and well-being. These study designs enable people to test the effects of technology exposure in their own lives and provide reliable statistical inferences on the effects for that individual, as well as the general case (Matias, Pennington, and Chan 2022).

3.2 Reverse versus Forward Causality

Another fundamental hurdle for litigators and scientists is the emphasis courts place on the past. Court cases are often built around specific events that have already happened, while causal research is often focused on making inferences for the future.

With forward causality, researchers test "what if" questions about actions that are common and repeatable. In this category, a randomized trial is the simplest, most reliable form of causal research to develop if you're lucky enough to ask the right question in advance (Green and Thorley 2014). In this kind of study, most famously clinical trials, researchers randomly assign a group of people, situations, or institutions to receive the intervention (or not) and then compare outcomes between those who received it and

those who did not.

The greatest constraint on randomized trials is that it's not always ethical to conduct them, especially when they could cause serious, irreversible harms. For example, criminology researchers have sometimes rejected the idea of randomly assigning vacant buildings to be bulldozed despite wanting to know whether it could reduce firearm assaults and illegal drug violations (Gobaud et al. 2022). Yet many scientists, the authors included, argue that randomized trials should prioritize understanding and alleviating the greatest risks and harms, as is standard in medical research. Indeed, one of us (Matias) has argued that, rather than avoiding experimentation, companies should have an obligation to test their products on high-stakes outcomes before widely deploying them (Matias, Ko, and Mou 2016). For very high-risk issues like vaccine testing, consumer toxicology, and mental health research, volunteer "human challenge trials" and other novel consent protocols may enable researchers to effectively balance the risks involved (Blum 2019; Ophir et al. 2024).

While randomized trials usually can't establish causality after something happens, reverse causality is sometimes possible using other methods. Alongside tests for exposure using forensic and historical data, quasi-experiments and simulations help researchers look back on past events to estimate their effects compared to what might have happened otherwise.

In quasi-experiments (sometimes called natural experiments), researchers use datasets that were previously collected in order to examine the effect of something that happened in the past. In these cases, researchers can't randomly assign an intervention, so they can only make causal claims when an extraordinary coincidence (like unusual weather or a very unexpected event) creates experiment-like conditions (Campbell 1969; Hernán and Robins 2023).

Quasi-experiments are tricky to get right, but when the conditions allow, they can offer powerful evidence on the effect of a product or policy. Statistical work on the chilling effects of surveillance and censorship on freedom of expression has tended to adopt this kind of reverse causality. In one study, one of us (Penney) examined the effect of public knowledge about NSA surveillance on the behavior of Wikipedia readers (Penney 2016). In a similar vein, CAT Lab is studying the effect of AI law enforcement on freedom of expression. These quasi-experiments are especially valuable for studying interventions that researchers can't control and that in any case couldn't be assigned randomly for practical or ethical reasons.

Another kind of reverse causal research involves simulations and proxies. When the stakes are high enough, researchers attempt to reproduce the conditions of a high-stakes incident. A proxy is a stand-in, like a guinea pig or an anthropomorphic test device (formerly called crash test dummies), that can be used to simulate a situation without harming humans, potentially dozens or thousands of times. Such studies enable

researchers to ask how things might have been different. A growing body of scholarship looks at the role of computer simulations as part of expert testimony (Wakeland 2021), especially in epidemiology. We expect to see more simulations brought forward in cases involving algorithms and AI systems in the future.

3.3 Systematic Review and Meta-Analysis

Cases involving claims of general causality can be difficult for courts to interpret when interpreting a regular flow of new studies with seemingly conflicting claims. This sense of scientific disagreement can be increased by problems in how some scientists, companies, news media, and influencers prioritize only the most surprising or self-serving results.

Consider for example the case of alcohol and cancer. On Monday, the tabloid news might tell you that alcohol causes cancer; on Tuesday, it will say the opposite. Yet in the seventy years since the first study linking alcohol with cancer, scientists have conducted many studies over time and thus have reliably established that alcohol causes cancer. While the estimates of any individual study will vary, researchers can use well-established techniques for systematic reviews and meta-analysis to pool findings across those studies to arrive at a combined answer. Scientists have also developed reliable methods to account for "publication bias"—systematically missing data that arises from regulatory and reputational incentives that motivate people and companies to keep inconvenient research in the "file drawer" (Cooper, Hedges, and Valentine 2019).

To avoid spreading inaccurate beliefs that are hard to correct, many scientists resist drawing conclusions about general causality in the absence of systematic reviews. When an issue receives little scientific funding or attention, this conservatism can protect defendants from unfounded accusations. Yet when paired with inaction from legislatures and regulators, scientific conservatism can also delay acknowledgment of harms and the search for remediation (Orben 2020). This sparse data and scientific uncertainty create a window for powerful actors to delay accountability by commissioning new research rather than fixing problems—allowing harms to persist for decades (Weiss 2021; Oreskes and Conway 2011).

3.4 Pattern Causality and Discrimination

Some claims about harms or benefits depend explicitly on patterns of behavior, especially where there are concerns that particular groups of people or organizations have disproportionately borne those harms or benefits. Cases related to cartels, genocide, employment discrimination, and antitrust have typically relied on statistical analyses to establish whether a particular group was favored or targeted. In all of these situations, the law addresses patterns of decisions and behaviors that researchers can analyze in aggregate (Ball and Price 2018).

Where does causality come into conversations about discrimination? As more algorithms get challenged in court (Metcalf et al. 2023), we expect we'll see more reliance on research that studies these patterns of discrimination. For example, in November 2023, a pair of journalists published data showing that UnitedHealth "pushed employees to follow an algorithm to cut off Medicare patients' rehab care," evidence that launched a class action lawsuit. The case hinges on claims that the algorithm has a 90% error rate. Like all claims of discrimination, the argument is causal, saying that the system would perform differently for a patient with different characteristics—that using information about age "caused" the algorithm and human decision-makers to cut off care (Ross and Herman 2023).

Many arguments over discrimination hinge on counterfactuals about things that people cannot easily change—for example, would this candidate have been hired if they had a different gender? In these cases, randomized trials are impossible; researchers cannot randomly assign people to change their gender or the color of their skin on command. While the difficulty of answering causal questions about discrimination is often used as a shield against accountability, these questions can sometimes be answered with cleverly designed audit studies (Sen and Wasow 2016) or with reference to decision thresholds established by regulators (Wright et al. 2024). Computer scientists and computational social scientists have also made many advances in conducting causal audit studies of discrimination, alongside methods to analyze the results (Matias, Hounsel, and Feamster 2022; Vecchione, Levy, and Barocas 2021).

3.5 Magnitude, Doses, and Trade-Offs

When reliable science on the impact of technology products on society is available, debates shift to arguments over how to interpret scientific findings. Without clarity about what is being measured and how it matters in people's lives, consequential effects can easily be dismissed.

Even when people agree on the science, they sometimes disagree about what counts as consequential. Consider, for example, fears that the YouTube algorithm has exposed people to videos and channels by often-violent extremist groups. A recent study published in *Science Advances* found that 3% of people who do not subscribe to extremist material nonetheless have viewed extremist videos due to YouTube recommendations. Industry representatives have claimed that this number was too low to be a matter of concern, while the scientists argued (supported by multiple peer reviewers) that "low levels of algorithmic amplification can have damaging consequences when extrapolated over YouTube's vast user base and across time" (Chen et al. 2023). Some harms are so important that they matter to courts even if they happen to only one person. Other harms have some threshold level.

When discussing effects, judges and juries sometimes think about technologies as "doses," similar to drugs, poisons, pollution, or cigarettes, where harms increase linearly

as the dose increases (Abeele, Halfmann, and Lee 2022; Tsatsakis et al. 2018). Yet many technology impacts are not so linear. In the study of well-being and communication technologies, for example, scientists have found a "Goldilocks effect," where both overly low and overly high amounts can be harmful (Przybylski, Orben, and Weinstein 2020). A Goldilocks effect is not proof that no harm exists—it just requires a different way of thinking about the relationship of technology to harm.

When clear, consequential harms have been documented, policy debates often turn to trade-offs in ways that are unsupported by the evidence. When researchers observe harms, corporate advocates will often point to alleged benefits of a given technology and argue that the benefits outweigh the harms. Unfortunately, very few scientists have asked questions about trade-offs. While tech firms routinely conduct thousands of behavioral studies that investigate the financial trade-offs of product designs, those studies are largely kept secret. As a result, few publicly accessible studies about digital technologies have been designed to study both benefits and harms side by side. Without research that considers trade-offs, cost-benefit arguments about tech platforms tend to be based in marketing, speculation, and selection bias.

3.6 Evidence of Negligence

Thinking beyond dose-response determinism, parties can be held responsible for negligence in some areas of law for not behaving with a level of care that a reasonable person would exercise in similar circumstances. This, we suspect, is one of several frustrating reasons that technology firms are sometimes very careful to limit research that could successfully prevent and reduce harm. If a platform learns how to reduce harm and doesn't take action, they might become liable for that decision in the future.

Our first introduction to the power of science in online safety involved a decision by a technology firm to deliberately avoid learning important information about the safety of its service. After one of us (Matias) led a statistical analysis of Twitter's blind spots in the enforcement of policies against online harassment (Matias et al. 2015), company employees refused to meet with them to discuss the report. Years later, as we watch how courts are using the Haugen leaks of internal Meta research, we can guess one possible reason: they didn't want internal records that could create future liabilities.

In upcoming lawsuits against Meta on mental health, we will see considerable debate over the validity and reliability of leaked studies conducted by the company's own researchers. Meta's opponents argue that the company knew about the harms to mental health. Yet since at least some of the leaked studies appear to have flaws in their research design, it's likely that some claims in the slides could be insufficiently supported by the evidence. As a result, we can expect corporate lawyers and their hired expert witnesses to argue that photos of slide decks are insufficient evidence of what the company knew. And even if whistleblowers truly believed that Meta was harming people, expert witnesses for the defense will likely argue in court that the company's executives were right to dismiss the

claims of what they understood to be flawed research.

How can researchers question or validate claims about the reliability of data that we only see in slide deck screenshots? Public-interest researchers can bring two tools to this work. The first is the practice of simulation and meta-analysis, which can recreate the conditions of a study from summary tables on a slide. Second, litigators can seek to export data from platform software during discovery and create privacy-preserving archives of corporate research for statistical investigation. CAT Lab, along with our collaborator Kevin Munger, has already shown how to create these privacy-preserving data archives with the Upworthy Research Archive, a dataset of over 30,000 behavioral experiments conducted by a media company over three years (Matias et al. 2021). A new law in Minnesota will require transparency on platform experiments starting July 1, 2025 (Thorburn, Stray, and Bengani 2024).

3.7 Damages and Remediation

As scientists, we're often asked by regulators: How can we remediate the problems we're trying to address? This can be especially challenging in fields where corporate funding has steered the work of scientists away from addressing the harms created by those same companies (Whittaker 2021). In the absence of clear alternatives, legislatures, courts, and regulators can either feel unable to act and delay accountability or feel compelled to do something and choose thinly supported policies.

The Tobacco Master Settlement Agreement of 1998 offers a powerful alternative, showing how courts can incentivize innovation toward remediations that have not yet been discovered. After state attorneys general sued the tobacco industry for the harms of cigarettes, the final settlement directed $250 million to create a new foundation to fund research and innovation on effective tobacco programs (Jones and Silvestri 2010).

Rather than logjam innovation by waiting to make rulings until underfunded initiatives discover effective remediation, courts can contribute to long-term solutions through creative deployment of settlement funds and damages (Healton 2018). In cases involving the tech industry, courts could serve the public interest by creating similar funds to support industry-independent research from the resources secured in future rulings and settlements.

4 Moving Forward on Digital Technology, Causality, and the Law

We hope these tools and strategies can better bridge the work of lawyers, researchers, and civil society groups involved in the important work of technology accountability. Based on the conversations in our workshop, we offer six critical questions about platforms/technology, causality, and the law that require further exploration by researchers, litigators, regulators, and advocates:

4.1 How do we solve problems of heterogenous effects?

When scientists focus on average effects, researchers can (by definition) miss harms to individuals, as well as minority and marginalized groups—what researchers call "heterogenous effects" (Orben et al. 2022; Orben et al. 2024-05-07). Heterogenous effects occur when one group of people is more at risk to some harm than others. When people with a high risk of harm are a minority, the most common statistical tests might fail to observe those harms, leading courts to wrongly conclude that no harm occurred (Johannes et al. 2024). While technology firms have developed sophisticated systems to study heterogenous effects in marketing and sales, public-interest actors urgently need to develop parallel capabilities.

4.2 How do we help courts arrive at reliable conclusions without falling prey to bad science?

Getting at the truth is hard, especially when the initial questions are driven by public fears (Orben 2020). There is a lot of unreliable science out there, and some researchers would eagerly support pro- or anti-corporate arguments in return for fame and money, even if that's not where the evidence leads. We urgently need to help improve the quality of evidence and its interpretation in cases involving digital technology firms.

4.3 How can the search for reliable science avoid creating barriers to justice?

When scientists insist on systematic reviews or create new, more reliable methods to study a problem, we risk making it harder for non-scientists to be heard, especially if the methods require expensive training and equipment. In the history of consumer protection, for example, chemical testing of milk products proved more reliable than taste tests, but also converted food testing from a widespread public endeavor into work for a small circle of professionals (Cohen 2011). While these new methods improved the reliability of evidence in individual cases, they reduced the overall capacity to detect bad actors.

Under *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, federal judges have taken on the responsibility of deciding what kind of experts and what kinds of evidence are admissible in court (Jasanoff 2005). In theory, this could improve the quality of scientific evidence in courts, but it can also keep courts from considering important science and crucial voices. Community/citizen-science data is especially vulnerable to dismissal, which is concerning because many of the most important studies on the effects of tech platforms have come from crowdsourced, participatory research (Matias 2023a). The search for reliable science can also delay justice and accountability. In cases where the most reliable evidence could take many years to compile, calls for more reliable evidence are a standard tactic from corporations to delay accountability (Weiss 2021; Orben 2020). As we create ways to improve the quality of scientific evidence used by courts, we also encourage institutions to create pathways for science to become more inclusive and

usable (Citizen Science Association 2019; Matias 2023c).

4.4 How can we escape the trap of mistaking responsibility for capability?

How do we avoid the trap of thinking that the entities responsible for harms are the same ones who are best positioned to most effectively prevent or address those harms? It is rare in public health for those who caused a harm (from pollution, for example) to hold the keys to its prevention or remediation. Yet in technology policy, people often turn first to industry experts for answers. In the fight against this flawed, simplistic notion of determinism, some scholars have also argued against regulating the tech industry (Angel and boyd 2024). The result has been a continuation of the status quo. How can policymakers, legal experts, and scientists move beyond this gridlock?

4.5 How can we navigate conflicts between scientists and technology firms?

Researchers continue to wrestle with the idea that tech companies and their hoards of data about billions of people were supposed to solve problems of scientific uncertainty, not create more problems. Writing in 2009, a group of future tech industry leaders and prominent university-based scientists established the field of Computational Social Science, to "collect and analyze data with an unprecedented breadth and depth and scale" and achieve "enormous progress for public good" (Lazar and Nelson 2023).

Fifteen years later, the field is in crisis as it wrestles with the fallout of its dependence on an unreliable relationship with technology firms—a crisis driven partly by conflicts with companies over topics that expose tech firms to liability and reputational risks. If this kind of research is going to deliver on its early promise to benefit humanity, we need to solve the problems raised by these conflicts (Matias et al. 2025).

4.6 How do we navigate science in conflict?

Finally, tech companies have hired and supported thousands of the leading statisticians and social scientists of our era, linking status in multiple fields to industry relationships. Elite universities have hired and promoted faculty for fifteen years on the basis of work underwritten by tech firms. With new regulations on the horizon, companies will invest hundreds of millions of dollars into grand research projects that could delay or deflect accountability. A reliance on industry funding means that many leading scientists' conflicts of interests disqualify them from serving the public as expert witnesses.

As courts and regulators consider cases against tech firms, some leading scientists with access to privileged corporate resources, acting in good faith, will also feel compelled to point out flaws in research seeking to hold companies accountable. It will be hard to find scientists of a similar standing who do not have significant conflicts of interest. Many will worry about the consequences of challenging giants of their field on both sides. People will take these very public conflicts personally, and these conflicts will be very lonely.

In the long term, the scientific community needs paths to sustainability that permit a commitment to the public interest, held together by the norms of disinterestedness and openness that are fundamental to science (Merton 1973).

5 Conclusion

As regulators and courts consider the harms and benefits of tech products in a growing number of cases, the tools of science and statistics could help provide answers. Yet longstanding disconnects between science and the law could prevent courts from accessing the most reliable evidence. At its best, scientific evidence could protect firms from unsubstantiated accusations and obtain justice and redress for people who have faced systemic harms. Yet science risks becoming a confusing shield against accountability and an inaccurate cause of widespread fear.

In this article, we have summarized key concepts in science and the law that could bridge the divides that would otherwise result in science becoming a tool of confusion on urgent public-interest questions. If scientists and litigators can build greater understanding about each others' standards of evidence, especially surrounding causality, we hope to see courts gain access to higher quality, more directly relevant evidence. Yet since science is ultimately a social and institutional endeavor, reliable evidence will depend on investments and institution-building to address challenges of trust, sustainability, integrity, and conflict management over the long term.

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