Field Theory: AI as Social Science Question, Object & Tool

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Uses of advanced artificial intelligence are changing how societies organize labor, govern, produce knowledge, and make meaning. In light of these developments, this essay argues that AI models, tools, and systems pose three interrelated imperatives for social science: they demand renewed attention to social theories of how technology, human experience, and social order are entangled; they require study as objects of inquiry in their own right; and they offer capabilities that may transform – or upend – the practice of social investigation itself. From Weber's analysis of rationalization to Du Bois's study of technology and inequality to contemporary scholarship on algorithmic governance, the essay examines what social science distinctively offers: the capacity to historicize the apparently unprecedented, to trace connections across scales, and to center those most affected by technological change. It identifies how algorithmic systems are remaking the distribution of opportunity and risk as a central task of social inquiry and asks what futures social science might help bring into being.

The emergence of advanced artificial intelligence – from generative models that produce text, sound, and images, to the expanding array of algorithmic tools now embedded across social life, to deep learning and agentic systems that may transform research – has become a touchstone for contemporary debates about society. The introduction of AI models, tools, and systems is both a marker of human resourcefulness and a portent of societal disruption. These technologies arrive with promises to enhance human capacities, accelerate scientific discovery, and generate new cultural forms. Yet their use also threatens to erode human autonomy and displace human judgment, and is heightening inequality, destabilizing political systems, and obscuring accountability.

For social science, this moment is urgent. The introduction of AI confronts researchers with at least three interlinked imperatives: to renew explanations for how technological change is entangled with human experience and social order; to examine AI as an object of inquiry; and to assess AI as a methodological tool, the speed and scope of which may change, but also distort, the practice of social research. These imperatives, in combination, define what it means to study society in the age of algorithms and automated power.

https://doi.org/10.1162/DAED.a.990

This is not the first time social science has addressed technology as important to the analysis of society. Since their inception, the social sciences have been bound up with the theorization of technological change in areas including economic life, industrial production, labor relations, and education. Max Weber traced how technical rationalization and bureaucracy remade authority. W. E. B. Du Bois revealed how industrialization intersected with economic and racial inequality. Later, Herbert Marcuse exposed how technology could reshape freedom and thought itself. Their work exemplifies how moments of technological upheaval have spurred the development of foundational ideas in the social sciences.

Yet advanced AI poses challenges that may push this tradition to its limits. Unlike industrial machines that extended human labor or bureaucratic forms that rationalized tasks, AI tools operate through rapid statistical patterning and large-scale data processing that may defy easy comparison to prior technologies. Their deployment can unsettle categories that once seemed stable – work, knowledge, governance, even personhood – and in doing so, demand normative and conceptual innovation from social scientists. The sociotechnical phenomena that earlier theorists illuminated reappear today but refracted through algorithmic systems of scale, opacity, and reach that may strain inherited frameworks.

What is at stake is more than retrospective understanding. If social scientists wait until AI systems are fully entrenched, we will be left to document their consequences after the fact. The opportunity instead is to shape trajectories in parallel time to articulate critical frameworks, surface risks, generate concepts and evidence that guide public choices about design and governance, and advance research that heightens our understanding of contemporary society.

Social scientists confronting artificial intelligence join a tradition of grappling with novel technological developments. We have long recognized that technologies are not merely neutral instruments but forces that redistribute power and shape meaning. Classic theories of society were often forged in response to technologically mediated social disruption: the upheavals of the Industrial Revolution, the displacements of empire, the reorganization of work and politics after global war. Each wave of transformation demanded not only empirical description but also sense-making. Artificial intelligence, with its promises and perils, presents a similarly paradigmatic moment, one that calls for retrieval of these theoretical traditions and creative extensions of them.

Among the earliest to grasp these dynamics was Max Weber, who sought to make sense of how industrial capitalism reorganized authority and legitimacy. In *The Protestant Ethic and the Spirit of Capitalism* (1905), he observes that "this order is now bound to the technical and economic conditions of machine production which . . . determine the lives of all individuals . . . with irresistible force."[1] For Weber, the factory system was not just an economic structure but a relentless drive to organize

life through calculation, efficiency, and control. He describes the result as an "iron cage": a social order in which bureaucratic and technical logics, once unleashed, confined human beings within systems of rationalization and constrained their freedom. This iron cage imagery resonates powerfully today. Algorithmic management tracks the movements of Amazon warehouse workers, the routes of Uber drivers, and call center productivity; it automates employment decisions and imposes a web of continuous surveillance. As factories in the Industrial Revolution regimented time and labor, AI systems now impose regimes of quantification across domains from warehouse logistics to knowledge work.[2] Weber helps us see that these uses of artificial intelligence are not simply a bundle of techniques but a system of order – an institutional logic that reorganizes human relationships under the banner of rationalization.

Yet Weber's focus on rationalization left crucial social dimensions unexamined. At the same moment, W. E. B. Du Bois insisted that technological change could not be understood apart from relations of power, particularly those structured by race and empire. In *The Negro Artisan* (1902), he documents how automation displaced Black craftspeople, eroding forms of autonomy and skill that had been essential to their civic standing. Without political protections, he argues, technological change deepened inequality rather than alleviating it.[3] Later, in *Darkwater: Voices from Within the Veil* (1920), Du Bois extends this critique to the global stage. He observes that "Western science" and industry had perfected machines of production without developing mechanisms for just distribution, turning technical command into a tool of domination. Du Bois insists that technologies absent political safeguards are not emancipatory but instead reinforced hierarchies of race, class, and empire.[4] His analysis points us toward a central question for the use of advanced AI today: Who benefits, who is displaced, and how are inequalities reinscribed through the deployment of these new systems?

By the mid-twentieth century, Herbert Marcuse had given this critique a new emphasis, showing how technological rationality could suppress critical reflection and reinforce conformity. In *One-Dimensional Man* (1964), he argues that the modern exercise of power no longer depended primarily on overt coercion but worked through technology itself. Efficiency and productivity became unquestioned ends, narrowing thought and desire and foreclosing the imagination of alternatives.[5] This dynamic is legible in today's AI systems. Recommendation engines steer attention and desire, curating environments that make certain possibilities appear natural while obscuring others. Large language models produce persuasive outputs that blur the boundary between information and manipulation; as with Marcuse's diagnosis, constraints on human agency seem inevitable precisely because they arrive in the guise of technical systems. His work reminds us that the power of technology lies not only in what it enables, but in how it constrains the horizons of thought and action.

Taken together, Weber, Du Bois, and Marcuse remind us that technologies do not merely augment human capacity; they can shuffle social life, redistribute power, and enframe meaning. Returning to them matters now not because their theories are perfectly fitted to the AI era, but because they teach us to ask the right kinds of questions. Their insights remain indispensable for interpreting AI, even as new conditions require us to build upon them with creativity and care. To retrieve this tradition is therefore not to rehearse it mechanically but to renew it, elaborating new categories and methods appropriate to this moment.

Artificial intelligence introduces forms of complexity and uncertainty that call for new conceptual tools. Machine-learning systems, for example, can generate outputs or identify patterns that were not programmed in advance and that may be unanticipated by developers. Equally significant is the reach of AI technologies across domains. Unlike a machine tethered to a single site, like a hospital or factory, AI systems are pervasive, spanning multiple social spheres. A credit score shapes not only financial access but also housing and employment opportunities.[6] Content-moderation algorithms influence both everyday expression and national politics.[7] Supply-chain optimization changes corporate logistics and reverberates through global labor markets and geopolitics.[8] These interconnections reveal AI tools and models as systems with multiplier effects that may ripple beyond their originally intended applications or their immediate sites of use.[9]

To this unpredictability and cross-domain reach, add a third defining feature of advanced AI: opacity – not necessarily intrinsic to the tools themselves, but the outcome of commercial decisions to deploy systems that are not fully understood and rarely transparent. This, combined with proprietary claims, the rush of the so-called AI race, and lack of regulatory oversight, means that AI systems can be difficult to interrogate. Opacity, in this fuller sense, is not merely a technical condition but a political and economic strategy: systems are rendered difficult to interrogate not because complexity makes transparency impossible, but because commercial incentives and institutional arrangements make opacity profitable. This is precisely what makes AI a central object of social science inquiry rather than a narrow technical concern.[10]

These features – unpredictability, cross-domain reach, and opacity – also recast enduring questions of power. The rationalization of life, the entrenchment of inequality, and the narrowing of thought all persist in the AI era but refracted through systems and institutions that require reimagining from social scientists. How pervasive AI use organizes power and constrains imagination must be analyzed with attention to the scale, speed, and infrastructural reach that earlier theorists did not foresee.

Scholars across the social sciences have begun this work of theoretical renewal. In sociology, accounts of the "ordinal society" update classical analyses of rational-

ization, showing how algorithmic ranking and scoring intensify social stratification and redefine social membership.[11] In political science, research on democratic deliberation examines the conditions under which algorithmic tools might support rather than supplant collective decision-making – and also cautions how the use of artificial intelligence threatens democracy, including representation, accountability, and trust.[12] Economists have argued that accounting for interactions between researchers and machine learning tools can help refine theory generation, and have developed task-based frameworks demonstrating that the effects of AI on labor and inequality are not technologically determined but depend on choices about how these systems are designed and deployed.[13] Theories of digital labor have shown how data-labeling centers and microwork platforms deploy rules of discipline, supervision, and fragmentation that differently reproduce and deepen, rather than transcend, industrial regimes of control.[14] Studies of race and technology have revealed how algorithmic systems presented as neutral actually encode and reproduce racial hierarchy, extending historical patterns of discrimination into automated decision-making.[15]

Yet even powerful emerging technologies do not determine their own applications or outcomes. Research on algorithmic biotechnologies has underscored their "social life" and how communities contest and repurpose scientific tools, offering conceptual models for understanding how the meanings and uses of AI remain sites of struggle rather than settled outcomes.[16] Research on automated financial trading has extended sociologist Erving Goffman's concept of the "interaction order" to algorithmic systems to explain how trading algorithms queue, compete, and deceive through electronic order books, generating emergent dynamics that no individual actor designed or fully controls.[17] Such work suggests the theoretical innovation required of this moment: drawing on disciplinary traditions while forging insights adequate to the distinct qualities and challenges of advanced AI.

But the full theoretical architecture for understanding AI in society remains to be built. What is needed is not simply a catalog of its effects across sectors, but integrated accounts of how algorithmic systems are transforming the fundamental coordinates of social existence: the nature of work and economic value, the character of public life and political authority, the production and circulation of knowledge, and the very boundaries of human agency. Such frameworks will grasp artificial intelligence not as a discrete technology but as an infrastructural layer that increasingly mediates how institutions operate, how individuals are seen and sorted, and how collective futures are imagined and foreclosed.

This moment requires social science to both retrieve its critical traditions and enlarge them – to think beyond the categories that earlier transformations made salient and to craft new concepts commensurate with present uncertainties. Building this account will require sustained collaboration across disciplines and a willingness to conduct empirical research while theorizing at the scale of

the AI transformation. But renewal cannot be achieved in abstraction. It requires engagement with the models, tools, and systems through which artificial intelligence is being deployed in society. Linking critical traditions with emerging research, social science should approach the AI turn as demanding not only theoretical attention but empirical investigation.

For the social sciences, AI has become unavoidable. It touches every site of inquiry – political, economic, cultural, and epistemic. Therefore, to study it is not merely to analyze a suite of technologies, but to examine the "full AI stack" – from the extraction of critical minerals, to the energy demands of data centers, to the involvement of workers in development and adoption, to the design and circulation of AI products.[18] Taken seriously, this means treating AI models, tools, and systems not as a technical enterprise but as a social one – the foundation for a social science *of* AI.

Across the social sciences, technologies are analyzed not as mere instruments but as human products that steer flows of resources, capital, and imaginaries, and whose design, ownership, circulation, and use are embedded in wider contexts.[19] This perspective is essential for understanding AI systems that are built in laboratories and corporations but quickly exceed those sites, becoming embedded in society. They embody assumptions about what is valuable or efficient, shaping the distribution of visibility, recognition, and opportunity.[20] The integration of AI into social life therefore demands attention not only from scholars of the impacts of technology but from all who study the organization of society.

This becomes clear when examining how AI intersects with social relations. What appears as a media "feed" or "trending topic" is in fact the outcome of algorithmic decisions about visibility and engagement.[21] Research has traced how recognition, intimacy, and status are increasingly mediated by AI systems, altering the conditions under which social ties are formed and maintained.[22] Surveillance, too, has been remade: no longer simply recording behavior, algorithmic surveillance actively conditions it, nudging individuals toward certain choices, constructing probabilistic profiles that may preempt action altogether, and foreclosing privacy, all across entire populations.[23] AI thus emerges not only as an infrastructure of communication but as a mediating force – one that curates what is seen, conditions what is done, and influences how identity and social capital are constituted through computational logics operating simultaneously at intimate and aggregate levels.

A social science of AI can also interrogate labor markets, demonstrating that artificial intelligence does not simply substitute for or augment human work but reorganizes the relations of expertise and value through which economies are conventionally structured. Platforms such as Google, Amazon, and ByteDance deploy AI to coordinate production and labor, extracting value through data, scale, and algorithmic curation. These dynamics strain economic models premised on ratio-

nal actors: AI systems generate patterns of interaction between human behavior and the speed and scope of algorithms that traditional models may not capture.[24] Economist David Autor argues that this reorganization does not simply eliminate jobs but "reshapes expertise," enabling more workers to take on responsibilities once limited to highly credentialed professionals.[25] Whether this strengthens or erodes middle-class livelihoods, however, depends on institutional design and policy.[26] Autor refines this point with research scientist Neil Thompson by showing that automation affects wages and employment differently depending on whether "expert" or "inexpert" tasks are displaced.[27] Analyzing millions of online job postings, economist Daron Acemoglu and colleagues trace how AI adoption alters skill demands, finding that it reduces vacancies outside of roles that are AI-intensive even as aggregate employment effects remain modest.[28] These labor and inequality effects are inseparable from the political and institutional contexts in which these technologies are deployed.

A social science of AI must therefore also investigate governance in the algorithmic age: how power is exercised, how legitimacy is claimed, and how publics can hold AI-mediated institutions to account.[29] Governments around the world now deploy algorithmic tools to allocate welfare benefits, regulate immigration, and police populations.[30] Sarah Brayne's ethnography of the Los Angeles Police Department illustrates how so-called predictive policing systems reorganize discretion, expanding surveillance of marginalized communities while insulating the users of such technology from accountability.[31] Sociologists therefore argue that social science's engagement with artificial intelligence must include questions of governance and sustained attention to how AI produces inequality and concentrates power.[32] Political scientists have explored whether it might support rather than supplant collective decision-making, examining how algorithmic tools could facilitate deliberation at scale while acknowledging the risks such technologies pose to public acceptance and participation.[33] These studies demonstrate that AI deployment reflects policy choices and organizational arrangements as well as technological affordances.

AI also demands attention as a cultural phenomenon – one that shapes not only what people see and hear but how meaning itself is produced. Recommendation algorithms curate the films, music, and news that billions of people encounter daily, structuring attention and taste.[34] These systems do not merely reflect existing preferences, they actively shape them, creating feedback loops between user behavior and algorithmic curation that make it difficult to disentangle choice from conditioning. Ethnographic research – including of cultural consumption and gig work – has traced how workers, artists, and content creators navigate these logics and how AI systems cultivate particular forms of subjectivity.[35] At the same time, these technologies are altering the infrastructure of public discourse, raising questions about the future of shared knowledge and trust.[36] Through these processes,

the deployment of AI alters the cultural ground on which social life unfolds, not determining outcomes but changing the terms on which sense is made.

The implications of AI use extend beyond governance and the law to cultural understandings of humanity itself. In particular, anthropologists and sociologists have explored how people interact with AI companions, assistants, and avatars in ways that blur the boundaries between tool, partner, and persona – raising concerns about emotional dependence and mental health.[37] Sociologist Marion Fourcade and political scientist Henry Farrell contend that large language models are already destabilizing everyday rituals that underpin trust in institutions.[38] Recommendation letters, performance evaluations, and peer review rely on repetition and formality as much as originality; when such rituals are generated by AI, their meaning shifts. Efficiency may increase, but the risk is an erosion of belief in the sincerity of others' words – a foundation on which social trust depends. Anthropologist Nick Seaver adds to this line of research by showing how the concept of "attention" has migrated from human psychology into the architecture of neural networks.[39] In machine learning, attention functions as a technical mechanism for weighing relevance, but in public life, it also names a fragile human faculty vulnerable to capture. These studies suggest that uses of AI not only extend human capacities but reconstitute them, turning attention and ritual into contested sites of agency and significance.

Finally, AI use poses challenges for knowledge production itself, including that produced by social science. Researchers increasingly rely on machine learning to analyze large datasets, identify patterns, and generate hypotheses at speeds no human team could match. These tools also introduce new epistemic risks. Anthropologist Lisa Messeri and cognitive scientist M. J. Crockett argue that AI is taken up in research as the Oracle, the Surrogate, the Quant, or the Arbiter – roles that lend an aura of authority and create "illusions of understanding," in which narrow outputs are misinterpreted as broad comprehension.[40] This raises questions about both the validity of AI-assisted findings and the distribution of epistemic authority: Who is positioned to evaluate claims generated by systems whose operations may be opaque? As AI tools become embedded in research workflows, social science disciplines face a reflexive challenge to study shifts in knowledge, trust, and epistemology in society while remaining attentive to how their own methods may be reoriented in the process.

At a high level, a consistent finding emerges from this research: AI is not an external force acting upon society from outside but an internal phenomenon constituted through social processes, institutional choices, market dynamics, and political struggles. Its effects are neither uniform nor preordained. They vary with context, design, and the distribution of power that determines how these technologies are built, deployed, and contested. A social science of AI must therefore be both empirical and normative, attentive to how algorithmic systems operate in

practice and to the values that should guide their development. The research surveyed here represents the beginnings of such an enterprise, one that treats AI not as an exogenous shock but as a central site where fundamental questions about inequality, authority, and human well-being are being negotiated.

The questions that remain are as consequential as any the social sciences have faced. Under what conditions do algorithmic systems deepen stratification, and under what conditions might they be designed to reduce it? How do interactions mediated by artificial intelligence reshape the formation of identity, community, and collective action? What institutional and political arrangements can preserve meaningful human agency in decision-making processes increasingly delegated to machines? What forms of governance are appropriate and effective for increasingly dynamic sociotechnical systems? How will societies reimagine, negotiate, or redraw the boundaries between human and machine? And as these AI models, tools, and systems are developed to be more capable, autonomous, and ubiquitous, what societal futures are being foreclosed or made possible by the choices embedded in their development? These are fundamental questions about social order and the distribution of benefits and burdens.

If AI technologies are a necessary focus of social inquiry, they are also increasingly vehicles through which social science itself is conducted. Just as the introduction of the survey, the census, statistical modeling, and qualitative data analysis platforms changed research practice in earlier periods, AI tools now extend the methodological repertoire of the social sciences in ways both generative and unsettling.[41] The challenge is to discern how these tools might enable new ways of knowing without constraining inquiry to what is most easily computable or without allowing research agendas to be determined by readily available technology rather than important questions.

AI technologies may offer significant benefits for social research. By rapidly processing vast corpora of text, images, and data, they enable social scientists to analyze patterns that would have been impossible to detect with traditional methods. AI tools can help scholars extend analysis from the microlevel of individual interactions to the macrolevel of global networks, opening new vantage points on how culture, politics, and economy evolve. They may help accelerate research workflows, facilitate comparative analysis across time and place, and generate synthetic datasets that allow testing of counterfactuals. These capacities could advance disciplinary debates and strengthen the public role of social science, potentially equipping researchers to respond to urgent issues with rigor and dispatch, including about the social and political implications of AI technologies and the companies developing them.[42]

Over a decade ago, I joined colleagues in calling for a new "computational social science." In the journal *Science*, we argued that the massive digital traces generated by

commercial online activity opened unprecedented opportunities for social inquiry.[43] Harnessing these data required collaboration across disciplines – computer science, sociology, political science, economics, and law – and demanded careful attention to ethics, privacy, and interpretation. Computational social science promised to extend the scope of what social scientists could do and know, allowing contemporaneous analysis of social dynamics at the population level. But it also carried risks of distortion if pursued uncritically, treating data as ends in themselves rather than as a partial means of illuminating social life.[44]

That call is now renewed in the age of AI, though with greater caution. Where computational social science once relied on analyzing digital traces – search queries, social media posts, mobile phone records – AI introduces generative and "predictive" systems that actively structure those traces and can even generate synthetic ones. Social scientists are no longer just analyzing human and social behavior as mediated by digital tools; they are also analyzing environments already shaped by artificial intelligence and increasingly using algorithms themselves to conduct research.[45] AI is not simply another source of data. It is an array of novel research instruments, sometimes productive and sometimes misleading, that reconfigures facets of social research and demands far more critical scrutiny than it has received to date.

Examples from across disciplines illustrate the potential and the limits of this methodological transformation. In sociolinguistics, large language models have opened new possibilities for analyzing language acquisition and processing. Trained on massive text corpora, these models learn broad statistical regularities of language – what linguist Emily M. Bender and colleagues have described as "stochastic parroting" – that researchers can nonetheless leverage to explore linguistic patterns.[46] While these models do not "understand" language as humans do, their performance provides a new lens for testing hypotheses about the structure of language and the nature of learning it.

In applied economics, machine-learning methods enable real-time analysis of market sentiment, drawing on streams of text from news, social media, and financial disclosures.[47] Economists can now study the feedback loops between information and behavior, revealing dynamics that were once opaque.[48] Yet these methods also raise concerns. Forecasting models that integrate AI tools may improve the accuracy of "predictions" at the cost of interpretability, and with limited capacity to explain the mechanisms driving research findings or economic outcomes. The field confronts a trade-off between robustness, methodological transparency, and shared evidentiary standards.

In sociology, the use of artificial intelligence can enable massive-scale content analysis that can trace cultural change or the diffusion of social activity across millions of documents and posts. Thus, researchers can now combine qualitative findings with computational breadth. For example, sociologist Christopher Bail's experiments with AI-mediated social simulation demonstrate how algorithms can

model the dynamics of polarization, offering new ways to test hypotheses about how beliefs spread and harden.[49] These models open possibilities for exploring counterfactual explanations, but they also underscore the risk of naturalizing assumptions embedded in algorithmic design.

Political science has likewise embraced AI for modeling, particularly in the study of electoral behavior and policy outcomes. Models trained on historical data can attempt to forecast voter turnout, partisan shifts, or policy adoption.[50] Yet "predictive" success does not translate into explanatory depth. Algorithmic models can reproduce observed patterns without shedding light on underlying mechanisms, raising questions about how much weight these analyses should merit for explanation and theory building.

At the same time, AI-powered survey research offers efficiency and scalability but raises concerns about systematic exclusion and rigor. These methods may misrepresent vulnerable populations who are less digitally visible or whose linguistic patterns diverge from dominant training data, replicating patterns of exclusion that have long characterized both social research and the institutions it studies.[51] Communities already subject to disproportionate surveillance – through policing, welfare administration, or immigration enforcement – may find themselves rendered simultaneously hypervisible to state systems and invisible to the research intended to illuminate their conditions. A study might generate findings that appear generalizable while omitting those most affected by policy.[52] Moreover, the nascent use of AI-generated research participants may pose an "existential threat" to social science, as it destabilizes the boundary between human and artificial actors and calls into question whether online research can still reliably capture authentic human behavior.[53] These problems are not unique to the use of algorithmic tools in research, but the velocity of AI-assisted research amplifies their stakes.

The prudent use of AI technologies raises the possibility of exploring complex questions that have been central to social science but remain difficult to examine fully with existing approaches. How does collective action evolve and how is it sustained over time? How do informal economies operate at scale and how are they shaped by patterns of social interaction and influence? How does language influence cognition and culture? How do communities build resilience not only in the face of environmental or economic shocks but also amid shifting social and technological conditions? How do information, narratives, and norms shape decision-making, conflict, and cooperation across societies – both domestically and transnationally? How do social institutions sustain legitimacy and facilitate cooperation in rapidly changing social environments?

Realizing this potential depends on how AI tools are designed and integrated into social inquiry. Progress in this area will require technologies that do not yet exist or remain underdeveloped: models designed for interpretability and explain-

ability; systems trained on ethically acquired and representative data rather than convenience samples of the digitally visible or digitally vulnerable; tools capable of integrating qualitative and quantitative evidence and engaging interpretive complexity rather than collapsing it into discrete classifications. If AI developers in industry and academia oriented their work toward these goals – in partnership with social researchers and communities – the result could be not merely incremental improvements but a genuine expansion of what the social sciences can know and do.

Yet realizing this potential requires methods that artificial intelligence alone cannot provide. Ethnographic practice – long-term engagement, trust building, and attentiveness to what is not said as much as what is – can reveal the subtle ways AI is embedded in social life.[54] Such approaches are particularly essential for understanding how AI is experienced differently across communities shaped by race, class, and geography – differences that aggregate data routinely obscure. Without such grounding, studies risk reproducing the very opacity they critique. If ethnographic grounding is essential, so too is direct engagement with the systems under study. In work with journalist Julia Angwin and technologist Rina Palta, I examined how five widely used chatbots responded to questions about U.S. elections. The study found that these systems routinely generated inaccurate, incomplete, or misleading answers.[55] The project highlighted both the utility of AI in stress testing automated information systems and the necessity of independent, human-driven evaluation to assess their societal risks.

The lesson across these examples is that AI technologies can be uneven research tools. As Messeri and Crockett caution, AI risks becoming a "hammer seeking nails," tempting researchers to fit questions to available tools rather than developing tools adequate for meaningful questions.[56] This dynamic threatens to narrow inquiry to what is most legible to algorithms while neglecting issues that require interpretive or contextual approaches. A related but distinct concern applies to the widespread use of off-the-shelf AI models. Trained on opaque, unrepresentative, or historically biased corpora, such tools compromise the validity and reproducibility of research even when the questions themselves are well conceived.

Meeting these challenges will require movement on several fronts. The most promising path forward lies in research that combines ethically developed and responsibly deployed algorithmic tools with the depth of qualitative and theoretical analysis. Machine learning might identify patterns across large datasets, which social scientists then interpret through ethnographic or historical methods that situate findings in social relations and illuminate their significance. Such collaborations could open forms of inquiry that neither algorithmic nor interpretive approaches can achieve alone, expanding the reach of social science while preserving a commitment to better understanding social complexity. This will demand vigilance, however, and resistance to the temptation to treat AI tools and systems as value-free instruments or to let computational outputs set the terms of social inquiry.

New validation techniques are also required. Many AI models, tools, and systems are black boxes. Incorporating them uncritically into research could render social science itself opaque. Social scientists need methods to benchmark AI-assisted findings against established approaches, to test robustness across models, and to make transparent the assumptions embedded in training data.[57] Without such validation, the field may cede its explanatory force to systems it cannot fully interrogate, producing results without the accountability and transparency on which scholarly credibility depends.

These problems are not incidental to proprietary AI models – they are fundamental to their design. When corporations control the most powerful systems, academic researchers become users rather than architects of their own methods. Training data remain undisclosed, model updates arrive without warning, and access can be revoked or priced beyond reach. Open-source alternatives – models, tools, and systems with training data, architectures, and governance that are transparent to research communities and others – address these epistemic limitations directly. There is a strong case that social science should refuse proprietary AI models entirely. The epistemic requirements of scholarly inquiry may be fundamentally at odds with profit-driven, black-boxed systems whose training data, architecture, and governance remain inaccessible to most researchers. Developing such alternatives requires investment and collaboration, but the payoff is research infrastructure that serves scholarship rather than market imperatives. This is not antitechnology sentiment but a defense of what distinguishes research from consultancy: the imperative that claims about the social world be contestable and answerable to communities of inquiry.

The development of renewed ethical frameworks for advanced AI use in social science is equally urgent and should draw on the field's insights about technology, power, and social order. Just as research standards for consent and protection of human subjects evolved over the twentieth century, so too must frameworks for AI-augmented research evolve now. This includes attention to how training data are sourced, how outputs are used, and how participants' autonomy is respected.[58] It also requires scrutiny of how AI-mediated research may reinforce the very inequities many social researchers study: for instance, by drawing on data generated through surveillance of marginalized communities, by contributing to environmental pollution, or by disrupting social cohesion. AI models, tools, and systems have both great potential and profound limitations. Used uncritically for social science, they risk narrowing the horizons of inquiry; used reflexively, they may expand how social science can contribute to public understanding. The aim is to develop a practice of social science research with artificial intelligence that is theoretically innovative, methodologically rigorous, ethically responsible, and socially relevant. Such a practice could enable researchers to address pressing social problems with new precision – work developed in partnership with affected communities, atten-

tive to historical inequities, and subject to ongoing evaluation. This future social science could not only illuminate social challenges but help envision and test interventions with both technical capacity and moral imagination.

Artificial intelligence is more than just another tool of modern life. It reorganizes labor, governance, knowledge, and culture, unsettling categories that once seemed stable, and compelling the social sciences to confront perennial questions of freedom, inequality, and meaning anew. The specifics will change; the models that dominate today will be superseded, the policy debates will shift, the applications we now find novel will become infrastructural and invisible. But the underlying challenge – of understanding how technologies remake the conditions of social existence – will persist, as will the need to remain attentive to who benefits, who is harmed, and what possibilities are opened and foreclosed.

History offers some guidance. Moments of rupture – industrialization, mass migration, the rise of digital networks – have always demanded conceptual reinvention. Social scientists of earlier generations developed new frameworks to make sense of factory labor, bureaucratic organization, and the transformation of public life by mass media. The advent of advanced AI represents another such rupture, distinguished by its reach, velocity, and entanglement with the most intimate dimensions of everyday life. AI now shapes the conditions under which perception, communication, and decision unfold, and does so in ways that strain our existing vocabularies.

For social science, this is not merely a challenge but a responsibility. Few other domains of inquiry are better positioned to address the issues that matter most today and in the future. These questions cannot be left to technologists alone. They demand the distinctive capacities of social science: the ability to trace connections between individual lives and structural forces, to historicize the apparently unprecedented, to center the perspectives of those most affected, and to insist that the way things are is not the way they must be.

The stakes could not be more consequential. AI is already shaping who gets hired, who gets surveilled, who receives care, and whose voice is amplified or suppressed. Left to the vagaries of market imperatives and technical optimization, these systems will reproduce and entrench the uneven social conditions that social scientists have long documented and sought to resolve. Yet this outcome is not inevitable.

This essay has been cautionary throughout. It must, however, conclude with some optimism. If social science rises to meet this moment, a new generation of researchers, trained in both AI-mediated methods and interpretive traditions, will produce knowledge that is at once rigorous and humane. Their work informs the design, deployment, and governance of AI systems that expand human well-being rather than rationing it by algorithm. Decision-makers draw on social scientific evidence to craft frameworks that are adaptive, accountable, and attentive to the communities most affected by technological change. The social science field of

play – perhaps no longer organized by disciplines as we know them – will forge new partnerships with developers and engineers who welcome normative scrutiny and legal guardrails, with compensated artists and humanists who bring different ways of framing and imagining, with communities who help shape research agendas, and with publics who demand that artificial intelligence serve the common good rather than narrow interests. Social science itself is transformed : its methods enriched by tools it has learned to use critically, its questions sharpened by the weight of what is at stake, and its influence amplified by recognition that serious, publicly engaged social theory and inquiry are indispensable to any future worth wanting.

AUTHOR'S NOTE

I am grateful to James Manyika and M. J. Crockett, as well as members of the Science, Technology, and Social Values Lab at the Institute for Advanced Study, for their thoughtful feedback on this essay.

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