

Article

Misinformation Research at the National Science Foundation

William Sims Bainbridge¹¹ wsbainbridge@gmail.com

Abstract: Promotion of misinformation online has become common, usually defined as false or inaccurate assertions without clear motivation, in contrast to unethical disinformation that is consciously intended to mislead. However, misinformation raises ethical questions, such as how much obligation a person has to verify the factual truth of what they assert, and how many cases were intentional falsehoods that simply could not be proven to come from liars. Since the beginning of the current century, the National Science Foundation supported much research intended to understand misinformation's social dynamics and develop tools to identify and even combat it. Then in 2025, the second Trump administration banned such research, even cancelling many active grants that funded academic projects. Examination of representative research identifies ethical debates, the cultural differences across the relevant divisions of NSF, and connections to related questions such as the human implications of artificial intelligence. This clear survey of the recent history of research on false information offers the background to support future science and public decisions about what new research needs to be done.

Keywords: misinformation, disinformation, artificial intelligence, ethics, National Science Foundation

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1. Introduction

The history of the National Science Foundation seemed to be reliable progress, since its creation in 1950 as the primary US government agency funding research across the scientific disciplines, until in 2025 a major crisis struck that brought into question NSF's future as well as how we should understand its past. NSF had been experiencing a slow evolution from emphasis on "pure science" to "applied engineering" although often described with the paradoxical term, "computer science" (Brooks 1973; Carter 1979; England 1983; McCray 2009). Especially noteworthy was the addition in 1986 of the Computer and Information Sciences and Engineering (CISE) Directorate to its organizational structure (National Research Council 1999; Freeman, Adrion and Aspray 2019). The second administration of President Donald Trump proclaimed NSF must culturally transform itself, including limitation of research on misinformation and disinformation, while advancing related forms of artificial intelligence.

On January 20, 2025, Trump ordered actions for "Restoring Freedom of Speech and Ending Federal Censorship," with this apparently ethical justification: "Under the guise of combatting 'misinformation,' 'disinformation,' and 'malinformation,' the Federal Government infringed on the constitutionally protected speech rights of American

citizens across the United States in a manner that advanced the Government's preferred narrative about significant matters of public debate. Government censorship of speech is intolerable in a free society."¹ In April, some active NSF grants judged to concern misinformation were cancelled, along with many grants that seemingly promoted Diversity, Equity, and Inclusion (DEI) following the ethical agenda of Trump's opponents. This article seeks to provide a social science background for understanding the culture of misinformation research, conducted also from the perspective of human-centered computing, given that the status of social sciences at NSF has been unstable and often problematic (Alpert 1954, 1955, 1957; Larsen 1992; Solovey 2020).

Very quickly, an independent website named Grant Witness began listing the grants cancelled at NSF and at the National Institutes of Health.² Then on May 23, NSF made public its own list of 1,752 active grant cancellations, which did not classify them by cause, and a few were later removed in response apparently to legal challenges.³ I searched the NSF grant abstracts database for "misinformation," "disinformation," and "malinformation," finding that 263 had "misinformation," 73 had "disinformation," and 22 contained both "misinformation" and "disinformation." None of the grants used the term "malinformation," which Wikipedia defines interestingly as "information which is based on fact, but removed from its original context in order to mislead, harm, or manipulate."⁴ Among the identified grants, 68 had been cancelled, while most of the others had already completed their research. Communication with a few of the principal investigators of cancelled grants revealed that they had been given no explanation why theirs was not worthy of continuing, and they were told they had no right to appeal that decision.

Here we shall also use a different database at the National Science Foundation to understand the meaning of "misinformation" and how it should be studied and perhaps combatted by social and computer scientists. In recent years, NSF has been developing the policy that all publications based on NSF funding must soon be freely available to anyone, and now includes vast numbers of them in an online archive: "In support of NSF's plan for providing public access to its funded research, the NSF Public Access Repository (PAR) is the designated repository where NSF-funded investigators deposit peer-reviewed, published journal articles and juried conference papers. PAR also provides search mechanisms to enable you to find and use these articles and papers."⁵ On August 9, 2025, I searched PAR for publications including the word "misinformation," finding 303 of them that offered complete references. I told the search tool to sort the results by date. The two earliest publications, dating from 2011, plus 15 from 2020 that focused on the COVID pandemic, provide a good introduction to their content, the diversity of grant types, and our methods for learning from them.

2. Entering the Misinformation Culture

The first example is a 2011 study by Philip N. Howard and Muzammil M. Hussain, which can be accessed in two versions which have different titles. At the website of the *Journal of Democracy*, we could pay \$25 to get the full issue that included “The Upheavals in Egypt and Tunisia: The Role of Digital Media.”⁶ NSF’s Public Access Repository offers the free publicly accessible full text titled “Digital Media and the Arab Spring.”⁷ To be sure, the journals deserve our respect. Yet for readers who do not have access to major academic libraries, it is too expensive to scan through a large number of journal articles. So we shall use a publication for free from PAR, if one is available, and here is the paragraph that contains the word “misinformation:”

After ignition, the street battles of political upheaval began, albeit in a unique manner. Most of the protests in most of the countries were organized in unexpected ways that made it difficult for states to respond. The lack of individual leaders made it hard for authorities to know whom to arrest. Activists used Facebook, Twitter, and other sites to communicate plans for civic action, at times playing cat-and-mouse games with regime officials who were monitoring these very applications. In Libya, foes of the Qadhafi dictatorship took to Muslim online-dating sites in order to hide the arrangements for meetings and protest rallies. In Syria, the Asad regime had blocked Facebook and Twitter intermittently since 2007, but reopened access as protests mounted, possibly as a way of entrapping activists. When state officials began spreading misinformation over Twitter, activists used Google Maps to self-monitor and verify trusted sources. Then too, authorities often flubbed their information-control efforts. Mubarak disabled Egypt’s broadband infrastructure yet left satellite and landline links alone. Qadhafi tried to shut down his country’s mobile-phone networks, but they proved too decentralized.

Each publication in PAR has a page giving information about it, including the related NSF grant or grants, and the connection for this one was grant 1144286 with this title: RAPID Social Computing and Political Transition in Tunisia.⁸ As explained in the NSF Proposal and Award Policies and Procedures Guide, “RAPID is a type of proposal used when there is a severe urgency with regard to availability of or access to, data, facilities or specialized equipment, including quick-response research on natural or anthropogenic events and similar unanticipated occurrences.”⁹ This grant’s abstract begins by explaining why rapid funding was needed: “This Grant for Rapid Response Research (RAPID) project will study patterns of learning, design, and repurposing in social computing by networks of activists preparing for the upcoming Tunisian elections.”¹⁰ The total budget of a RAPID grant is limited to \$200,000, and principal investigator Howard received just \$45,625. External peer review for this kind of small grant is not necessary, and usually the cognizant program officer writes a review-like recommendation for approval by the director of the NSF division that would provide the money.¹¹

Today we may well imagine that several governments not only promote misinformation but also use computer systems based on research in this area to identify online sources that

are critical of them, and shut them down as if they were misinformation. More moderately, today's highly advanced text-based large language models employed by search engines and chatbots can identify websites and other publications that state controversial ideas. Critics can then either simply post warnings about them, or link sources that may be more truthful. Researchers and journalists could use that technology more fairly, to map the political ideologies and other forms of culture that distinguish different online sources.

The second PAR publication, in chronological order, was based on a very different kind of NSF grant and had the title CAREER: Information Misperceptions in the Internet Era.¹² The capitalized word CAREER indicates that this grant was made in a special competition which many NSF programs have conducted annually for three decades. Its March 3, 2011, announcement, which was in effect when this grant was made, described it as "a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations."¹³ To be eligible, a scientist or engineer needed to have earned a doctorate but not yet academic tenure, and indeed getting a CAREER grant nearly ensured the recipient would get tenure, whether at their current institution or a new one. These grants are often "continuing," which means that the funds are provided by NSF in annual increments, and they tend to last five years.

As CAREERs are always made just to one individual, in this case Robert Garrett received \$536,771 to support his research, at Ohio State University. His OSU web page says he is now a full professor and director of the School of Communication.¹⁴ His public website summarizes his early research area: "Political misperceptions and the Internet: The past three U.S. Presidential elections have provided a fascinating window into how the Internet is shaping the flow of political misperceptions. Using a nationally representative survey conducted in 2008, representative three-wave panels conducted in 2012 and 2016, and online experiments, my students and I are examining the relationship between online news use, exposure to falsehoods and their rebuttals, and beliefs."¹⁵ His first publication that turned up in the PAR search was titled "The Promise and Peril of Real-Time Corrections to Political Misperceptions," and had this informative abstract:

Computer scientists have responded to the high prevalence of inaccurate political information online by creating systems that identify and flag false claims. Warning users of inaccurate information as it is displayed has obvious appeal, but it also poses risk. Compared to post-exposure corrections, real-time corrections may cause users to be more resistant to factual information. This paper presents an experiment comparing the effects of real-time corrections to corrections that are presented after a short distractor task. Although real-time corrections are modestly more effective than delayed corrections overall, closer inspection reveals that this is only true among individuals predisposed to reject the false claim. In contrast, individuals whose attitudes are supported by the inaccurate information distrust the source more when corrections are presented in real time, yielding beliefs comparable to those never exposed to a correction. We find no

evidence of real-time corrections encouraging counterargument. Strategies for reducing these biases are discussed.¹⁶

Garrett's co-author, Brian E. Weeks, was at the time a graduate student in communication at OSU, and is now tenured at University of Michigan.¹⁷ An article in PAR titled "Emotions, Partisanship, and Misperceptions" was authored by Weeks alone: "This experimental study demonstrates that the independent experience of two emotions, anger and anxiety, in part determines whether citizens consider misinformation in a partisan or open-minded fashion."¹⁸ Written by Weeks and Garrett, "Electoral Consequences of Political Rumors" analyzed already existing "national telephone survey data collected immediately after the 2008 U.S. presidential election."¹⁹ Two publications included other authors to analyze survey data from the 2012 presidential election. "Driving a Wedge Between Evidence and Beliefs" documented that "exposure to ideological online news media contributes to political misperceptions."²⁰ "Partisan Provocation: The Role of Partisan News Use and Emotional Responses in Political Information Sharing in Social Media" found that "partisan media may drive online information sharing by generating anger in its audience." Searching separately by the grant number, rather than "misinformation," turned up this additional publication based on both 2008 and 2012 election data: "Candidate Vulnerability and Exposure to Counterattitudinal Information" found that "as the defeat of a supported candidate appears more likely, attention to counterattitudinal content will increase," using the term "counterattitudinal" to refer to an apparent change in the person's perspective.²¹

On March 5, 2020, NSF announced a special pandemic-related competition for RAPIDs, "accepting proposals to conduct non-medical, non-clinical-care research that can be used immediately to explore how to model and understand the spread of COVID-19, to inform and educate about the science of virus transmission and prevention, and to encourage the development of processes and actions to address this global challenge."²² On March 27, the US government enacted the "Coronavirus Aid, Relief, and Economic Security Act," or the "CARES Act," which included a \$75,000,000 appropriation for NSF.²³

Table 1 lists the subset of RAPIDs that turned up in the "misinformation" search, arranged in terms of the NSF divisions that managed them. The first two grants in the table were funded by the Computer and Network Systems (CNS) division of the Computer and Information Science and Engineering (CISE) directorate. Its current statement says it "supports research on computer and network systems, cyber-physical systems and cybersecurity and their role in strengthening the security and resilience of the U.S. cyberinfrastructure and cyberspace - key to national security and economic growth. This includes research on hardware and software systems, future generation computing, secure and resilient cyberinfrastructure, and security, privacy and trust in cyberspace research."²⁴ That quotation correctly identifies CNS as a major source for studies to understand and solve online ethical problems, including misinformation.

Table 1: NSF Grants that Explored Misinformation in the Pandemic

Directorate and Division	Grant ID and Title	Cost
CISE: Computer and Network Systems	2026945: Tracking and Evaluation of the Coronavirus (COVID-19) Epidemic Propagation by Finding and Maintaining Live Knowledge in Social Media	\$150,000
	2027792: How Scientific Data, Knowledge, and Expertise Mobilize in Online Media during the COVID-19 Crisis	\$197,538
CISE: Information and Intelligent Systems	2027360: Understanding Community Response in the Emergence and Spread of Novel Coronavirus through Health Risk Communications in Socio-Technical Systems	\$79,380
	2027713: Countering COVID-19 Misinformation via Situation-Aware Visually Informed Treatment	\$104,491
	2027750: Ensuring Integrity of Covid-19 Data and News Across Regions	\$199,748
	2027689: Tackling the Psychological Impact of the COVID-19 Crisis	\$199,871
EDU: Research on Learning in Formal and Informal Settings	2028012: Dynamic Interactions between Human and Information in Complex Online Environments Responding to SARS-COV-2	\$91,928
ENG: Civil, Mechanical, and Manufacturing Innovation	2027375: Geospatial Modeling of COVID-19 Spread and Risk Communication by Integrating Human Mobility and Social Media Big Data	\$82,041
SBE: Behavioral and Cognitive Sciences	2027375: Geospatial Modeling of COVID-19 Spread and Risk Communication by Integrating Human Mobility and Social Media Big Data	\$199,888
SBE: Office of Multidisciplinary Activities	2031768: Tracking and Network Analysis of the Spread of Misinformation Regarding COVID-19	\$149,858
SBE: Social and Economic Sciences	2030694: Vulnerable Populations, Online Information, and COVID-19	\$85,427
	2029039: Coronavirus Risk Communication: How Age and Communication Format Affect Risk Perception and Behaviors	\$49,133
	2027387: Rumor Diffusion During Unrest	\$74,000
	2028374: Visualizing Epidemical Uncertainty for Personal Risk Assessment	\$191,696
	2029420: Automated Extraction and Validation of the Gist of Social Media Messages about COVID-19	\$206,375

The abstract of the first grant explicitly states: “This project addresses the technical challenges of finding new, verifiable facts from noisy online media and social networks in a timely manner. Social media contain the necessary timely information, but they also carry significant challenges represented by misinformation, disinformation, and concept drift.”²⁵ The second grant’s abstract says its “research project seeks to understand how scientific knowledge, expertise, data, and communication affect the spread and correction of online misinformation about an emerging pandemic. The project team is investigating how information moves through social media platforms and jumps to and from other media platforms, including traditional journalism - online, print, and broadcast outlets. It aims to uncover how claims and statistics related to scientific knowledge and expertise shape, and are shaped by, these information and influence dynamics.”²⁶

Two other NSF divisions supported multiple RAPIDs in this set. Also in CISE, Information and Intelligent Systems “invests in research and education that explore the dynamic interactions between people, computers and information, including artificial intelligence, robotics and human-centered computing.”²⁷ In NSF’s directorate for Social, Behavioral and Economic Sciences (SBE), the Social and Economic Sciences (SES) division “advances fundamental understanding of how people live, work and cooperate with one another. The evidence and insight that researchers generate with SES support help improve quality of life, institutional effectiveness and economic prosperity.”²⁸ In Table 1, we do not see three of the seven NSF directorates that existed in 2020: Biological Sciences, Geosciences, or Mathematical and Physical Sciences, while two are represented just once: STEM Education (EDU) and Engineering (ENG). If the National Science Foundation represents the convergent culture of science and engineering, then each division may represent a subculture within it.

3. Social, Cognitive and Computer Cultures

Having used a small group of projects related to COVID-19 as a coherent example, we now expand the scope to cover misinformation concerning any topic. The large number of cases in the full PAR dataset overwhelmingly represent the three NSF divisions just described, but two others had more than 10 cases and should be added to our analysis to provide comparisons. The EDU directorate used to be EHR, an abbreviation for “Education and Human Resources,” yet liked to think of itself as the stem of the NSF tree, rather than a mere branch, so it became STEM Education. Actually, STEM stands for “Science, Technology, Engineering, Mathematics.” Its goals remain human-centered, if not primarily research-focused: “to develop a well-informed citizenry and a diverse and capable workforce of scientists, technicians, engineers, mathematicians and educators.”²⁹ The Graduate Education division “supports graduate students and the development of innovative programs to prepare tomorrow’s leaders in STEM fields.”³⁰ The Behavioral and Cognitive Sciences division of SBE “supports research on the brain, human cognition,

language, social behavior and culture, including research on the interactions between human societies and their environments.”³¹

Before examining how five NSF subcultures relate to misinformation, we must mention that the total \$228,392,317 cost of the grants in Table 2 overestimates the investment in research on misinformation. Several grants included it only as a minor topic, but we do not know what fraction, and the economic significance of NSF has come under risk. The May 30, 2025, budget request to Congress reported that a total of about \$9,263,930,000 had been invested in fiscal year 2024, while only \$4,143,610,000 was initially requested for fiscal year 2026.³² Yet outside the plan to exclude misinformation research, no reductions were expected in NSF investments in artificial intelligence research. In the current political chaos, support for NSF and the organization of its directorates have become highly uncertain.

Table 2: Grants Related to Misinformation in NSF’s Public Access Repository

Directorate and Division of National Science Foundation	Grants	Cost	Papers	Articles
BIO: Environmental Biology	7	\$10,198,164	1	6
BIO: Integrative Organismal Systems	2	\$811,201	0	2
BIO: Molecular and Cellular Biosciences	1	\$543,168	0	1
CISE: Computer and Network Systems	61	\$55,896,272	38	34
CISE: Computing and Communication Foundations	9	\$9,894,307	2	4
CISE: Information and Intelligent Systems	77	\$46,000,232	54	34
CISE: Office of Advanced Cyberinfrastructure	6	\$4,479,541	3	3
EDU: Graduate Education	12	\$17,162,648	7	8
EDU: Research on Learning in Formal and Informal Settings	5	\$7,524,594	0	5
EDU: Undergraduate Education	5	\$1,858,260	1	5
ENG: Civil, Mechanical, and Manufacturing Innovation	9	\$4,288,187	3	7
ENG: Engineering Education and Centers	1	\$177,067	0	1
ENG: Electrical, Communications and Cyber Systems	2	\$611,576	0	1
GEO: Earth Sciences	1	\$249,862	0	1
GEO: Integrative and Collaborative Education and Research	1	\$19,255,398	0	1
MPS: Mathematical Sciences	2	\$595,395	0	1
O/D: Office of Integrative Activities	1	\$20,000,000	5	0
SBE: Behavioral and Cognitive Sciences	13	\$8,271,633	2	16
SBE: Office of Multidisciplinary Activities	8	\$3,746,249	3	7
SBE: Social and Economic Sciences	31	\$9,034,339	10	32
TIP: Innovation and Technology Ecosystems	2	\$6,597,966	2	1
TIP: Translational Impacts	2	\$1,196,258	2	0

The one award listed from Office of Integrative Activities (OIA), a non-division in the Office of the Director (O/D) of NSF, cost a remarkable \$20,000,000, but is noteworthy for

the questions it raises about the nature of “scientific publication” these days. It was not a grant but a *cooperative agreement*, which implies that NSF personnel would have a more active role in its work. As of August 20, 2025, NSF’s Public Access Repository included 224 publications that cited this funding source. Only 9 were listed on its abstract page, but publication links are not expected there until the project’s final report is submitted, estimated to be after June 30, 2026.³³ While the abstract does not mention “misinformation,” it could be inferred in the project’s goal to establish “a consortium of Arkansas researchers with a synergistic, integrated focus on excellence in data analytics research.” Thus many divisions and offices at NSF may have only limited connections to research actually focused on misinformation.

Of the 5 OIA publications in Table 2, three currently have links in PARs. One connects to a chapter titled “Misinformation Campaigns” in a German book about the digital transformation of the media, dedicated to a deceased German-American, Rolf Wigand, who received NSF grants while he was a professor at the University of Arkansas.³⁴ Indeed, Wigand was counted as a co-author with Samer Al-khateeb, who had earned his degrees at Arkansas, and Nitin Agarwal who is a professor there now. The chapter’s abstract reports: “We found that social media platforms, especially blogs, provide a fertile ground for irresponsible citizen journalism to flourish... The rogue side of citizen journalism can include disseminating misinformation, agitation and propaganda, content mocking, biased or offensive contents, etc. In this research, we try to understand rogue citizen journalism from social science perspective using a socio-computational informed methodology.” The other two papers, by Nitin Agarwal and some Arkansas colleagues, were given in workshops on Reducing Online Misinformation through Credible Information Retrieval, held in the 2022 and 2023 meetings of the European Conference on Information Retrieval.³⁵

A similar case is the one in Table 2 from the Geosciences directorate, a cooperative agreement for \$19,255,398 devoted to ocean-related research on “complex interactions between climate hazards and communities to inform governance of coastal risk.”³⁶ It already had 64 publication links on its abstract, including the one article that mentioned misinformation.³⁷ Another case was hidden in the funding from Computer and Network Systems, fully \$25,127,344 to create “a city-scale platform for advanced wireless research that will be deployed over the period 2018 - 2023 in Salt Lake City, Utah.”³⁸ While the abstract links to 36 publications, the one most relevant here is titled “Multipath Multicarrier Misinformation to Adversaries,” which links to three other CNS projects in this set. That conference paper explores the possibility of using misinformation defensively, sending false messages to eavesdroppers in defense against their violation of the user’s privacy, specifically on a wireless channel but developing design principles that might be adapted more generally to online communication.³⁹

Within the Computer and Network Systems division, the program most central to research on technology-based misbehavior is Secure and Trustworthy Cyberspace, usually called SaTC and pronounced “SAT-see,” which apparently managed 36 of the CNS grants in Table 2. The SaTC announcement posted on October 31, 2023, proclaimed: “Achieving a truly secure cyberspace requires addressing both challenging scientific and engineering problems involving many components of a system, and vulnerabilities that stem from human behaviors and choices. Examining the fundamentals of security and privacy as a multidisciplinary subject can lead to fundamentally new ways to design, build, and operate cyber systems; protect existing infrastructure; and motivate and educate individuals about cybersecurity.”⁴⁰ In a long list of goals, it mentioned: “studying and modeling the methods and motivations of actors in the creation, dissemination, consumption, sharing, and evolution of (mis/dis)information online; imbalance and polarization due to misinformation and/or lack of accountability.” Although SaTC’s home was in CISE, many divisions across NSF partnered in the multidisciplinary effort, and among the priorities for the Social, Behavioral, and Economic Sciences division was “predicting, understanding, and countering effective responses by individuals or organizations to misinformation and manipulation of online content and processes, and cyber-attacks and threats.”

Initially, the increasing social significance of online misbehavior caused NSF to redesign SaTC, but the politicization of issues like misinformation played a role as well. In 2023, NSF funded workshops that deeply considered how SaTC could be improved.⁴¹ In connection, a book-length *Secure and Trustworthy Computing 2.0 Vision Statement* was assembled by Patrick McDaniel and Farinaz Koushanfar (2023, 165), which examined misinformation repeatedly, including this clear recommendation:

Misinformation and information manipulation is an attractive venue for attackers and malicious entities; by attempting to change the belief state of the target entity (individual or public), adversaries can significantly impact the individual or public’s decision-making process. Misinformation has many forms, such as video, audio, memes, etc. Social media is a big enabler of misinformation, and so is mass media. Depending on the type of manipulated information, the process can follow different procedures ranging from traditional spamming campaigns to large scale fake information propagation in social media. Connection to SaTC: information manipulation can be viewed, in part, as attacks on decision making. From SaTC (security) perspective, it would be useful to think about information manipulation/information integrity research as research on cognitive security.

Yet when NSF announced “SaTC 2.0” on December 5, 2024, it had a new name, Security, Privacy, and Trust in Cyberspace, and its public announcement did not mention any word like “misinformation” or “manipulation.”⁴² Currently it “supports interdisciplinary research and education to develop a secure, resilient and trustworthy global cyber

ecosystem by addressing vulnerabilities, improving trust in cyber systems and cultivating a well-trained cybersecurity workforce.”⁴³

Both CNS and Information and Intelligent Systems (IIS) are coincidentally listed in Table 2 as having 34 journal articles, while conference papers were more common, 38 and fully 54. In contrast, the two SBE divisions tended to have far more articles than papers given at conferences, perhaps reflecting cultural differences between the disciplines, such as urgency for quick results in computer science, or simply that computer scientists have more access to travel money through NSF grants.

All 77 of the grants listed for the Information and Intelligent Systems division of CISE were managed by directors of its three programs, although 17 of them were funded through special sources, such as the COVID competition. The Robust Intelligence program, which is NSF’s most established source of funding for artificial intelligence research, funded just 12 of the grants, while coincidentally each of the other two funded 24. Information Integration and Informatics (III) supports “computational and AI research on the full data life cycle, from collection through archiving, analysis and discovery, to maximize the utility of information resources for science and engineering.”⁴⁴ Human-Centered Computing (HCC) supports “interdisciplinary research in human-computer interaction to design technologies that amplify human capabilities and to study how human, technical and contextual aspects of computing and communication systems shape their benefits, effects and risks.”⁴⁵ The two largest funded by each of III and HCC well illustrate their significance as well as scope.

III invested \$1,144,224 in Ask the Experts: Generating Question-Answer Pairs for Addressing Information Deficits about Vaccines.⁴⁶ One of its publications, “Development and Validation of VaxConcerns,” offered a taxonomy of vaccine concerns and misinformation, and began: “The reluctance of individuals to get vaccinated, despite the availability of vaccines, poses a challenge in the prevention and control of infectious diseases. This phenomenon, termed vaccine hesitancy, is exacerbated by misinformation (i.e., factually incorrect statements regarding vaccines).”⁴⁷ The other big III grant, Efficient Collaborative Perception over Controllable Agent Networks, received \$1,232,000 to “study how to jointly search across data sources by mapping the information coming from all data sources to a common information space.”⁴⁸ This would have many applications, including developing an online consensus that could combat misinformation. A resulting publication examining the difficult collaboration between human and AI evaluations, began: “In recent years, we have experienced the proliferation of websites and outlets that publish and perpetuate misinformation. With the aid of social media platforms, such misinformation propagates wildly and reaches a large number of the population, and can, in fact, have real-world consequences. Thus, understanding and flagging misinformation on the web is an extremely important and timely problem, which is here to stay.”⁴⁹

When an HCC grant titled Improving Human-AI Collaboration on Decision-Making Tasks was made in 2021, it cost the initial maximum for a so-called “Medium” grant, \$1,200,000, then in 2025 it received a supplement of \$30,000 to total \$1,230,000.⁵⁰ A publication titled “A Comparative Evaluation of Interventions Against Misinformation” reported results from this methodology: “During the COVID-19 pandemic, the World Health Organization provided a checklist to help people distinguish between accurate and misinformation. In controlled experiments in the United States and Germany, we investigated the utility of this ordered checklist and designed an interactive version to lower the cost of acting on checklist items.”⁵¹ It reported that users faced many challenges in attempting to assess whether online claims are misinformation; the benefit from different tools was often more limited than their developers had hoped, and there were surprising differences between Germans and Americans in how they responded.

The most costly of the HCC-funded projects in Table 2 was a collaborative project, Pervasive Data Ethics for Computational Research, distributing \$2,994,912 across six institutions via formally separate grants.⁵² The primary goal was to draw upon many sources to develop a coherent conception across many issues, as outlined at the beginning of a comprehensive report titled *Values and Ethics in Human-Computer Interaction*: “An important public discussion is underway on the values and ethics of digital technologies as designers work to prevent misinformation campaigns, online harassment, exclusionary tools, and biased algorithms. This monograph reviews 30 years of research on theories and methods for surfacing values and ethics in technology design.”⁵³ This was actually the last fully “large” regular research project funded by the Human-Centered Computing program.

For many years, the regular IIS competitions were divided into three categories: (1) Small grants less than \$600,000, (2) Medium grants in the range \$600,001 through \$1,200,000, and (3) Large grants in the range \$1,200,001 through \$3,000,000. On July 2, 2019, it was announced that Large grants would end, and two collaborative pairs of proposals that had been submitted months earlier were funded well below the traditional maximum, for sums of \$1,263,706 and \$1,535,637.⁵⁴ On July 25, 2025, all regular CISE programs “Replaced Medium and Small project classes with a single project class with a maximum budget of up to \$1,000,000 and a duration of up to 4 years.”⁵⁵ We may reasonably speculate this evolution away from large research grants was at least substantially motivated by a general shift at NSF toward special competitions that funded rather huge Institutes that did not need to propose very specific research activities, but merely plan to advance broad technological goals. For example, on July 29, 2025, NSF announced funding of five National Artificial Intelligence Research Institutes at a cost of \$20,000,000 each.⁵⁶

The projects in Table 2 supported by EDU’s Graduate Education division tended to develop curricula for teaching computer science and related fields. The largest of these grants invested \$3,448,681 in renewal of an existing project with an inspirational name,

Federal and University Training Union for Research and Education on Security (FUTURES). It was funded by the CyberCorps Scholarship for Service program which has this goal: “Examining the fundamentals of security and privacy as a multidisciplinary subject can lead to fundamentally new ways to design, build, and operate cyber systems, protect existing infrastructure, and motivate individuals to learn about cybersecurity.”⁵⁷ Yet on April 21, 2025, the program announced “it is not accepting proposals at this time as the solicitation is undergoing revision,” and over half a year later a new solicitation had not been posted.⁵⁸ On May 9, 2025, an entire division of the EDU directorate vanished from NSF’s website, the Division of Equity for Excellence in STEM, which supported diversity, equity, and inclusion.⁵⁹

Among the grants managed by a program director in the Behavioral and Cognitive Sciences division of SBE, one combined funding from its Social Psychology program with funds from Decision, Risk and Management Sciences, a program in SBE’s other division covering traditional academic disciplines, Social and Economic Sciences. Titled A Signal Detection Approach to Understanding Susceptibility to Misinformation, it received \$423,866, then became an Administratively Terminated Award, given that its abstract began: “One of the greatest challenges for the functioning of societies in the information age is the prevalence and impact of misinformation.”⁶⁰ The principal investigator, Bertram Gawronski, is director of the Social Cognition Lab at the University of Texas at Austin, which proclaims this scope: “Research in our lab uses a social-cognitive approach to address three broad questions: (1) How do people make evaluative judgments (good vs. bad)? (2) How do people make truth judgments (true vs. false)? (3) How do people make moral judgments (right vs. wrong)?”⁶¹ Six of the seven publications connected to this grant in PAR turned up in the topical search, while the most recent was published March 31, 2025, after the cancellation of the grant, which may have blocked using PAR: “Who Falls for Misinformation and Why?” (Hubeny, Nahon, Ng and Gawronski 2025). In the context of empirical survey data, that article considers a diversity of theories about personality characteristics that may favor acceptance of misinformation, and is freely available from the journal rather than having a PAR version.

In contrast to CISE’s Information and Intelligent Systems division which contained just three large programs, SBE’s Social and Economic Sciences (SES) division contained many small programs. Most prominent in Table 2 was Decision, Risk and Management Sciences (DRMS) which managed 8 grants, while the SaTC inter-directorate competition managed 7 through SES. DRMS is rather multidisciplinary and supports “research that increases understanding of how individuals, organizations and societies make decisions. Areas include judgment, decision analysis and aids, risk analysis and communication, public policy decision making and management science.”⁶² In 2019, the long-standing Political Science program was split into two, Accountable Institutions and Behavior which funded 4 of these grants, and Security and Preparedness which funded another in partnership with it. Other numbers were: 4 Sociology, 2 Economics, and 1 Law and Social Science. A

collaborative pair of awards titled The Development of Ethical Cultures in Computer Security Research was funded through the short-lived Cultivating Cultures for Ethical STEM program.⁶³

4. Disinformation Pathologies

While “misinformation” may be applied to honest beliefs one person holds but someone else is convinced are false, “disinformation” refers to intentional falsehoods, even criminal frauds and deceptions serving evil governments. “Disinformation” is thus a subcategory of “misinformation” which cannot be properly applied without reliable information about the motives of the communicator. Given the sensitivity of the topic, we shall not here name NSF-funded researchers who have developed concepts and research methods for studying disinformation and its consequences, but summarize what four NSF programs primarily funded. Of the 73 grants containing “disinformation” in their abstracts, 22 came from Secure and Trustworthy Cyberspace. Its October 2, 2020, solicitation explicitly prioritized research on “spread of misinformation and societal resilience to foreign influence and organized disinformation.”⁶⁴ It linked to a brief US government organization named the Cyberspace Solarium Commission, which closed down in December 2021, immediately after publishing a white paper, “Countering Disinformation in the United States,” that acknowledged research and policy in this area would face many difficult challenges.⁶⁵

Interestingly, 2 of the SaTC grants were RAPIDs and 9 were EARly-concept Grants for Exploratory Research. NSF’s general rules explain: “EAGER is a type of proposal used to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches. This work may be considered especially ‘high risk-high payoff’ in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives.”⁶⁶ Some of the words in the SaTC titles suggest the diversity of ways online communication media can be misused: spam, manipulators, racial bias, deepfake attacks, influence campaigns, malicious content, non-democratic states, disadvantaged populations.

Six of the 73 grants were managed by the Human-Centered Computing program. Three of them were actually a collaboration across universities to study how individual members of online communities may moderate their content and respond to attacks like disinformation scams. The other three were CAREER grants, one of which unfortunately was cancelled when about 80 percent of its funding had been provided. The earliest of these CAREERs completed very successfully, posting 21 publications in NSF’s PAR, examining how disinformation often spreads online. Another examined the flaws in current systems of norms, market constraints and computer software architecture that are intended to support good discussion in online social media. The third sought remedies for

the common decline in information resources that employ volunteer peer production, including harm caused by disinformation and vandalism.

Those two programs belonged to NSF's Computer and Information Sciences and Engineering directorate, while another six of the grants were managed by the Human Networks and Data Science (HNDS) program in the Behavioral and Cognitive Sciences division of the Social, Behavioral and Economic Sciences directorate. "HNDS is especially interested in proposals that provide data-rich insights about human networks to support improved health, prosperity, and security."⁶⁷ Three of the six also had partial funding from CISE's Security, Privacy, and Trust in Cyberspace program. The three funded just by HNDS were a set of collaboratives developing infrastructure to collect data about disinformation and other dangers attacking democracy, and all three were cancelled, but about when they were expected to be completed. Two of the others were RAPIDs, one of which examined how online disinformation campaigns connect to real-world protests and violence.

Five independent grants were managed through NSF's newest directorate, Technology, Innovation and Partnerships (TIP), which currently describes itself in terms of conflict: "Global competition in science and technology is fierce. To continue to keep the nation secure, we must invest in accelerating breakthrough technologies, transitioning these technologies to the market, and preparing Americans for better-quality, higher-wage jobs, including through reskilling and upskilling."⁶⁸ When fully founded in 2022, TIP took over existing programs, including Convergence Accelerator which the year before had managed a competition about Trust and Authenticity in Communications Systems focused on how online information sharing systems "face a common threat; communication systems can be manipulated or can have unanticipated negative effects."⁶⁹ Three of the five were standard grants in phase 1 of a 2-phase plan, each receiving \$750,000 and being completed before NSF faced the 2025 crisis. The other two were phase 2 cooperative agreements for \$5,000,000 each. They received their full funding, and we may wonder how much they will be required to return to NSF, given they were both cancelled on April 18, 2025.

To explore the extensive scholarship concerning disinformation that exists outside NSF, I used the search engine at www.jstor.org, an online journal archive. Entering just "disinformation" got 11,717 results; adding "research" dropped the results to 8,023, and checking a box to focus just on "articles" gave 3,160 results on November 14, 2025. The title of the first article in order of relevance proclaimed: "The Social Media Propaganda Problem Is Worse Than You Think." The authors argued that the distinction between misinformation and disinformation was no longer relevant, because disinformation posted in online social media would be widely disseminated by people who believed it (O'Connor and Weatherall 2019). The second article, "Disinformation's Dangerous Appeal: How the Tactic Continues to Shape Great Power Politics," makes the same point that

“disinformation and misinformation can overlap and amplify off of each other. And good - and when I say good I mean highly prolific - disinformation peddlers know what the audience wants and how to keep giving narratives or feeding narratives to confirm their beliefs” (Watts 2020, 20). Another article expressed pessimism in its title, “Disinformation And Democracy: The Internet Transformed Protest But Did Not Improve Democracy,” and pondered (Schiffrin 2017, 118): “disinformation spread by social media has undermined the functioning of democracy globally. But if social media is undermining our ideas of democracy, how can we solve the problem without also undermining the processes of democracy?”

5. The Wider Context

The earliest grant discovered by searching the NSF abstracts system for “misinformation” was funded by NSF’s Economics program but lacked any descriptive text, dating from 1982 and thus before 1985 when that feature was added, but had this title: Misinformation and Decision Processes in Insurance Markets.⁷⁰ The title of a resulting 1983 book chapter began with the key word, “Misinformation and Equilibrium in Insurance Markets,” and reported its finding that “the existence and efficiency of competitive insurance markets can be affected by consumer (mis)perceptions of the risks that are being insured against” (Kleindorfer and Kunreuther 1983, 67). Two of the four other grants related to misinformation made during the twentieth century provided tiny doctoral dissertation support from SBE programs. A small 1999 grant from the Behavioral and Cognitive Sciences division investigated “the impact of imagining on memory for both autobiographical and laboratory events, misinformation effects, and memory intrusions.”⁷¹

A grant from the Social and Economic Sciences division addressed fundamental methodological issues facing the social and cognitive sciences: “There is a pressing need to develop interviewing procedures that enhance children’s ability to discriminate, in their eyewitness reports, between events they remember experiencing versus events they remember hearing other people describe. This research builds on earlier work by these investigators that demonstrated that misinformation from parents often infiltrates the autobiographical reports of 3- to 8-year-old children, that errors appear even during the free-narrative portion of interviews, that asking explicit source-monitoring questions improves older children’s ability to distinguish between events that actually occurred versus misinformation.”⁷²

The first grant in the set from the twenty-first century was titled Scalable Decision Tree Construction and awarded fully \$2,187,700 from the Information and Intelligent Systems division to Johannes Gehrke in the computer science department at Cornell University: “Through a large experimental study and a theoretical investigation, this project develops a framework to devise split selection methods with absolutely zero bias. The new methods

will permit users of decision trees to interpret the tree without any doubt of misinformation.”⁷³ Decision trees in computer science are rather like the path diagrams statistical social science has employed for over a century (Wright 1921). A set of well-defined variables or choices for the user or the computer to decide are arranged according to a network of connections. Prior to submitting the grant proposal, Gehrke and colleagues had explained in a journal article: “we refer to tree-structured models for both regression and classification problems as decision trees, since each node in the tree encodes a decision” (Gehrke, Ramakrishnan and Ganti 2000, 159). Note that the forms of misinformation described in the last few examples need not be intentional disinformation, lies promoted to serve the interests of the liar, but simply errors or omissions that need to be corrected to achieve the most accurate and beneficial results.

In 2009, the Human-Centered Computing program had supported a pair of grants as a Large project investing \$3,006,903 in developing Design Principles for Information Networks Supporting the Social Production of Knowledge: “The project is motivated by a profound transformation taking place in the way knowledge is produced and shared; in particular, the way it emerges in a ‘bottom-up’ manner from global social networks that largely self-organize online. This raises profound challenges: at a time when a large proportion of Americans turn first to Internet sources for information about politics, health, commerce, and education, there is still very little understanding among the public as well as within the research community of how to deal with deception and misinformation online, or how to prevent online communities from falling into conflict and polarization.”⁷⁴ A related essay published in *Annual Review of Sociology* five years after the grants began did not use the word “misinformation,” but enthusiastically summarized the many ways in which online research could achieve progress in areas of interest for social scientists (Golder and Macy 2014).

An excellent project about political conflict in the internet era, led by Filippo Menczer at Indiana University and largely funded by a 2011 grant titled, Meme Diffusion Through Mass Social Media, had a goal to create a lasting research infrastructure: “The open-source platform we develop will be made publicly available and will be extensible to ever more research areas as a greater preponderance of human activities are replicated online. Additionally, we will create a web service open to the public for monitoring trends, bursts, and suspicious memes. This service could mitigate the diffusion of false and misleading ideas, detect hate speech and subversive propaganda, and assist in the preservation of open debate.”⁷⁵ Completed before NSF’s development of the Public Access Repository, like most projects of its period it has no publications there, despite investing fully \$919,917 and adding 30 publications to the abstract. Its Project Outcomes Report, attached to its abstract in 2016, included: “We were the first group to uncover evidence of systematic, orchestrated, and widely spread misinformation campaigns based on ‘astroturf’ (fake grassroots movements) and social bots. Some social bots are created to deceive and harm

social media users. They have been used to infiltrate political discourse, manipulate the stock market, steal personal information, and spread misinformation.”

Already in 2014, the head of the science committee in the US House of Representatives, Lamar Smith, severely criticized this grant: “The government has no business using taxpayer dollars to support limiting free speech on Twitter and other social media. While the Science Committee has recently looked into a number of other questionable NSF grants, this one appears to be worse than a simple misuse of public funds. The NSF is out of touch and out of control. The Science Committee is investigating how this grant came to be awarded taxpayer dollars. The NSF must be held accountable for its funding decisions.”⁷⁶ Smith was a leader in the Republican party, and an early publication based on the grant reported that “right-leaning Twitter users exhibit greater levels of political activity, a more tightly interconnected social structure, and a communication network topology that facilitates the rapid and broad dissemination of political information” (Conover, Gonçalves, Flammini and Menczer 2012).

Researchers in this field may hope that the political hostility to their work would fade, if they used a more general definition, for example studying all kinds of online cultural differences, categorizing communications in terms of their subjective perspectives rather than objective truth. Indeed, the diverse results from the NSF-supported research are highly informative, yet do not indicate that a purely technical solution to the misinformation problem is possible. Perhaps the public needs guidance from honest and reliable social organizations, yet currently they seem lacking. The National Science Foundation may not be able to support much high-quality social and cultural research on controversial topics, following the crisis it experienced in 2025. Yet the complex results of the research NSF already funded can contribute to a revival of ethical and conceptual consensus, if scientists, engineers and the general public cooperate in the coming years.

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