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Toward a Sociology of Public Demonstrations

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Abstract

This paper develops a social-theoretical approach to public demonstrations (e.g., software demos, the performances of "market pitchers," even street protests). Public demonstrations are often viewed as proofs, persuasion tools, and theatrical performances. I argue that they play a larger set of roles in social life. Depending the spaces of their enactment, they may serve as transactional and coordination devices, cognitive and relational tools, mobilization and competition apparatuses, observatories for demonstrators, and resources for project design, management, and assessment. They constitute an important form of interaction and help to structure social relationships. My argument is based on investigations into the uses of public demonstrations by the European Commission and U.S. scientists and engineers. These studies illustrate how "demo-cracies"—regimes that use public demonstrations for the management of public affairs—have developed in industrial and postindustrial societies.

Keywords

public demonstration, demo, transaction, interaction, coordination, competition, evaluation, project management, scientific capitalism, science, technology and society

The goal of this article is to reflect on the social uses of public demonstrations and to contribute to the development of a social-theoretical approach to such phenomena. Public demonstrations are often viewed as proving and persuasion devices. They are also commonly perceived as theatrical performances or spectacles. I argue that public demonstrations play more diverse roles in social life. Depending on the social spaces in which they are enacted, public demonstrations may serve as transactional and cognitive tools, coordination or competition devices, mobilization apparatuses, resources for project management, design and assessment, or observatories for both audiences and demonstrators. Furthermore, public demonstrations—and especially public demonstrations of technology (or "demos")—are an important form of interaction in themselves, affecting the structuration of social relationships on a range of scales.

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Although the notion of "public demonstration" should sound familiar to most readers, the contours and stakes of my project may not be immediately obvious. Indeed, while the terms "demonstration" and "public demonstration" (i.e., a demonstration performed in public) are widely used, the practices to which they refer do not all appear to be connected. Broadly speaking, "demonstration" suggests a written or audiovisual exercise whose intended or declared purposes are proving or convincing. "Demonstration" and "public demonstration" are used to refer to phenomena as varied as experimental proofs or specific parts of physics lectures in the academic world, the performances of technology salespeople, and street protests. It is strange to think of all demonstrative practices as belonging to a single field of inquiry.

Besides, some of these practices are perceived as hardly worth theorizing. Their stakes appear visible only on high-profile occasions, such as the PowerPoint demonstration that General Colin Powell gave at the United Nations on February 5, 2003, to make the case for the United States going to war against Iraq. But public demonstrations are routinely consequential across many domains, including economic life (as sales practices or tools for product design and launch), politics (as instances of collective mobilization or performances designed to shape, test, or persuade a large audience), and science and technology. Demonstration practices constitute a fruitful domain of sociological investigation despite their diversity. My argument to this effect draws from empirical inquiries I have conducted in recent years on the uses of demonstrations by the European Commission (EC) and by U.S. scientists and engineers.

RESEARCH ON DEMONSTRATIVE PRACTICES

To date, social scientists have studied demonstrative practices in a disconnected fashion. Research generally consists of case studies, with public demonstrations themselves not always the focus of the analysis. Scholars have examined business practices such as "market pitching" (Clark and Pinch 1992, 1995; Le Velly 2007; Sherry 1998), product launching (Simakova 2010), and project management (Capelle 2012; Rosental 2002). For example, in the field of sales practices, Clark and Pinch (1992, 1995) have produced fine-grained analyses of how market pitchers master the behavior of crowds and adjust their demonstrations accordingly. Likewise, Pinch and Trocco (2002) show how a skillful demonstrator was able to create a large market for a music synthesizer by touring the United States. Other studies have explored the role of public demonstrations in economic experiments (Callon and Muniesa 2007), architecture (Houdart 2005; Yaneva 2009), music (Pinch 2003), the health sector (Coopmans 2011; Winthereik, Johannsen, and Strand 2008), artificial intelligence (AI) (Rosental 2004, 2007), the activities of hackers (Auray 1997), and forms of collective mobilization and political participation (Barry 2001; Brian 2001; Girard and Stark 2007; Rosental 2011).

Despite their isolation from one another, studies of public demonstrations have common features. First, several authors converge in approaching public demonstrations as persuasion tools and rhetorical devices (see, for instance, Bloomfield and Vurdubakis 2002; Latour 1983; Rosental 2005; Stark and Paravel 2008). It is typical for studies to examine the rhetorical power of demonstrations by analyzing their structural and material dimensions. These studies highlight how different types of material devices, as opposed to simply speech, can be mobilized in the design of public demonstrations. Furthermore, they underline how the asymmetrical power of experts facing crowds may express itself in "displays of virtuosity" (Collins 1988).

For example, Shapin and Schaffer (1985) studied how Robert Boyle designed public experiments in seventeenth-century England in an effort to eliminate dissent over "matters

of fact." Well-respected elites had to witness the running of experiments and produce testimony that would inspire trust in the claims formulated about nature. Also, detailed written reports on the experiments and precise descriptions of their material settings had to be produced and circulated. Shapin and Schaffer's study, which focuses on Boyle's air-pump experiments, reveals the persuasive power of Boyle's methods of knowledge production.

Another approach to public demonstrations as sources of credibility and persuasion can be found in the work of Jasanoff (2005), who views demonstrations in relation to "civic epistemologies." This term refers to "the institutionalized practices by which members of a given society test and deploy knowledge claims used as a basis for making collective choices" (Jasanoff 2005:255). Jasanoff uses this notion to highlight how political cultures, history, and the varied competencies of collectivities have to be taken into account in order to understand why different scientific claims come to be seen as reliable and authoritative in some societies versus others. Like Brian Wynne (1992), Jasanoff opposes a public understanding of science model that attributes differences in the social uptake of science and technology to a deficit of understanding. But while Wynne insists that lay people be considered complex and competent actors who can cope—like scientific experts—with relative ignorance and uncertainty, Jasanoff shifts attention to how political communities know things in common, and from communities' public understanding (singular) to communities' public understandings (plural). On this approach, public demonstrations appear as persuasion tools and possible public proofs, and the types of demonstrations required to support knowledge claims vary according to the contexts in which they are performed—for instance, sociotechnical experiments in the United States.

Other aspects of public demonstrations have been analyzed by authors interested in the forms of political intervention, democratic participation, collective mobilization, protest, and power that demonstrations may represent. These scholars have shown how public demonstrations consisting of local protests or technological performances help create new spaces for politics, sometimes reinforcing centralized power, sometimes allowing otherwise marginalized actors to weigh in on the management of public affairs (Barry 2001; Girard and Stark 2007; Lemieux 2008; Mukerji 1997). Illustrating the former, Mukerji (1997) argues that Louis XIV used the Gardens of Versailles in seventeenth-century France as a public demonstration of power, consolidating the view of political order as an extension of natural order. In a different vein, Girard and Stark (2007) consider how the attack on the World Trade Center in New York City on September 11, 2001, and its aftermath produced various forms of public demonstration. Architects competing for the Ground Zero redesign contract attempted to show that their projects were inspired, relevant, and safe by using PowerPoint presentations and other forms of visualization. Meanwhile, New York City citizens took part in street demonstrations to pressure government agencies into providing information about the danger of airborne particulate matter stirred up by the attack. And with the aid of technical experts, civic organizations and community groups sought to demonstrate online, through tables and charts, that the Environmental Protection Agency was engaging in a cover-up; their efforts ultimately succeeded in bringing their grievances to the attention of elected officials. All of these demonstrations clearly represent modes of political intervention and collective mobilization.

Still other scholars have examined the nature of, and epistemological debates regarding, demonstrative performances in the field of science and technology. They have documented the ways in which demonstrations have been likened or opposed to practices such as geometric proofs, experiments, or lectures, as well as their uses as spectacles and entertainment, from antiquity to the contemporary period, especially in the case of the experimental sciences (Dolza and Vérin 2003; Hankins and Silverman 1995:37–71; Rosental 2004; Schaffer

1983, 1994; Shapin 1988; Thébaud-Sorger 2009). These studies trace the major evolutions, variations, and debates across history in the status granted to public demonstrations.

Schaffer (1994), for instance, shows how public demonstrations of machines in eighteenth-century England, such as Atwood's machine—a machine designed by George Atwood to demonstrate the motion of bodies under constant forces—were subject to controversy. Some natural philosophers associated demonstration devices with artifice and argued that philosophical instruments were more appropriate transmitters of the messages of creation. Cambridge mathematicians used sophisticated devices to teach Newton's truths to their students while contrasting demonstrations with "illustrations." And in Georgian Britain, demonstration could refer either to the extraction of a proof from undeniable axioms or to theatrical showmanship.

Several studies of the contemporary period have focused on the extent to which public demonstrations are or should be perceived as fiction or reality. Some authors have portrayed the running of certain demos as pure illusion or mutually agreed upon fiction (Lunenfeld 2000:13–26; Wagner and Capucciati 1996) or as technological dramas that would limit or disable the critical sense of spectators (Lampel 2001). In a way that can be compared to Tarde's portrayal of society as being composed of a minority of insane hypnotists followed by masses of sleepwalkers (Tarde 1903), public demonstrations of market pitchers have even been described as performances of hypnotists influencing crowds (Duval 1981). Other studies have analyzed public demonstrations as multiply framed experiences combining fabrication and reality (Smith 2009). According to these approaches, audiences may have multiple or fluctuating experiences and be at least partly aware of the fiction they are observing.

Erving Goffman, who used a dramaturgical metaphor to approach demonstrations, argued along these lines. According to Goffman, demonstrations are performances with teaching or evidential roles: more precisely, "performances of a task-like activity out of its usual functional context in order to allow someone who is not the performer to obtain a close picture of the doing of the activity" (Goffman 1974:66–8). Goffman had in mind a large set of demonstrations of everyday life, such as demonstrations of vacuum cleaners by sales representatives or demonstrations of weapons by military people. His interest was in determining how the ideal running through of an activity was perceived by the audience.

Dramaturgical approaches to public demonstrations have been deployed successfully by sociologists to reveal many social dynamics. They have shown in particular how audiences of public demonstrations do not simply exist "ready-made," but rather arise in response to performances, and how persuading implies constructing the public (Ezrahi 1990; Hilgartner 2000; Jasanoff 2005). Dramaturgically inclined scholars have analyzed the ins and outs of different forms of public demonstrations, including street protests. For instance, Shepard (2009) shows how queer notions of play have affected many social movements, leading to new theatrical forms of protest. Beyond the case of street protests, dramaturgical approaches have been used to analyze the production of history in events such as the Oliver North Iran-Contra hearings held by a U.S. Joint House-Senate Committee in 1987, examined as a form of media spectacle (Lynch and Bogen 1996). By approaching expert advice as performance and public drama, and debates about advisory reports as theatrical contests, such studies have also shown how advisory bodies such as the American National Academy of Sciences have become credible in the eyes of the public (Hilgartner 2000).

All of these approaches to studying public demonstrations are valuable. However, other uses of public demonstrations that are less visible, but often quite creative and invested with major social and political stakes, have gone underanalyzed. It is these other uses that I wish to bring out.

THE RESEARCH SETTING

I draw on two empirical studies. The first consists of observations I conducted on the uses of public demonstrations by a large European research and development (R&D) program in the field of Information Technologies called "Advanced Communications Technology and Services" (ACTS) and on larger explorations of EC practices. The EC uses various kinds of public demonstrations to manage its R&D programs and help define and implement European policies and politics.

The ACTS program was managed by the Directorate General for Telecommunications, Information Market and Exploitation of Research of the European Commission from 1994 to 1998 and was followed by other European programs: "Information Society Technologies" (1998–2006) and "Information and Communication Technologies" (2007–2013). The list of participants in the ACTS program included researchers, engineers, and executives from numerous European countries, many of whom were working for telecommunication and computing firms.

To collect data and observe ACTS activities, I drew on multiple sources and combined research methods. In the late 1990s, I conducted a series of interviews among ACTS participants in Europe, conducted a two-day ethnography of a large ACTS meeting in Brussels, and collected textual and multimedia documents. These include a series of ACTS and independent reports, CD-ROMs, and brochures produced by ACTS participants and the ACTS program. The list of documents also includes electronic presentations of ACTS projects published in European online databases, European newsletters and publications, newspaper articles, technical publications of ACTS participants, electronic exchanges of ACTS participants in a specialized forum, and video clips of public demonstrations of technology.

My second study is of the production and uses of demos by AI researchers in the United States. I started collecting data on the preparation, performance, and use of demos at the beginning of the 1990s. My methods included interviews; ethnographies of laboratory work, research seminars, and conferences; and the analysis of a large set of textual and multimedia documents, such as e-mails and videos of demos. I conducted my observations discontinuously for about 20 months at major universities and research institutions located on the East and West Coasts of the United States, including MIT, Stanford University, and research institutes located in the Silicon Valley. I followed the fate of some of these projects into the 2000s by collecting documents at a distance, such as research articles and video, web, and written presentations of results.

For the AI study, I focus here on the development of two software projects I followed in the 1990s, to which I am giving the pseudonyms Alpha and Mediannotation. The Alpha project was run by NASA and a network of American research institutions. Alpha started at the beginning of the 1990s, and an educational extension of the project is still under development. The software was originally designed to plan and analyze the trajectories of spacecraft, starting with the Cassini mission. The Cassini spacecraft was built to collect data on Saturn and its satellites from 2004 to 2008—the 2008 deadline was later extended to 2017. Alpha was initially intended to be used by astronomers and astrophysicists to design optimal trajectories for space probes. The Alpha project involved writing software code as well as testing and demonstrating (or "demo-ing") different versions of the software. Over the years, it brought together a growing number of researchers and engineers working for different teams. As most of them were located in Silicon Valley research institutions, face-to-face meetings were sometimes possible, although electronic communication was more common.

The Mediannotation project was developed in the 1990s at the MIT Media Lab. Its aim was to develop an iconic language and a piece of AI software to annotate and retrieve

multimedia documents. One of the goals was to allow journalists to retrieve texts, images, and videos. For this purpose, journalists could use icons indicating, for example, the presence of a camera in a video sequence or the fact that the sequence was produced under gray weather, to annotate videos. They could then search for all sequences with desired icons. This project brought together five researchers who spent a great deal of time preparing and performing computer demos in front of small groups of invited guests.

DEMO-CRACY IN EUROPE

What roles did public demonstrations play in the context of the ACTS program? Before answering this question, it is necessary to say more about the program. The main purpose of ACTS was to develop a high-speed communications network in Europe, together with appropriate multimedia services, to contribute to European economic development and competitiveness. More specifically, ACTS was supposed to facilitate the development of a European network, comprising cables and all necessary electronic equipment and software, and of innovative multimedia applications designed for the high-speed network such as software for high-quality videoconferencing or for the viewing, manipulation, and transmission of medical image data. Another purpose of ACTS was to develop experiments of telework within major industrial firms and participating European institutions. To reach these goals, ACTS selected and funded more than 150 projects. The program's overall budget was around €700 million (or $1 billion at October 2013 exchange rates).

As ACTS work advanced, many public demonstrations were staged to "disseminate information." These demonstrations were intended for masses of European citizens whose ability to understand science and technology was presumed to be limited, but even more important, the demonstrations were intended for journalists and for economic and political authorities. Now, according to Jasanoff (2005), the production of demonstrations and their reception by European publics should be heterogeneous due to varied national political cultures. But problems of reception were limited in the ACTS case as representatives of economic and political powers (such as company managers and national and European elected officials) were key audiences. These elites were used to international exchanges, and EC public demonstrations were an appropriate common medium for them.

It should also be noted that ACTS officials had to "demonstrate" the achievements of their program in a specific political context. They faced insistent questions, conflicting demands, and criticisms from European Parliament members and industrial lobbies regarding the management of their large budget. Lobbying organizations representing different industries, such as the telecommunications industry, sought favorable treatment.

By the end of the 1990s, the telecommunications lobby publicly criticized EC funding of short-term commercial projects focused on information society applications such as telemedicine, tele-education, electronic commerce, and multimedia content applications (Chappaz 1997). The lobby argued that such projects were already being developed and tested outside EC R&D programs, that they duplicated private sector work and represented a waste of public funds, and that before applications were developed, a modern telecommunications infrastructure needed to be put in place. Other lobbies, however, argued that funding application projects would stimulate the development of such an infrastructure.

ACTS officials had to show that they adopted a relevant and balanced position between the funding of telecommunication operators and the subsidies of smaller firms developing multimedia applications. Highlighting the productivity of each aspect of the program helped them counter the claims of groups asking for a larger share of the subsidies.

To help deal with criticisms, ACTS managers had to "demonstrate" the achievements of their program and frame them as not simply favoring R&D. The stress put not only on research and technology development (RTD) but also on "demonstration" was explicit in the title of ACTS's third call for proposals: "Third call for proposals for RTD actions for the specific programme for Research and Technology Development, including Demonstration, in the field of Advanced Communications Technologies and Services." The term "demonstration" signaled that applicants were to exhibit technological accomplishments in order to convince audiences and provide proof of the feasibility and usefulness of technical projects or approaches.

A Large Set of Demonstrative Tools

Several devices were used by ACTS officials to show convincing results. One was the production and distribution of summary reports in Brussels and beyond, displaying statistics on funded projects. Given the large number of projects funded by the program, masses of technical publications and documents were also generated. But these were generally opaque and unreadable for administrative officers, industrialists, and politicians compared with the summary reports, which listed project abstracts and provided tables and figures describing the projects in a concise way. Figures bore on the number of scientific papers written in conjunction with funded projects, as well as contributions to standards, patents, and experiments produced by, or attributed to, the ACTS program. Statistics based on the answers of ACTS participants to questionnaires described the different types of tests conducted on the network and the technological applications being developed, as well as the program's goals and "benefits" for participants.

The dissemination of information also entailed other tasks. It required the building of electronic databases to display information about projects on the Internet. It involved hiring journalists to present especially exciting results in European publications. It also required the production of short, concise success stories of ACTS projects, which were distributed on CD-ROMs.

Demos

By far the most important means of communicating the achievements of the program was running "demos." *Demo* is an abbreviation of *demonstration* that refers to one specific form of demonstration, whereas *demonstration* is a generic term. A demo consists of exhibiting a technological device, such as a piece of computer software, in action (Rosental 2007). The exhibition usually occurs in front of an audience, following a carefully planned script. Demonstrators may provide commentary as they run the technical device, linking its operation to general properties of a theory or method, for example. Demos are used by researchers in the applied sciences, engineers, executives, sales representatives, and consultants to demonstrate the feasibility of a technological approach, the value of a specific theory, or the proper running of a prototype or product. They often accompany the launch of high-tech products, most famously in the cases of demos given by Steve Jobs and Bill Gates for Apple and Microsoft, respectively. But more often demos are run in everyday life by individuals in front of friends and family members as a way to share excitement or provide instruction in a product, or to promote adoption or sales, as in Tupperware meetings. Demos take place in spaces as diverse as homes, shops, and showrooms, within firms, in theaters or exhibits, or on TV, especially on teleshopping channels or programs.

Demonstrators often prepare their speech in advance and build a *repertoire* (or stabilized narrative) in order to comment on the running of the demo. The exercise is scripted in the sense that a scenario or script is used to plan the performance.[1] Unlike what one finds in the movie industry, however (Grimaud 2003), the script or scenario isn't generally expressed in writing or even orally. Its preparation commonly takes a long time for the demonstrators, who are anxious to anticipate questions and criticisms.

A demonstrator running a demo tends to make himself or herself a representative of the machine being demonstrated (sometimes a sales representative). A whole scenario is set up, in which extreme and spectacular circumstances are often established to demonstrate the operation of the device, impress the audience, and produce witnesses to the achievements. Members of the audience may be invited to exchange views or manipulate the device once the demonstrator is done with his or her performance. The outcome of the demo depends to a large extent on the talent of the demonstrator in controlling the interaction. If this outcome is favorable, the positive impact of the demo can be extended, as witnesses can testify about the reality of the achievements to a wider circle of actors.

Demonstrations can be performed in person but they may be also recorded and then turned into a video. A video of a demo obviates the need to bring sometimes cumbersome and fragile devices in front of sponsors or customers. It also allows the demonstrator to avoid a considerable investment in time and the risk of failure in random replications.

ACTS demos involved showing the functionality and usefulness of multimedia applications and of high-speed exchanges of information that allowed various forms of telework. These demos gathered executives and managers of telecommunication and computing firms, engineers, researchers, EC senior officials, representatives of lobbying organizations, journalists, and politicians.

Organizing a teleconference involving economic actors and political authorities was a targeted and powerful way for ACTS officials to demonstrate the projects' results to actors concerned with public spending. Because of the demos, these actors were not forced to base their opinions on the ACTS's results and future on expert advice alone, or on the length or weight of technical reports and papers that challenged their reading skills. Instead, ACTS demos provided moving pictures and personal interaction. The limited time needed to attend demos offered a unique opportunity for busy officials to apprehend—or at least gain the illusion of apprehending—submitted projects. This proved essential in a world where some models of science are unrealistic. Science and technology are not always evaluated and certified by fully competent specialists operating outside the constraint of time limits. Rather, evaluation routinely occurs within a very imperfect economy of time and know-how (Lamont 2009; Rosental 2003, 2008, 2010).

For audience members who could not physically attend, ACTS officials also used video clips of selected demos in CD-ROMs advertising the program's results. The CDs were developed by researchers in communication sciences who benefited from ACTS funding. The CDs were distributed to ACTS participants, industrialists, and political representatives.

Producing a large number of demos using various formats in front of multiple audiences was a powerful means of increasing the visibility of the ACTS program and conveying its utility. Some ACTS demos were planned from the very start of the program, following a precise four-year schedule.

Altogether, ACTS demonstrations of feasibility functioned like demonstrations of strength (Mukerji 1997, 2009), exhibiting the reliability of the technologies at stake and of the participants. Demos were, at the same time, tools that could be used to assess the program and its projects and to define future funding policies. But public demonstrations served other purposes as well.

Demos at the Crossroad between Coordination and Competition Dynamics

As I just noted, the periodic performance of demonstrations was built into the ACTS timetable. ACTS participants took advantage of this and appropriated the running of demos for their own purposes. Demos helped participants maintain confidence in the work in progress. The demos helped participants justify funding to administrative and political authorities and to company managers. Demos also enabled ACTS participants to solidify or build social networks by generating interest in their project, for example, among newly approached or unknown actors. The interests of demonstrators and audiences could sometimes converge around demos, and demonstrators could obtain new contracts or build new partnerships.

For example, different demo versions allowed research engineers to show off their work to their advantage and create new partnerships within their firm. Demos also helped academics to gain credit in front of their peers as well as find new industrial partners. In some cases, ACTS participants were able to reuse demos they had produced in new circumstances. Thus, demos could be part of broader demonstrative campaigns deployed across a large number of arenas, instead of being isolated demonstrative *coups*.

Performing demos helped to define and refine the content of ACTS projects in a dialectical manner. Engineers and researchers took seriously the criticisms and suggestions expressed by audiences during demos. As such, demos played a role in influencing the orientation and reorientation of projects. Sometimes, demos were even used as tools for project management when demonstrators observed audiences' reactions in a systematic way and collected ideas in order to define the content of their research step by step.

Demos were thus at the crossroads between coordination processes and competitive dynamics. They contributed to the coordination of not only demonstrators and audiences but also ACTS participants themselves. To benefit from EC funding, the latter had to display collaborative work with European partners. Even if they had competing approaches and interests, preparing common demos represented a common denominator.

But demos were also marked by a concern to hide some results, as European telecommunication operators were starting to compete with one another given the end of national monopolies. Representatives of computing and telecommunication firms were often asked by higher-ups within their firms to keep certain aspects of their work secret, behind technological black boxes, so to speak, during their meetings in Brussels. They arrived in Belgium with sometimes imprecise understandings of what could be said and shown and what should not be revealed.

Demonstrators negotiated these issues during demo interactions according to how the demonstrations themselves went and the kinds of links that the demonstrators had built in the past or wanted to build in the future with their interlocutors. A gain of information was generally more rewarding for the demonstrators than a well-kept secret, especially as it was often difficult to track down information leaks. As a result, gifts and counter-gifts of information were very much at play. In the context of these dynamics of veiling, unveiling, and dissimulation, demos operated more like exchange and secret management tools than proof procedures or persuasion instruments.

Public Demonstrations as a Bridge between Science, Technology, and Society

Demos played a central role in establishing and structuring relationships and competition between the multiple actors involved in ACTS projects. Demos structured the distribution of credit allocated to individuals, teams, and institutions, as well as to scientific and technological objects. But demos also structured the work of participants, especially when demos were used as mechanisms for observing audience reactions, tools for project management, and

exchange apparatuses. Their impact was further enhanced by a range of peripheral tools, such as written and oral reports, brochures, and CD-ROMS exhibiting success stories. Demos served, in other words, as the flagship among a fleet of demonstration devices.

The use of demos, moreover, was amenable to many different strategies and agendas. The setting up and performance of demos met the complementary interests of several types of actors—scholars, engineers, firm executives, managers, politicians, journalists, administrative officers—and constituted a rare opportunity for interaction, competition, and coordination of action.[2] These actors would probably never have met without such a gathering device. Their exchanges were marked by recourse to spectacular demonstrations similar to those that brought together scholars, entrepreneurs, and representatives of political and religious powers in France and in England in the seventeenth century (Licoppe 1996). At a global level, demos served as a bridge between science, technology, and society.

Public Demonstrations as a Constitutional Topic

The process I have described illuminates why "demonstration activities" were at the heart of the chapter devoted to science and technology in the recent effort to draft a European constitution. In other words, it explains how demonstrations have become a constitutional topic for Europe. The European constitution project states,

> The Union shall carry out the following activities, complementing the activities carried out in the Member States: (a) implementation of research, technological development and demonstration programmes, by promoting cooperation with and between undertakings, research centres and universities; (b) promotion of cooperation in the field of the Union's research, technological development and demonstration with third countries and international organisations; (c) dissemination and optimisation of the results of activities in the Union's research, technological development and demonstration. (Treaty Establishing a Constitution for Europe 2004:109–10)

This statement illustrates that managing European R&D programs like ACTS and enacting effective public demonstrations have become central components of the European political project. It also reveals how European politics and policies of science and technology have been defined in recent years in management terms and how demonstration activities have become an essential tool of European public management. As surprising as it may seem, demos have become key tools in the construction of Europe itself as a political and scientific community.

In short, the EC has developed a "demo-cracy"—a regime that uses public demonstrations for the management of public affairs. I do not use this expression to mean that the EC has found an efficient way to convene mass audiences across European countries and convince them of the success of its actions; public demonstrations appear to be intended first and foremost for economic and political elites. Instead, I want to highlight the fact that the EC has mobilized public demonstrations to administer public affairs in a systematic manner and to define and manage political projects on a large scale.

DEMO-CRACY IN AMERICA

The Alpha and Mediannotation software projects are useful cases for studying public demonstrations in very different social spaces. Demos of Mediannotation, for their part, showed how sequences of a video clip could be annotated with a set of icons. Demonstrators showed

how they quickly retrieved sequences they had associated with different icons. They also allowed members of the audience to participate in the annotation of the video and the retrieval of sequences. Demonstrators observed the reactions of audience members and collected their suggestions and criticisms. Members of the Mediannotation team created a short video version of a demo in order to present the project to colleagues and to actual and potential partners and sponsors.

Alpha—again, originally developed by NASA—grew over the years to involve researchers and engineers who worked for different institutions. Many demos of different versions of Alpha were performed within partner institutions and other organizations, as participants in the project looked for ways to adapt the software for other industries and purposes.

Alpha demos were performed in front of various audiences. They showed, using well-prepared scenarios and case studies, how Alpha could be used to solve astronomical problems and to plan, analyze, and visualize spacecraft trajectories. Demonstrators allowed time for questions and for audience members to manipulate the software themselves. In an e-mail to one of his partners, a participant in the project described the active role of the audience in one presentation:

> The demo with [these] folks went extremely well. They were able to use the system after a half hour demonstration, and threatened to commandeer my computer so they could play with it some more.

Demos were sometimes supplemented by other forms of public demonstration. But though they can be analyzed as theatrical performances and tools of persuasion, demos also had other dimensions.

Demos as Transactional Devices

First of all, the American demos I studied were often mobilized as a mode of presentation of self. In the course of my inquiries, numerous scientists and engineers introduced themselves to me and others by immediately offering to run demos of the projects on which they were working. Such offers were commonly made after a first e-mail exchange or meeting.

Partnership between the very first NASA-Alpha team and a group based in another research institution started just this way. For both Alpha and Mediannotation participants, demos were a tool to meet people but also to establish exchange relations. They were gifts that called for counter-gifts. They could be compared to an exchange of business cards. During the visit of a research group, guests were honored with the presentation of demos. In exchange, guests could offer advice or promise sponsorship or other goods. In a symmetrical manner, in exchange for an appointment at the place of a possible sponsor or partner, demonstrators offered to perform demos for their hosts.

In this way, demos represented a transaction. They served as a medium for exchanges at the performance site, such as exchanges of information and the sharing of common experiences. And demos often called for further exchanges. They could be compared to the practices of street demonstrators who offer free goods at the beginning of their presentations in order to attract crowds and push spectators to buy products as an exchange down the line (Clark and Pinch 1995).

Demos were thus far from one-way communication tools for demonstrators, simply used to deliver proofs, persuasive messages, or even a mix of both. They were fruitful mechanisms of empirical observation for both audiences and demonstrators. They were a form of communication in a rich sense of the term, establishing commonalities and creating social

links. Exchanging advice in a pleasant atmosphere and showing good will and intentions—or even, at times, disinterest—were important steps in the building of a stable and lasting relationship. As a result, demos were not simply a form of door-to-door selling for Alpha participants. They were a medium through which participants could discover new people, institutions, and resources.

When they analyzed how spectators reacted to their demos, Alpha and Mediannotation demonstrators were able to collect data on their audiences—their expectations, projects, problems, and the ways they might appropriate the demonstration machine. Demonstrators also discovered how to adjust the prototypes to facilitate their adoption or how to help future users adjust to the tools, through what was generally called "training." In some cases, audience members were able to become more involved in the development of the project, thus transforming interlocutors into partners or future users.[3] Over time, prototypes became more finely targeted products, and "markets" or "micro-markets" were constituted.

Demos as Binding the Making and Marketing of Science and Technology

In the context of such dynamics, demos represented tools for project management and design strategy. Indeed, most of the demos under study were performed while their technologies were under development. Demonstrators used demos to periodically (re)define the next steps of their projects. As in the case of the Mediannotation project, they paid close attention to the reactions of their audiences and to the dialectical exchanges following demos in order to adjust the projects' contents. Reports on demos were sometimes produced and circulated internally, as illustrated by the following e-mail of an Alpha participant to one of his partners:

> [He] and I are writing up a report summarizing the information we gleaned from the demos this past month. . . . The next version will incorporate what we learned from evaluations with potential end users, as well as extensions we have planned all along. . . . What is the difficulty in explaining this . . . ? When I've given talks and demos, it seems to enhance the audience's understanding.

Such uses of demos could occur even at a very early stage. It was then an important source of "quick irreversibility" for the prototypes and the later products. Quick irreversibility in innovation processes has long been noted by historians (David 1986). But this phenomenon has rarely been linked to the use of demos, even though such a link can be observed in as canonical a case as the development of the QWERTY keyboard (Rosental 2009).

In the Alpha case, many features of the software under development were determined by the preparation and performance of demos at a very early stage. The software was initially built around the prospect of quickly running a demo bearing on a set of 15 "good" cases. Handling these cases sequentially structured the work of project participants for some time, as well as the end product. Participants didn't just plan to prepare and run demos once the software was ready; rather, preparing demos was part of the initial design process. Demos structured more than they punctuated or crowned the work that had to be accomplished. They were at the heart of relations that bound the making and marketing of science and technology.

This is not to deny, of course, that demos were also used by demonstrators as tools for demonstrative conquest. Alpha and Mediannotation project members multiplied performances. They acted as representatives of their technical devices and sometimes as business representatives when "selling" their project became a priority. In the Alpha case, for instance,

AI researchers went on the road, visiting NASA centers, computer and aerospace firms, Department of Defense workshops, and universities and conferences. They exhibited their running device in research institutions and in the framework of academic seminars. They were ready to adapt parts of their software as necessary.

This approach led to authentic demonstrative campaigns. Demonstrators covered many relevant spaces. The matching exploratory work was carried out in a systematic way. This permitted demonstrators to create a mass effect in terms of circulation of information around the project. Investment decisions were commonly made on the basis of indirect representations of the working of prototypes. Demo audience members sometimes served as witnesses who shared their views on projects with extended circles beyond the exhibition sites.[4] For example, here is how one Alpha participant explained in an e-mail to one of his partners how he could use a demo to create a useful witness:

> I'll likely be seeing [him] at [the conference], we're tentatively planning on taking a machine to give demos. He could probably give a report to his colleagues, thus there might not be as much urgency to give a demo [elsewhere] right away.

Creating witnesses through demos was not the rule, however. Audiences could also be the direct targets of demos, in which cases spectators could play the role of "decision makers" rather than deliver testimonials to third parties.

In the context of such door-to-door selling, demos were frequently supported by other types of demonstrative action. Such is the case for the seminar talks that gave rise to hybrid presentations mixing demos and standard lectures. Arguments exchanged in offices or in corridors with managers fall into the same category. These were sometimes gathered together in short and carefully prepared blurbs. They became part of the repertoires that demonstrators mobilized. Abstracts of a page or less were sometimes placed on Web sites. These research clips were intended to generate interest among busy managers. They were supported by lengthy internal or external research reports.

All these tools were combined to build demonstrative paraphernalia. To the extent that this is so, Alpha and Mediannotation demos cannot be properly grasped as autonomous objects. Their role has to be analyzed in the context of larger social projects. Technologies and demos were assessed in light of heterogeneous performances and elements. Unlike in market pitching situations, demo audience members did not have to make a quick evaluation of devices at the demonstration site. Indeed, they did not have to decide immediately whether to buy a product (Sherry 1998).

The collective dimension of public demonstrations should be also noted. In the Alpha case, demonstrative campaigns were not led by isolated individuals. They were the result of orchestrated action. Groups of demonstrators acted in a coordinated way. Even when demos were performed by single demonstrators, as was commonly the case, the performances were carried out in complementary spaces, in a concerted manner. At other times, demonstrators gathered in front of audience members to present complementary aspects of their project. The spectacular dimension of the demos was then strengthened. Quantity added to quality and the collective experience of the performers conjoined to impress audiences. Institutions were explored and sometimes mastered through demonstrations of strength.

Demos as Cognitive and Assessment Tools

Demos also played an important cognitive role in the Alpha and Mediannotation projects. For certain audiences, they represented privileged ways to grasp the projects' contents.

AI projects in the United States have been funded by various industries, but especially the defense sector (Guice 1998; Roland and Shiman 2002). As the AI field has a low level of autonomy, the evaluation of AI research conducted by sponsors and nonspecialists is no less important than that conducted by peers. Demos are a well-suited form of demonstration in this context. They allow researchers and engineers to exhibit more "tangible" results than those conveyed by academic papers and technical reports, particularly when meeting sponsors.

Demos also do not require much time. They can be completed in a few minutes. Indeed, a demo appears all the more spectacular when it is well calibrated in time. The limited time needed to attend a spectacular demo offers a unique opportunity for busy and unspecialized managers to learn about projects. Alpha and Mediannotation demonstrators were generally aware of this and paid great care to the timing of their demos. The following e-mail of one Alpha participant to some of his colleagues illustrates this:

> I'm going to see if I can speed up [this] problem a bit . . . 7 minutes is too long for a demo, and demos turn out to be important . . . 15 seconds is good. If you can do [that] as well in 15 seconds, then that would be 45 seconds total which would make a good demo.

At the same time, Alpha and Mediannotation demos met the constraints of project-oriented research and evaluation activity. Project-oriented approaches have been key in the field of AI research since its inception, as in many other fields (Boltanski and Chiapello 1999; Torka 2009). I noted above how demos were used by Alpha and Mediannotation members as a tool for project management. Periodically performing demos is an asset for demonstrators who need to maintain the confidence of sponsors in a middle-run research program. Demos allow managers to follow the development of projects with relative ease, without getting mired in minute theoretical refinements.

It is also relevant that the professional identities and trajectories of AI researchers are not as clear-cut as in other fields. Several AI researchers I met were simultaneously, or had been successively, academics, consultants, defense advisors, or high-tech firm executives or founders. Such is the case, for example, of members of research institutes who were consulting professors at Stanford University and of computer science or philosophy professors at Stanford who created their own firms. Some AI academics were former executives of computer firms. Some of them had read management handbooks prescribing specific ways of running demos. Such blurred profiles and trajectories contributed to the migration and mutation of demonstrative practices and converged toward the wide use of demos.

Indeed, AI researchers could use and reuse demos in many different spheres of their professional life. They could use demos to present theoretical results, technological accomplishments, or future high-tech products. In this way, demos contrasted sharply with academic papers, for example, that were mostly suited to academic exchanges. Demos allowed demonstrators to build economies of scale in terms of energy and time devoted to preparing presentations of their work. Some demonstrators perform more than 100 demos per year (Markoff 1996). Running demos has become so commonplace and expected that it is nothing less than a privileged operator for the management of social relations in the AI field, and in social spaces like Silicon Valley more generally.

The MIT Media Lab, where Mediannotation was developed, was particularly fond of demos. The founding director of the lab, Nicholas Negroponte, strongly encouraged his collaborators to perform demos. His slogan—a play on "publish or perish"—was "demo or die" (Brand 1987). Walls of the Media Lab were made out of glass so that sponsors could take

guided tours, in effect viewing spontaneous demos, without interrupting the work of researchers. Demos were systematically used as a key tool to sustain the funding of research.

Demos had specific virtues for representatives of defense institutions. They fit well with long-standing traditions of spectacular demonstrations of military strength. But they were not like parades. More like theoretical papers, they offered demonstrators resources to exhibit some results, while leaving other aspects of their projects in the dark. Demonstrators could remain secretive about some of the working principles of the devices, leaving elements of their work within technological black boxes. For example, demonstrators could show how a piece of software worked while keeping its code secret. Moreover, Alpha and Mediannotation demos aligned well with the logics of showcase building that characterized consultants' success stories. They allowed demonstrators to exhibit exemplary cases and tremendous successes. This form of demonstration fitted the needs of a world where contracting is the rule and where researchers have to justify their activity.

Furthermore, demos were an ideal medium between the worlds of laboratories and the uncertainties of research, on one side, and the worlds of managers expecting certain scenarios and quick results on the other side. Demonstrators had to deploy self-assured attitudes in order to meet such expectations, and their ability to do so helped build bridges. While managing the public expression of their own doubts, demonstrators worked to reduce the tension between sponsors' expectations and the reality of research. Demos made exchanges and cooperation possible between parties.[5]

Yet in some instances, demonstrators were unable to minimize the uncertainties of the research process. They had to find some balance between sponsors' expectations and the reality of research. In this respect, even choosing whether to name a demonstrative tool a "version of a product," a "prototype," or an "experiment" was a high-stakes matter. For instance, calling something an "experiment" helped demonstrators limit sponsors' expectations for rapid achievements and minimize problems in case a demo ended up going wrong.[6] The following e-mail from an Alpha participant to some of his partners prior to a demo at an aerospace firm illustrates this approach:

> Some of the . . . comments seemed to show a lack of understanding that we are very much in an experimental mode. . . . I think it would be best to send a message to [them] that reduced short term expectations, without deflating what appears to be substantial interest. Any ideas?

Exhibiting devices whose behavior was already well known was another tool demonstrators could use to deal with tensions while minimizing the risk of failure. Demonstrating an apparatus with previously identified bugs was less risky than running a machine that had been recently improved but whose behavior was uncertain. As time was needed to master complex technology, some demonstrators used only stabilized demo tools in public and employed the term *version* rather than *prototype* to describe demonstration devices.[7] In this spirit, a participant in Alpha explained to some of his partners in an e-mail:

> We are going to stop development of the current system this Friday, and "freeze" it, we will only be using it for giving demos. . . . The new version will not be available for several months, and we are not planning on any intermediate versions that are robust enough to demo.

Stabilizing demonstration devices in successive versions with ever more interesting features offered many advantages to demonstrators. It allowed them to back up the idea that

their research would always bring more "concrete" results within a "reasonable" period of time. Such a strategy matched the rapid tempo of high-tech domains and squared with trends in the software industry, such as releasing "beta versions" of products still under development.

Last, but not least, demos played an important role in the distribution of symbolic credit to project participants in the dynamics of recognition.[8] For example, in one of the AI projects I followed, theoreticians held a relatively weak position compared with engineers and scientists involved in more applied research. As a result, demonstrations tended to insist on technological achievements more than abstract features, and the paternity of the project was rarely attributed to the theorists. But depending on the identity of presenters and audiences, variations in the distribution of credit could be observed. This was a source of both tension and care taken by participants when depicting project advances and everyone's contribution. Participants were fully aware that demos and other clips of research, such as abstracts put on Web sites, could strengthen or damage the relationships between participating individuals, teams, and institutions, depending on the way credit was distributed and capitalized.

Demo-cratizing Science and Technology

The term *capitalization* applies here not only to individuals but also to groups and institutions. During my inquiries, I observed that many different kinds of actors were able to benefit from demos. While Mediannotation demos were used to promote the MIT Media Lab, demos of extensions of the Alpha project, like demos of many other NASA projects, helped NASA to justify its spending to federal authorities and the public. In the face of relative mistrust of the agency by policy makers and the public following the space shuttle Challenger disaster, some Alpha participants developed an educational version of the Alpha software and specific demos that could be shown to a large audience. These demos were introduced on NASA Web sites. They were specifically designed for elementary and high school students and teachers, although they could also be of interest to other audiences, such as amateur astronomers and science lovers.

Today, some of these demos show how Alpha may be used to generate realistic solar system animations, as well as views that actual NASA spacecraft have of various planets on their trajectory. Textual and video presentations accessible on the Internet are accompanied by lessons that may be used in classes to explain, for example, what causes seasons on earth and phases of the moon. When connected to NASA Web sites, elementary and high school teachers have exhilarating material to explain planetary dynamics and share "space adventure" news with students. Questions and answers and video animations are provided for pedagogical scenarios.

On one of these Web pages, scientists who have become educational software developers ask teachers to send their reactions to the teaching scripts and suggest new lessons, to help produce better future versions. Here, demonstrators continue their practice of looking for ways to collect data on, and change the practices of, their future "customers." The strategy also attempts to identify relevant ways to adapt their software and build a network and a market around their product.

This demonstrative dynamic is beneficial not only for the demonstrators and teams who work for NASA but also for the institution in a broader sense. The former accumulate symbolic credit this way. They may also benefit from harnessing users as a free workforce to develop their product and its market (Neff and Stark 2004). But the same demonstrative practices help to promote NASA itself. On some NASA Web pages, next to demonstrative scenarios, answers to FAQs (frequently asked questions) insist on the benefits of space missions, their lower cost, and the care NASA takes with public money.

The demand for the quick display of pictures taken during space missions on NASA Web sites, together with the high number of questions submitted regarding the uses of the NASA budget, illustrates how the public is prompt to demand accountability when a medium facilitating such demands exists. Alpha educational demos are a powerful way to answer demands of this sort.

To be sure, NASA has long used education, together with other forms of public relations work, to find and renew public support (Byrnes 1994; Lewenstein 1993). But using demos for educational purposes induces specific relationships between the public, on one hand, and science, technology, and institutions like NASA on the other hand. The dynamics at work are not really about the "democratization of science," if this expression means providing people (the Greek *demos*) with access to science via the popularization of scientific concepts. Rather, the dynamics are ones of *demo-cracy*—managing public affairs via public demonstrations and, in particular, demos—and of a *demo-cratization* of science—structuring the relationships of citizens with science and its institutions through demos.

Here, the familiarity of citizens with science, technology, and their institutions is partly obtained via demos. Similarly, the links between citizens and scientists, as well as with the institutions for which they work, are constituted to some extent through demos. In the case under study, researchers are on the front lines of managing public perceptions of their activity. Extending their demonstrative activity makes the work of scientific laboratories visible and allows other entities to benefit from their work.

THE MANY ROLES OF PUBLIC DEMONSTRATIONS

Demonstrations have long been understood in terms of proof and persuasion, or *apodeixis* and *epideixis* (Von Staden 1994). But the cases I have presented here show that demonstrations cannot be reduced to proof and persuasion devices or to spectacles. Depending on the social spaces in which they are enacted, demonstrations may play less celebrated, more creative, and varied roles that help to manage social and political orders.[9]

This is not to deny that *apodeixis* and *epideixis* are important dimensions of public demonstrations in general. In the case of the ACTS program, for instance, reports, CDs, and live demos were intended to convince audiences of its productivity, the feasibility of different technical approaches, and the well-founded character of various technical and scientific claims. Facts, figures, lists, arguments, success stories, video clips, and on-site demos were combined to deliver public proofs. But in all the cases I examined, public demonstrations, and especially demos, also represented tools for a wide variety of transactions and contests. They were used by demonstrators as tests and as means to gain information about audiences, observe their reactions, and collect their feedback. They helped demonstrators build and maintain partnerships, coordinate their actions with others or compete with them, manage their projects, co-construct technologies and users (Oudshoorn and Pinch 2003; Woolgar 1991), and create markets for their products.

Nor were demos performed only after scientific and technological contents were stabilized, in order to sell them.[10] They were used at many project stages to define their contents in a dialectical way while taking into account audience reactions. The frequent performance of demos determined scientific and technological end-products and the very nature of scientific and technological objects that could be produced.

Public demonstrations of technology also represented unique resources for demonstrators to fit into various social logics. They provided matchless communication opportunities within interdisciplinary projects and in circumstances in which audiences preferred watching images and engaging in social interaction to reading texts. They were cognitive tools for assessors. They helped demonstrators answer managers' expectations of certainty despite

the uncertainties of research processes and to deliver the success stories anticipated within the consulting field.

Additionally, demos allowed demonstrators to protect secrets behind technological black boxes and deliver demonstrations of strength for the defense sector. They played a key role in the logics of distribution of symbolic credit. And they worked best when they were part of demonstrative paraphernalia versus independent objects and when they were enacted in the framework of collective action versus isolated *coups*.

More generally, public demonstrations helped to structure social relationships. We have seen how demos were used as modes of presentation of self, as ways to get in touch with others, and as means to create and maintain different types of relationships, including partnerships and large-scale links between science, technology, and society. As institutions like NASA and the EC capitalized on individual public demonstrations, the latter certainly came to form part of the Mertonian "indirect demonstrations" that help science to develop and maintain its authority and support in society (Merton 1938). But in the cases under study, demos also helped determine the very nature of the relationship between science and the public. The texture of these relationships was, in part, constituted through demos—not simply through the concepts they popularized but through the utopia they sometimes conveyed.

These cases also illustrate how public demonstrations may be seen as a major form of interaction. Erving Goffman viewed demonstrations as "technical redoings," to be opposed to other subcategories of "keying"—ceremonial, make-believe, contest, and regrounding (Goffman 1974).[11] My investigations suggest, however, that demos do not fit such a classification. The demos under study went beyond giving a close picture of the doing of an activity for learning or evidential purposes, or even transcribing an activity into another.

Based on these results and those of other studies documenting demonstration practices, it seems that public demonstrations may be viewed as a total social fact, implicating the whole of society and its institutions (Mauss 1954). Public demonstrations are an anthropological moment in industrial or postindustrial societies that may be as important as another grand anthropological event: weddings. Indeed, public demonstrations appear to involve as many exchanges, tensions, allocations of material and symbolic goods, redistributions of alliances, and deep moments of social life as do matrimonial ceremonies. Both types of events have a large impact on the fate of individuals and groups.

Moreover, public demonstrations of technology might be at the heart of a system I call "scientific capitalism" (Rosental 2007). I refer here to the dynamics whereby various types of demonstrations, and especially demos, generate symbolic credit and resources which are then invested to produce more demonstrations, which are then used to produce more symbolic credit and resources, and so on. In other words, demonstrations play in scientific capitalism the role that commodities play in the Marxian theory of capital.[12] Overall, this system gathers large-scale capitalists (i.e., major demonstrators who produce always larger cycles), small-scale capitalists, and proletarians—especially technicians and engineers who participate in the production of demonstrations in exchange for a wage.

DEMO-CRACIES

With these arguments, I hope to have helped open a fruitful field of sociological investigation on public demonstrations and especially on one key form of public demonstrations: demos. Public demonstrations appear as full-fledged objects for sociological investigation and for the sociology of knowledge, economic sociology, the sociology of organizations, and political sociology. They also appear as significant objects for the sociology of social

processes, and in particular for social studies of evaluation, benchmarking, and commensuration (Espeland 1998; Lamont 2009; Ogien 2013). Public demonstrations have major political stakes and contribute to the formation of the relatively invisible political regimes I have termed demo-cracies.[13] But what can we say about the power structure of such regimes?

Based on my observations, demo-cracies seem to provide power not so much to the masses as to talented demonstrators and the institutions that employ them. To be sure, demos provide a form of access for the masses to the closed world of laboratories. But the positions of demonstrators and of demonstrated parties (i.e., those who attend demonstrations) are often asymmetrical. This is the case when lay people watch demonstrations by highly qualified scholars or experts and when demonstrations are covered by the mass media and allow limited or no exchange (Collins 1988). Even if demonstrated parties are not the unskilled people that many models of the public understanding of science assume audiences to be (Wynne 1992), they often have limited resources, especially in terms of competencies and information about demonstration devices and time, to publicly contest the claims of those who perform demos. Compared with demonstrated parties, demonstrators are generally advantaged by the fact that they have prepared their performance in advance, have more time to express themselves, have anticipated questions and answers, and are equipped with black-boxed technologies.

However, under certain circumstances, the positions of demonstrators and demonstrated parties may be more symmetrical. Audiences of demos may be composed of "specialists," "partners," and "competent participants," and presentations may be interactive. Demonstrated parties may be sharp and critical observers able to assess technologies on the basis of features that are, in part, external to the demos.

Furthermore, the power of demonstrators is limited by the fact that performers may take turns. In some cases those who perform public demonstrations are professional demonstrators who make a living and a career out of the practice. More often, though, "demoing" represents only one aspect of their job and they themselves attend others' demos. In this context, there is no stable divide between demonstrators and demonstrated parties.

None of this is to deny that public demonstrations make various forms of audience manipulation possible. But the picture has to be nuanced by the facts that political cultures may affect the ways public demonstrations are received and that demonstrations may fail, produce mitigated effects, or be counterbalanced by other demonstrations. Public demonstrations also provide space for political participation and mobilization to those who would hardly ever intervene in the management of public affairs otherwise.

Still, public demonstrations sometimes generate fears of manipulation and hostility. They raise ethical concerns about their ability to convey truths to the public and to the scientific community and about their tendency to reinforce the power of dominant individuals and institutions. Hostility to public demonstrations of technology is evident, for example, among hackers who produce parodies to mock and criticize the computer industry's well-polished demos and commercial exaggerations (Auray 1997).

However, in themselves, public demonstrations neither contribute to nor endanger democracy. Demonstrative practices do not inherently alienate or empower demonstrated parties or even demonstrators. It all depends on the detailed uses of demonstrations and the contexts of their occurrence.

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NOTES

1. On the embodiment of scripts in technological devices themselves, see Akrich (1992).
2. On the role played by prototypes to produce convergences between multiple and discontinuous social worlds, see also Suchman, Trigg and Blomberg (2002) and Trigg, Bødker, and Grønbæk (1991).
3. In the history of science, participants have long been preferred to spectators (Shapin 1988).
4. Performing demos in front of indirect users—for example, when a technology can be adapted for another industry—does not seem to be uncommon (Winthereik, Johannsen, and Strand 2008).
5. On the specific uses of PowerPoint presentations for collaborative practices within organizations, see Kaplan (2011).
6. Similar labeling strategies have been also noted by Collins (1988) and Simakova (2010).
7. On the complex dynamics surrounding accounts of technologies under development, see Suchman et al. (2002).
8. Demo practices are an understudied aspect of credit issues in science and technology. For an introduction to such issues, see Biagoli and Galison (2002).
9. Note that this analysis also applies to mathematical and logical demonstrations (Rosental 2008).
10. On processes that lead to "stabilization" (or lasting forms) of technologies, see Pinch and Bijker (1984).
11. For Goffman, the term "key" refers to "the set of conventions by which a given activity, one already meaningful in terms of some primary framework, is transformed into something patterned on this activity but seen by the participants to be something quite else" (Goffman 1974:43–4).
12. Latour (1993:100–29) develops a similar view but sees inscriptions, versus demonstrations, at the heart of these cycles.
13. Although distinct, demo-cracy and scientific capitalism are likely to reinforce one another.

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