
Amateur Knowledge: Public Art and Citizen Science

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Abstract

The science studies literatures on amateurs and citizen science have remained largely unconnected despite similarities between the two categories. The essay connects amateur knowledge and citizen science through examples from public art. Through an analysis of the use of the term “amateur” by contemporary artists working to engage the public in critiques of science, connections in the ideals of democratic knowledge making by amateurs and citizen scientists are further explored.

“Amateur” can be a slur. The term is ambiguous, but generally suggests a lesser position than professional. The groups who identify themselves with this term—for example, amateur photographers and amateur astronomers—occupy a position outside the main body of knowledge production, even as they may contribute to the enterprise. By examining the work of new media artists, who blur and blend these boundaries as part of their artistic practice, this study seeks to complicate binary understandings of the notion of amateur–professional and citizen–scientist by suggesting that some actors take control of these categories and bend them to meet their needs.

1. David Garcia and Geert Lovink, *The ABC of Tactical Media*. 1997. <http://www.nettime.org/Lists-Archives/nettime-1-9705/msg00096.html>.

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Tactical media is an emerging art practice that uses the tools and practices of science and technology, often for the purpose of critiquing these fields. According to two practitioners, David Garcia and Geert Lovink, tactical media projects are inherently border-crossing: "Tactical media is a qualified form of humanism . . . an antidote to the newly emerging forms of technocratic scientism. . . . [It] crosses borders, connecting and rewiring a variety of disciplines."¹ Tactical media projects are often hybrids of artistic and scientific practice. Observing these tactical media practitioners through the lens of the literatures in science and technology studies on amateurs and citizen science reveals how these artists are using concepts like the amateur to promote a hybrid form of citizen-science public art.

For example, new media artist Paul Vanouse is known for his public-interest, science-related artwork, including *Latent Figure Protocol*, a critique of DNA fingerprinting that uses gel electrophoresis to create pictorial images. Genetic material is placed into gel electrophoresis trays that are fitted with cameras to display the gels on projectors or wall-mounted screens, and gels are run. When completed, the gels in the tray produce a prescribed image: a copyright symbol, a skull and crossbones, or a zero and a one. As well as showing the images and the gels that created them, Vanouse gives a lecture-style performance. He explains that he wrote a computer program to define the lengths of proteins that known enzymes cut, allowing him to organize the enzymes into an order to create specific cuts, thus producing any picture he wants from so-called DNA fingerprinting technology. These public interactions create a place for viewer feedback and discussion about the pieces. His artwork gives rise to questions about eugenics and the value laden-ness of DNA testing technologies.

In an interview with Vanouse, the artist referred to himself and other tactical media practitioners as amateurs. When I pressed further, he replied that "everyone is an amateur." It might seem that this would undermine his credibility as a tactical media practitioner, because why would this well-known artist refer to himself in this way? What exactly did Vanouse mean by this and what is at stake when other tactical media practitioners like the Critical Art Ensemble (CAE) talk about themselves as amateurs, and understand amateurs as "not invested in institutionalized systems of knowledge production"?² Science studies scholars have suggested that the status of the knowledge producers is reflected in the status of the

2. Critical Art Ensemble, "The Amateur," in *The Interventionist: Users' Manual for Creative Disruption of Everyday Life*, ed. Nato Thompson and Gregory Sholette, with Joseph Thompson, Nicholas Mirzoeff, and C. Ondine Chavoya (North Adams, MA: Mass MoCA, 2004).

knowledge itself.³ So at first glance it might appear that these artists undermine their positions by self-identifying as amateurs. However, the carefully crafted persona of the artist and the attention to theories of identity in tactical media practice suggest that the rhetorical move is intentional. For actors like Vanouse, taking up the position of amateur reduces the barriers between themselves as professional artists and the public.⁴ To take account of the works of tactical media practitioners, this essay will propose that we read together the literatures of amateurism, citizen science, and public art.

Amateurs

Amateurs are of interest to science and technology studies scholars, including Susan Douglas,⁵ Kathleen Franz,⁶ Kristen Haring,⁷ and Ron Kline and Trevor Pinch,⁸ because they make technical contributions to their fields of interest. The word “amateur” is often used interchangeably with “hobbyist,” which suggests a less serious valence than “professional” and connects amateur activities to leisure activities. Franz’s car tinkerers, for example, were hobbyists who made contributions to the development of the automobile.⁹ One of their innovations, the trunk, was adopted as standard equipment on cars, while the addition of a bed that allowed users to interpret cars as all-in-one hotel and travel machines failed to attract enough market appeal to become a standard feature of automobiles. Franz’s tinkerers saw a political valence to their technology: cars welcomed “elect” masses from urban areas to the liberty of the open road. The imagined open road provided freedom, and the automobile promised to reveal a perfected version of America’s natural landscapes.

3. Brian Wynne, “Misunderstood Misunderstandings: Social Identities and the Public Uptake of Science,” in *Misunderstanding Science? The Public Reconstruction of Science and Technology*, ed. Alan Irwin and Brian Wynne (Cambridge: Cambridge University Press, 1996), pp. 19–46.

4. Erving Goffman, *The Presentation of the Self in Everyday Life* (New York: Doubleday, 1959).

5. Susan J. Douglas, *Inventing American Broadcasting, 1899–1922* (Baltimore: Johns Hopkins University Press, 1987).

6. Kathleen Franz, *Tinkering: Consumers Reinvent the Early Automobile* (Philadelphia: University of Pennsylvania Press, 2005).

7. Kristen Haring, *Ham Radio’s Technical Culture: Inside Technology* (Cambridge, MA: MIT Press, 2007).

8. Ron Kline and Trevor Pinch, “Users as Agents of Technological Change,” *Technology and Culture* 37:4 (1996): 763–795.

9. Franz, *Tinkering* (above, n. 6).

Kline and Pinch investigated rural automobile users who refitted the technology for their own uses, including, among other things, as tractors and for powering washing machines.¹⁰ Eventually, however, tinkering was technically and rhetorically closed: companies designed their cars to be technically more difficult to tinker with and thus created an atmosphere in which car manufacturers were viewed as the originators of new automobile-related inventions. Social and technical factors led to what Pinch and Wiebe Bijker call “closure,” effectively limiting the tinkerers’ agency, and reduced interpretive flexibility.¹¹

In Douglas’s history of amateur radio operators, amateurs initially outstripped the navy’s radio operators by setting up networks that could send signals across the country.¹² Like Franz’s tinkerers, today’s open-software proponents, and many tactical media artists, Douglas’s radio operators saw themselves in terms of a politics of freedom. Similar to car users who viewed themselves as participating in the freedom of the open road, these radio operators wanted to be free to pursue their technical practice, which might be framed as free speech.

Haring tells the story of ham radio amateurs, who are, as she points out, largely male and well-off and “proudly insist” on their amateur label, and who were described as late as 1954 as the “lifeblood [of the] electronic industrial complex.”¹³ Haring’s narrative centers on the culture produced in the world of ham radio. Here, radio operators are engaged in identity formation and connect socially through the operation of their radios.

All four of these narratives involve people deliberately building political identities as amateurs: Douglas’s radio operators framed their hobby as a free-speech activity; Haring’s ham radio enthusiasts formed social identities through their activities; Kline and Pinch’s users took the available technology and refitted it for their specific needs; and Franz’s car tinkerers pursued a vision of a free America through their use of the open road. In these examples, amateurs are, to some degree, outside the system, able to bask in the interpretive possibilities for critiquing technologies through technical changes or through reframing the meanings of technologies. Tactical media

10. Kline and Pinch, “Users as Agents” (above, n. 8).

11. Trevor Pinch and Wiebe Bijker, “The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other,” *Social Studies of Science* 14 (1984): 399–441.

12. Douglas, *Inventing American Broadcasting* (above, n. 5).

13. Haring, *Ham Radio’s Technical Culture* (above, n. 7), p. 75.

practitioners have thought of and styled themselves as amateurs for similar reasons as ham radio operators and car tinkerers—namely, to shape the meanings of technologies and technological-political actions. In the words of the CAE in *The Interventionist*: “amateurs are not invested in the institutionalized systems of knowledge production and policy construction, and hence do not have irresistible forces guiding the outcome of their efforts, such as maintaining a place in the funding hierarchy or maintaining prestige-capital.”¹⁴

Citizen Science

Science and technology studies research on amateurs has remained largely unconnected to another literature on nonprofessionals who participate to varying degrees in science: the citizen scientist. Tactical media practitioners’ claims to amateur status and their interest in promoting public engagement with science give us reason to look at both literatures together. A number of thinkers and groups have developed the term “citizen science,” but generally we might think of two types of citizen scientists.¹⁵ The first type, exemplified in the literatures as sheep farmers, bird-watchers, and AIDS patients, are stakeholders who, while they hold no position inside the institutions of science or government, have an interest in studying a particular issue, one that can potentially be framed as scientific, and wish to affect an outcome. The second type, exemplified by science panels formed by government agencies for the express purpose of offering democratic solutions to what might be perceived as scientific problems, derive situational expertise from their status as lay people. These citizen scientists are brought forth intentionally to give advice on scientific–public problems and are qualified by their political meaning as citizens in a democracy and people outside scientific institutions.

Alan Irwin’s *Citizen Science* examines the relationship between science and the public in environmental issues in Britain.¹⁶ He offers several detailed examples to make his case for the power of public participation in science issues, including mad cow disease, acid deposition, and chemical industry safety. To move forward on environmental issues, he argues that scientists and the government need to enact better ways to engage the public.

14. Critical Art Ensemble, “The Amateur” (above, n. 2).

15. Frank von Hippel, *Citizen Scientist: Collected Essays of Frank von Hippel* (Berlin: Springer, 1991).

16. Alan Irwin, *Citizen Science: A Study of People, Expertise and Sustainable Development* (London: Routledge, 1995).

The current model of engaging the public, however, often assumes the “deficit model” of the public understanding of science—that is, the idea that if the public does not draw the same conclusions as mainstream scientists, it must mean that the public lacks adequate science education. Brian Wynne has explored sheep farmers’ expertise and political agency in dealing with nuclear-fallout effects from the Chernobyl accident.¹⁷ He shows that the farmers were not “extra” to scientific knowledge, but that instead, by contributing their local, practical knowledge, they were integral to authoring the correct story.

But as Eleanor Ely has pointed out, the idea of citizen science means different things in different contexts. It seems to be defined in reference to the work being performed in a particular project, and the necessary skills and degrees of autonomy of participants vary widely.¹⁸ We might think of Wynne’s citizen scientist as a bottom-up version, in which lay people had something at stake and organized to protect and promote their own interests. Another version of citizen science is the top-down model, in which scientists or government agencies seek the engagement and assistance of the public for their projects. Examples of such projects include the ones of the Cornell Lab of Ornithology (CLO), which enlist participants in a variety of bird-watching activities.¹⁹ There are also opportunities for participants to design their own projects within the framework provided by the CLO.²⁰ The evaluations of these projects include not only traditional measurements—for example, how many species of a particular bird were seen—but they also assess projects by the number of participants involved in the data collection. This second criterion often seems to be presented as a measure of success; it is difficult to find examples of projects that scientists claim had too few citizen participants. The CLO’s guidelines suggest having “a broad view of the ‘end’ as more than collecting data” to would-be project designers: “Projects exist because of a complex network of individuals who need to be impacted in some meaningful way in order to keep up their involvement.”²¹

17. Wynne, “Misunderstood Misunderstandings” (above, n. 3).

18. Eleanor Ely, “Volunteer Monitoring and the Democratization of Science,” *Volunteer Monitor* 19:1 (2008): 1–5.

19. “The Great Backyard Bird Count.” 2009. <http://www.birdsource.org/gbbc/>.

20. Cornell Lab of Ornithology, Citizen Science Central, “Designing a New Project?” 2007. <http://www.birds.cornell.edu/citscitoolkit/toolkit/realitycheck>.

21. Cornell Lab of Ornithology, Citizen Science Central, “Measure Effects: Reality Check.” 2008. <http://www.birds.cornell.edu>.

Using his own experiences, Steve Rayner critiques the top-down version of citizen science by examining the phenomenon of the government seeking out community members to volunteer to serve on citizen science panels and then to render their opinions.²² He suggests that the panels often become mouthpieces for public policy, rather than for exploring the concerns of citizens. He also questions the effectiveness of citizens in affecting the outcomes of the debates, arguing that the outcomes rarely appear to be changed by citizen science panels. Instead of using the process as a democratic vetting of new frames for understanding scientific issues, members of these panels are often presented with risk-analysis frameworks to guide their decisions. These frameworks suggest a specific way to think about the issues at hand, thus limiting the range of inquiry. Rayner finds that the panels act to produce a “fig leaf” of citizen approval for predetermined policies.

Citizen science and amateurs both involve people outside the traditionally imagined networks of science who engage in science in paradoxical ways. Citizen scientists involve themselves with public-interest issues, which often directly affect these individuals. While they may be seen as outsiders, they are, at least nominally, included in the process of science-related public policy; they are actors affecting a system of which they are part, and yet their selection as citizen scientists is dependent on the fact that they are not, in fact, professional scientists.

Amateurs act on the system as well by changing the political meanings of technologies and tinkering with technical parts. Amateurs are understood in terms of “interpretive flexibility”—that is, as actors, they make use of the affordances of technology in new ways. If we begin to look for this notion among citizen scientists we may be able to press forward Irwin’s and Wynne’s arguments to reveal the ways in which these actors use scientific materials in different ways than mainstream scientists, or how they appear to misunderstand science when in actuality they are promulgating other interpretations of the materials or ideas.

Public Art

In her review of the history of public art, Suzanne Lacy identifies some of the factors that lead to artists’ involvements in community-

22. Steve Rayner, “Democracy in the Age of Assessment: Reflections on the Roles of Expertise and Democracy in Public-Sector Decision Making,” *Science and Public Policy* 30:3 (2003): 163–170.

outreach art.²³ She presents two histories: one reads as an institutional history, the other as an examination of artists' individual involvements in political movements. Lacy describes the 1960s movement to exhibit art in public places for the enjoyment of the masses. The impetus for this kind of art education via exposure maps easily onto deficit models of the public's understanding of science. Similar to the idea of the deficit model of science education, art-funding agencies and community art centers worked under the assumption that the public needed more exposure to art; therefore if people could be exposed to more art, they would come to understand and appreciate it. Much of the art talk during the 1960s centered on restoring the power of art in contemporary culture.

To this end, the National Endowment for the Arts (NEA) funded arts in areas, often urban, that were marked for rejuvenation. In Lacy's account, the work funded was overwhelmingly of sculpture and the decision making was done by panels. This deviates from the myth of the lone artist subjecting viewers to his passions, since the artist, in this case, would be dealing with input from a panel that might include architects, city planners, city officials, and art curators. Most public art projects came to be thought of as site-specific; instead of art panels selecting already completed works, artists were selected to design art that fit the landscape and cultural place.

NEA officials may have seen a fantastic opportunity to create new art supporters via a public-outreach campaign that connected directly into the neighborhoods of potential future art connoisseurs. Similar to the science-education deficit model, it was believed that if only people were exposed to art, they would come to appreciate it and be interested in art more generally. Most of these projects have been evaluated as achieving this desired outreach effect; a few, however, have resulted in extreme consequences like deaths and legal action.

Maurice Agis's *Dreamscape*, an inflatable sculpture made of sheets of polyvinyl chloride that viewers could walk around in, toured Europe for nearly a decade before it was set up in Liverpool, where it was promptly attacked by vandals who slashed it with knives. Only weeks later, the piece floated off its moorings, killing three visitors and injuring another eleven. Initial speculation included the suggestion that the deaths might have been caused unknowingly by the vandals, who had damaged the sculpture's tethers, but the artist was eventually brought to court and fined £10,000, although the

23. Suzanne Lacy, "Metaphoric Landscapes and Cultural Journeys," in *Mapping the Terrain: New Genre Public Art*, ed. Suzanne Lacy (Seattle: Bay Press, 1995), pp. 18–47.

jury could not reach a verdict on charges of gross-negligence manslaughter.²⁴

Other projects produced enormous backlashes (though thankfully no injuries or deaths). In 1981, Richard Serra's *Tilted Arc* drew complaints from New York City office workers who regarded the 120-foot sculpture as an impediment—a physical barrier that prevented them from getting to work, since it required them to walk around either end each day. It was proposed to relocate the sculpture, but Serra declared that the piece was site-specific, and that moving it would destroy the integrity of the work. After nearly a decade of court battles the sculpture was removed.²⁵

Like citizen science's bottom-up and top-down approaches, public art is divided. Lacy separates Serra-type experiences of public art from what she refers to as "art in the public interest." A far cry from alienating those who work in or near the sites of public artworks, the new genre public artists wish to involve communities in the process, often to stimulate direct involvement in the design and creation of the works. For these so-called community artists, a piece that does not reflect the ideas of the local community nor, for many, provoke social involvement or political action is a failure. Many of these artists have their roots in the feminist, Marxist, and ethnic communities. For example, an artist might work with community members to collect photographs of the neighborhood over time and present them as a collage of local history.

In trying to include more groups in art, community artists began to blur the boundary between artist and audience; many art projects took on direct education components, besides the usual installation work. We might think of this as a form of "citizen art"; individuals were to be educated about the piece so that they could participate. And like the experiences of scientists and bureaucrats working with citizen scientists who come to admire the savvy and acquisition of new knowledge by the volunteers, the artists felt that the newly democratized art often elicited impressive participation by community members. As in Rayner's account of citizen science, the success of the citizen art process was determined by the degree and quality of citizen participation, as judged by the organizing experts.

In public art, the role of the artist in the process diverges from traditional models and can pose some issues for the artist as creator. Artists worry about the possibility that if community members were

24. "Dreamscape Artist in Court Over Deaths," *Peterlee Mail*. February 14, 2008. <http://www.highbeam.com/doc/1G1-177681163.html>.

25. Lacy, "Metaphoric Landscapes" (above, n. 23), pp. 18–47.

to create the final product, the artist might not agree with its content or aesthetics. According to Lacy, the artists who were most successful in this genre viewed themselves as mediators and organizers, rather than direct creators of the work.

Perhaps, in part, because of this amended role as artist-organizer, community artists have been generally marginalized by traditional art critics. Lacy argues that “appropriated, performative, conceptual, transient and even interactive art are accepted by art world critics as long as there appears to be no real possibility of social change.”²⁶ While she points out that art critics are looking for art that does not “do” anything, art that always “subordinates function to craft,”²⁷ she concludes with a rather different defense of new genre public art. This art, she contends, is not necessarily meant to enact social change; art is “not primarily a product but a process of value finding, a set of philosophies, and ethical action, and an aspect of a larger sociocultural agenda.”²⁸ It is clear that her examples—for instance, an artist reaching out to help homeless people create a public dialogue—are not actually meant to directly solve the homelessness problem.

Lacy claims that critical judgments cannot be based on actual change in the world. She points out that she knows of no examples in which community change was empirically measured as a standard for the success of a project. While we usually think of science as engaged in evaluative practices, the issue of how to evaluate community involvement seems to be precisely the issue for citizen science. The criterion of success for the measurements that Rayner cites as most commonly used seems to be citizen feedback, rather than measurable policy change.

Rayner gets at a similar issue when he talks about the intended results of citizen science panels.²⁹ He suggests that the real outcomes of these panels are rarely measured, and that there are few examples of real changes based on panel recommendations. Rayner finds that the impulse to create citizen science panels seem to be more related to pursuing an ideal of “Habermasian ‘ideal free speech,’” rather than arriving at a policy conclusion that could not have been negotiated without the panel.³⁰ He fears that, like technical expertise being

26. *Ibid.*, p. 20.

27. *Ibid.*, p. 21.

28. *Ibid.*, p. 46.

29. Rayner, “Democracy in the Age of Assessment” (above, n. 22), pp. 163–170.

30. *Ibid.*, p. 167.

used as a rhetorical cover for an already planned policy decision, citizen involvement (the proposed solution to this dilemma) may have the same problem; it too may come to provide political cover for predetermined outcomes. Perhaps citizen science practices make sense in the same ways as public art: namely, being effective in their symbolic power. The philosophy of citizen science—an interest in democratizing the scientific decision-making process—seems to be the same symbolic power that new genre public artists are seeking—namely, inclusion.

Amateurs Promoting Citizen Science through Public Art

The *Free Range Grains* project by CAE allowed participants to test foods labeled “GM free” for the presence of genetically modified (GM) ingredients. The project was a response to the European Union’s (EU) restrictions on requiring the labeling of all GM foods. The artists had previously engaged in a series of science-issue projects and presented *Free Range Grains* as the “final step in amateur research and opening a public lab.” Previous CAE projects, including *BioCom*, *Flesh Machine*, and the *Cult of the New Eve*,³¹ critiqued various aspects of biology, including the commodification of the body and reproduction, eugenics, and capitalism in biotechnology.³² As CAE collaborator Beatriz da Costa writes, “in a capitalist system, an institution with the power and influence of life sciences is better kept under skeptical public scrutiny.”³³

The artwork was designed as a performed installation at museums in order to include community members. Volunteers from the public brought in food to be tested for GM markers. The project’s goals, according to the artists, included demystification: “Biotechnology and the science behind it have to be one of the most misunderstood areas of production in the cultural landscape.” In this project, public involvement was necessary for the artwork to take place; members of the public had to gain some amateur know-how by bringing in their own samples for GM testing. The nature of the testing meant that the artists could only conclusively test for the absence of GM ingredients; it could not determine for certain whether GM was present. The artists hoped to affect awareness of GM regulation issues and

31. Critical Art Ensemble, “Biotech Projects.” 2009. <http://www.critical-art.net/Biotech.html>.

32. Critical Art Ensemble, *Marching Plague*. 2005–07. <http://www.critical-art.net/Biotech.html>.

33. Beatriz da Costa, “Amateur Science, A Threat After All?” 2004. <http://www.beatrizdacosta.net/files/threat.pdf>.

invoke critical inquiry about the role of biotechnology in culture. CAE had a clear position that was realized through the project: it does not believe that the EU will be able to maintain “containment” of GM materials, and it intended to show this by enabling citizens to test foods that are supposed to be GM free.

By contrast, Vanouse's *Latent Figure Protocol* places audience members more in the position of students who are asked to think critically about DNA fingerprinting. The artwork's pieces exist both as an image projected from a gel electrophoresis and as a performance by the artist, who takes on the attitude of a teacher. First, Vanouse indicates that the piece is starting and explains that he will set up the gels and then talk about the process. He immediately begins to methodically set up the gels, a process that appears to be technical to most viewers and might be compared to a happening or a constructed opportunity for audience members to watch in detail a science technique that is usually hidden behind laboratory doors. Then he explains what he is doing with the gels and, using a series of PowerPoint slides, why it is inappropriate to understand gel electrophoresis as DNA fingerprinting. In this case, the public may be amateur science students, but most of the notion of amateur work lies within Vanouse's actions as an amateur biologist and laboratory technician.³⁴

By seeing tactical media in the context of amateurism, citizen science, and public art, we gain a clearer understanding of what tactical media practitioners are doing and may be able to shed new light on the science and technology studies categories of the amateur and the citizen scientist. CAE engages the public in its installations as public art, and it attempts to involve members of the public in the citizen science process. Vanouse, for example, wears a lab coat, but is quick to inform the audience that he is not a practicing scientist. Tactical media artists sometimes talk about themselves as amateurs while attempting to engage the public in issues of science participation, in part because it places them on the same side as the public—as outsiders to the institutions of science they are critiquing. They suggest both subtly and not so subtly that anyone can become involved in public debates about science, and they encourage citizen science by creating projects that are intended to provide citizens with the tools and jargon to participate in science-related public-policy debates. By positioning themselves as amateurs, despite their expertise in art and familiarity with the scientific and technical tools, these

34. Paul Vanouse, “Selected Works.” 2007. <http://www.contrib.andrew.cmu.edu/~pv28/electart.html>.

artists argue that, like themselves, members of the public can also access scientific materials and ideas. This, they hope, will lead to more citizen engagement with scientific policy. As a form of public genre art, tactical media demonstrates an alternative lineage for the terms “amateur” and “citizen science,” which are traditionally understood as separate in science and technology studies. Tactical media depends on engaging the community on political issues through projects that often involve direct community participation.

The now well-known case of Steve Kurtz of CAE demonstrates the complicated status of the nonexpert and brings to the forefront issues of how we separate art and science and who has access and the rights to use knowledge and knowledge-making materials. In 2004, FBI agents raided Kurtz’s home and confiscated materials related to the *Free Range Grain* project. The FBI was concerned about the combination of Kurtz’s possession of such materials, which it perceived to be potentially connected to bioterrorism, and his political beliefs as evidenced by texts in his home. Prior to the seizure of these, the *Free Range Grain* installation had been performed in Germany and Austria; after the incident, it was part of a retrospective called *Seized*. Kurtz and Robert Ferrell, a professor of human genetics at the University of Pittsburgh Graduate School of Public Health, who provided Kurtz with bacteria for the project, were indicted for mail fraud, although the case was finally dismissed in 2008. One way to view the legal issues involved is to consider that they may have stemmed, in part, from the perception that nonscientists do not need nor have a right to the kinds of materials Kurtz was using for this artwork. In this case, his “amateur” use of science materials was considered a threat to public safety.

The Kurtz case offers interesting insights into the category of the amateur and how it interacts with legality. Kurtz’s experience particularly highlights the fact that materials that are regularly used by scientists are, when in the hands of nonscientists, perceived as threatening and worth pursuing with legal action. Like ham radio operators whose activities became regulated by the government, in the post-9/11 environment, Kurtz’s possession and work with biological materials were regarded as a possible precursor of bioterrorist activity and served as a pretext for a FBI search and seizure. CAE’s work could be “perceived as a serious threat to an authoritarian capitalist system, which relies on public ignorance and knowledge distribution through controlled channels.”³⁵

35. Da Costa, “Amateur Science” (above, n. 33).

Conclusions

Studying tactical media helps science and technology studies scholars to understand citizen science and amateurs in three ways by suggesting new ways to think about: how amateurs and citizen scientists become involved in their areas of lay expertise; the process of the democratization of knowledge; and the use of these ideas as rhetorical devices.

First, these public artists bring together ideas that are familiar to science and technology studies scholars writing about citizen science in the form of artworks. They offer a new way for understanding what amateurs are up to when they (in this case, artists) take up the practices and materials that the public—and, in cases like Kurtz's, the government—identifies as the tools of another group—namely, scientists. By connecting political interests to the reasons why amateurs become involved with technical practices we can see more clearly that the pursuit of knowledge by amateurs is sometimes more than a leisure activity. In the case of these public artists, the aim is to raise consciousness about science-related issues, which, in turn, has the potential to influence policy outcomes. Some citizen science is done by enrolling lay people in the creation of scientific knowledge, while other groups organize to meet policy objectives through educating themselves and actively attempting to change the political or scientific system. Similarly, some artists use the scientific and technical in positivist ways, while others engage with the same materials as critiques. Much like bottom-up, self-selected citizen science groups that are organized to research science-related policies in an effort to affect policy processes, these public artists are aiming for similar ends by engaging with science and technical materials through their projects.

Second, the category of the amateur as it is analyzed in science and technology studies can be fruitfully connected to ideas about citizen science. Both of these literatures are connected to the democratization of knowledge, the inclusion of nonscientists in scientific decision making, practices, and critical inquiry. By positioning themselves outside the formal scientific system, tactical media practitioners are able to make claims about the flexibility of their knowledge, which, they argue, is not embedded in the values of institutions, at least not those typically associated with knowledge control, which have substantial stakes in the knowledge-making process.

And finally, the actors in the tactical media movement provide us with a new window into understanding the idea of the amateur as a rhetorical device for framing practices. Tactical media practitioners

want members of the public to participate in science and art, and to use these practices to enhance civic, cultural, and institutional engagement. By speaking about themselves as amateurs, these practitioners are, in essence, saying to members of the public: "You can do what I can do." Although important skills are often possessed by tactical media practitioners—skills unlikely to be learned by participants in tactical media projects—practitioners' self-identification as amateurs makes sense, since this can be leveraged to convince project participants that they also are able to engage with art and science.

Thinking of tactical media as public art enables us to understand the practices better by placing them within the contexts of the public's engagement of art and artists reaching out to engage the public on technological-political issues. Considering together the literatures of amateurs, citizen science, and public art, we can ask more questions about the use of amateur work for the democratization of science, and also new questions about the ways in which public science projects should be conducted. New questions arise about the rhetorical strategy of actors who avoid, or not, proclaiming themselves as amateurs. The pairing of literatures on amateurs and citizen science, along with an understanding of public art, reveals how rhetorical self-identification frames practices that become powerful tools for enrolling interest in and critiquing science.