



Reflections on a Life in Science and STS

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Prologue

In popular histories, science is commonly presented as engaging in a struggle against organised religion. The story of Galileo, forced by church authorities to recant his views, is endlessly retold, as is the enormous conflict between Darwinism and creationism. In these accounts, science is presented as inherently superior to faith: rather than trust in divine revelation, scientists, using the experimental method, probe nature to find its truth.

Although science is different from religion in many ways, there are also some similarities. David Horrobin (1969) wrote a book titled *Science is God*. Others too have remarked that modern science has become a type of secular religion, a belief system that demands obeisance. Scientific knowledge has become the secular version of revelation, the equivalent of sacred texts. Scientists are like servants of the church of science, and scientific elites, or what might be called the scientific establishment, takes the place of religious hierarchies.

With this picture, what does it mean to be a critic, or indeed a heretic (Wolpe, 1994)? There can be disputes within science, just as churches have doctrinal divisions. More serious, though, is to question any of the fundamentals underlying the establishment.

There are many fundamentals, so there are various ways to be a critic. In my career, I've joined two critical movements. The first was the radical science movement, a small and short-lived effort to question the political economy of science. Most of those in the radical science movement were scientists themselves, making their challenge akin to a challenge by loyal church members to doctrinal fundamentals.

Later I became an academic in the field called science and technology studies (STS), which includes areas such as the history of science, philosophy of science, sociology of scientific knowledge, politics of technology and economics of innovation. STS, in its relation to the main body of scientists and technologists, might be seen as analogous to religious studies, namely learning about religion as a social activity, without necessarily believing in it. Within STS, I pursued a

particular course of seeking to provide ideas to support fair treatment of challenges to the scientific establishment.

My career in science and STS is just one of countless others, and perhaps of interest only because it is relatively uncommon. In any case, I describe here my own trajectory, highlighting various activities in a search for insights for others who might follow not in my footsteps but in a path slightly illuminated by light from the past.

In telling my story, or rather a perspective on my story, I try to extract some insights about the intersections of biography, political engagement and the role of circumstances. The initial sections provide short accounts of various activities in which I've been involved, along with some of the context of science and STS. The final two sections offer an assessment. Only some of my science/STS activities are addressed here. Also omitted are activities in other domains, including nonviolent action (a major interest since the late 1970s), education and democracy.

Beginnings

Growing up mainly in Tulsa, Oklahoma in a supportive family environment, my best subject was mathematics, and I also liked science. In 1965, I went to Rice University, in Houston, Texas, where I majored in physics. Through all this time I was politically inactive and held conservative views. Although it was the late 1960s, there were no anti-war rallies on campus, and I wouldn't have attended anyway.

However, in 1969, on the verge of graduation and being drafted into the army, I decided that I could not tolerate military service. Because of my computer programming skills, uncommon at that time, I assumed I would not be sent to Vietnam, but I had a gut-level abhorrence of authoritarian institutions. So I immigrated to Australia and started studies towards a PhD in theoretical physics at Sydney University.

My action triggered a change in my political understanding. I read voraciously, including books on the Vietnam war, political history, radical education, anarchism – and the critique of science. Jerry Ravetz's (1971) book *Scientific Knowledge and its Social Problems* was influential. My political views gradually moved to antiauthoritarianism and egalitarianism.

In 1972, in the second year of my PhD on a topic in astro-plasma physics, I was invited to join two academics in the Department of Theoretical Physics who were studying the effect of exhaust from supersonic transport aircraft (SSTs) on stratospheric ozone. The Concorde, the British–French SST, was proposed to fly to Australia, and the Australian Academy of Science was asked to investigate. My thesis topic gradually shifted to numerical methods and stratospheric dynamics, stimulated by the politicised topic of pollution of the upper atmosphere and its effects on human health and the environment.

Studying papers on SSTs and stratospheric ozone, I discovered that different researchers had come to dramatically different conclusions. In about 1974, I had the idea that these scientists were using various methods, such as their technical assumptions, to ‘push’ their arguments. They were committed to a conclusion and used various means to support it. I decided to write a book about this pushing of arguments, linking it to presuppositions, paradigms and the political economy of science (Martin, 1979).

In 1974, I joined a radical science discussion group, Science for People, organised by Hugh Saddler, who had been a key figure in BSSRS (British Society for Social Responsibility in Science), then at the forefront of radical science thinking. Perhaps half a dozen of us met once a month to discuss readings and ideas. The group never became involved in any action. Even so, it was important for me to test out my ideas.

Radical Science in Context

BSSRS and its US counterpart Science for the People were the primary nodes of the radical science movement, at least in the English-speaking world. Growing out of 1960s radicalism, the radical science movement has never involved more than a tiny proportion of scientists and engineers who, for the most part, simply do their work without questioning its underlying social roles, in what today might be called ideological discipline (Schmidt, 2000). Scientists and engineers, like most others, have views on social issues, and quite a few are active in political parties and various causes. However, few turn a critical gaze on the foundations of their professional activities.

The active phase in the Australian radical science movement was limited geographically and temporally to a few cities and mainly in the 1970s (Biggins, 1978). Possibly there would never have been much activity in Australia except for prior developments in Britain and the US. Hence, my involvement in the movement depended sensitively on timing and location. Timing was critical in being in Sydney, working in science, and being receptive to radical science ideas in the early 1970s. The wider context was groups and publications elsewhere. In those years, before the Internet, magazines and journals provided regular treatments of alternative perspectives. Three were especially important: *Science for People*, published in Britain, *Science for the People*, from the US, and *Radical Science Journal* (which later became *Science as Culture*) in Britain. A few books were influential too (e.g. Rose and Rose, 1976a, 1976b), but magazines offered a more convenient and flexible way of engaging with a network of like-minded individuals.

For a number of years, I subscribed to ten copies of *Science for People* and *Science for the People*, selling the extra copies to friends and sympathisers. This reduced postage costs and got the copies to some others who might not have subscribed on their own. When the magazines stopped publication, this

ended one of the important channels conveying radical science ideas. The Australian groups, such as they were, never produced a regular publication.

Canberra

After submitting my PhD thesis in January 1975, I spent a year doing a bit of tutoring before obtaining a job as a research assistant at the Australian National University (ANU) in Canberra. I spent a decade at the ANU, mostly in the Department of Applied Mathematics. I was on one-year contracts all this time, and my position was terminated three times along the way.

Arriving in Canberra, I immediately joined the local Friends of the Earth group and entered the world of activism. Most of the members were undergraduate students or unemployed. At age 29, I was the oldest yet least experienced member of the group. The major campaign focus at the time was opposition to uranium mining and nuclear power. I helped organise rallies, gave talks, wrote leaflets, went door-to-door with a petition and gradually learned to think strategically.

Friends of the Earth is an environmental group, of course. In Australia, it was also a prime location for grassroots politics based on non-hierarchical organisation, solidarity with oppressed groups, and local autonomy, influenced by ideas from radical feminism, direct democracy and the critique of industrialism.

The scientific case for nuclear power was spearheaded by Sir Ernest Titterton, who had worked on the Manhattan project. He happened to be professor of nuclear physics at the ANU. He wrote numerous articles and letters, especially for the daily newspaper *The Canberra Times*. I took a leading role in countering Sir Ernest's claims, also writing articles and letters to *The Canberra Times*. In doing this, it was helpful to have some relevant-sounding credentials, including a PhD in physics. Other key protagonists in the contest between experts were Sir Philip Baxter, formerly chairman of the Australian Atomic Energy Commission, and an ardent supporter of nuclear power, and my friend Mark Diesendorf, a highly knowledgeable anti-nuclear campaigner with a PhD in applied mathematics.

Sir Ernest, Sir Philip and a few other credentialed figures were important for the pro-nuclear side, giving it greater credibility. Countering their authority was an important part of the anti-nuclear campaign. This gave me practical understanding of the politics of expertise. A few years into this campaigning, I decided to write a critique of the views of Sir Ernest and Sir Philip, published as *Nuclear Knights* (Martin, 1980). This helped develop my skills in social analysis.

In writing a critique of Sir Ernest's and Sir Philip's views, I was directly challenging two important figures in the Australian scientific-political establishment. Sir Ernest initially sent me copies of his publications but declined to comment on a draft of my critique. When my publishers contacted him by phone about my draft, he said it was 'mainly rubbish' and 'quite puerile.' Sir Philip, in contrast,

threatened to sue for defamation. It was revealing, though hardly surprising, that these scientific elites did not condescend to engage intellectually with a junior scientist. They saw themselves as scientific authorities and, like religious authorities, were not going to treat apostasy with any respect.

In Canberra there was an active scientists' group, the Society for Social Responsibility in Science (ACT), that campaigned against the SST and against nuclear tests in the Pacific, among other issues. However, I decided not to join this group, preferring the egalitarian orientation of Friends of the Earth and the more radical politics of Science for People.

During my time in Canberra, a group was set up called Community Action on Science and Environment or CASE. The half-dozen members were environmental activists or junior scientists. We researched and produced leaflets or submissions on sugar, salt, television, hazardous chemicals and head lice treatments. The group was short-lived, 1980–1982. It showed me the difficulties of getting scientists (namely me and a couple of PhD students) to work on issues with activists.

Dissent in Science

After beginning work at ANU, I made it my business to contact all the radical academics on campus. There weren't many! I got to know everyone in the Human Sciences Program, a teaching unit addressing environmental issues from a holistic perspective, which was radical for its time. When a committee recommended that a key academic in the programme, Jeremy Evans, be denied tenure, students and supporters began a campaign to defend him and the programme. I became an active participant (see Martin, 1997, pp. 3–16).

I had heard about a few other environmental scientists who had come under attack, and recognised a pattern. Environmental researchers or teachers were at risk of what I called 'suppression of dissent.' I gradually collected more cases and wrote a paper about the issue (Martin, 1981). I gave a talk at the National Science Forum that was reported on the front page of the *Canberra Times*, generating hostile responses from the Vice-Chancellor and giving me an initiation in the interplay of media and controversy (see Martin, 1997, pp. 103–107).

After identifying characteristic features of suppression of dissent, I started noticing the same features in all sorts of news reports, articles and books. As well, after writing articles and obtaining some publicity, dissidents contacted me, setting up a synergy between writing, corresponding and obtaining new material. This has continued ever since.

In highlighting suppression of dissent in science, I was in effect supporting those who questioned orthodoxy, not necessarily supporting their views but supporting their right and ability to question without reprisals. My involvement with dissident views in science and mainstream responses to them has continually reminded me of how often the scientific establishment behaves in an

authoritarian way rather than the according to its ideology of free and open expression of ideas.

In 1984, an Australian group was set up called Women in Science Enquiry Network or WISENET. It had dual aims: to help women scientists in their careers and to challenge patriarchal structures in science. Membership was open to all. I was invited to join the Canberra group. My primary interest was the critique of science, but over time WISENET groups mainly focused on lauding and supporting women scientists, with the critique of masculine science falling to the wayside. Before this happened, Jill Bowling and I wrote an article focusing more on the critique of patriarchal science (Bowling and Martin, 1985).

At the end of 1985, my job at ANU was again terminated. Anticipating this possibility, I applied for all sorts of jobs and was lucky to obtain a lectureship at the University of Wollongong. It was in the Department of History and Philosophy of Science (HPS), soon to become the Department of Science and Technology Studies (STS). It was a liberation for me. Rather than working in a mathematics department where my wider interests were not valued, suddenly I was among colleagues who were passionately interested in ideas about science, technology and society.

STS in Australia

In the 1940s at the University of Melbourne, an HPS department was created, the first in Australia and one of the earliest in the world. By the 1970s and 1980s within this and other Australian HPS units, there was increasing interest in the sociology of science and in the political economy of technology. At the University of New South Wales and the University of Wollongong, the departments in the 1980s changed their names to STS. As well, there were units in several other Australian universities: Griffith, Murdoch and Sydney. In addition, there were quite a few academics doing HPS or STS while located in other departments, plus a few independent scholars in the field.

Australian HPS and STS units were linked in two main ways. The formal connection was via a professional organisation, AAHPSSS (pronounced 'opps'), standing for the Australasian Association for the History, Philosophy and Social Studies of Science. AAHPSSS held an annual conference and for some years sponsored a journal, *Metascience*.

The second mode of linkage was through informal contact. This could be within the STS professional community or via other networks and audiences.

As well as writing for academic audiences, which was the primary orientation of most work on the history and philosophy of science, many of the academics and research students addressed contentious social issues, for example technological innovation, medical controversies and nuclear war. This was true across Australia, though the balance between academic internally-oriented

interests and engagement with social issues was different in different places. The Melbourne HPS Department was the most oriented to traditional HPS, while the STS Department at the University of Wollongong had a reputation of being engaged with contemporary issues, with a critical perspective.

Keeping in contact was easy with immediate colleagues but more difficult between units due to Australia's large distances. At Wollongong, we kept in touch with some colleagues at other universities but were just as oriented to what was happening in the field internationally. For example, after actor-network theory was developed by theorists in France and Britain, a discussion series about ANT was organised in STS at Wollongong, mainly oriented to critique.

The intellectual environment was perfect for me, with my orientation to activism. Unlike my previous position at ANU, where most colleagues were indifferent and a few were hostile to my activism, at STS in Wollongong my interests were unexceptional. It took me about six months to adjust to the new supportive environment.

In the late 1980s, the Australian federal government introduced major changes in the higher education sector. Tuition fees were introduced, though made more acceptable with zero-interest student loans that were only paid back as an income-tax supplement when a former student's income was above a certain limit. This system enabled a massive expansion in student numbers. The government reduced its per-student funding, so the student load per academic increased dramatically. University budgets were squeezed.

In institutions built around academic disciplines, STS was always vulnerable to cutbacks because it is inherently interdisciplinary, which means that cognate fields – history, philosophy, sociology, political science, and sciences – can encroach on STS teaching topics. The government squeeze on per-student funding triggered internal restructuring in Australian universities, and few STS units were well placed to thrive. 'Efficiency' to university managers meant larger classes and heavy use of teachers paid by the hour. STS units dependent on teaching into a variety of other fields were vulnerable to having this service teaching taken over by other units. There was a gradual decline in the number of STS academics and research students.

Meanwhile, in STS internationally, as well as in Australia, there continued to be a divergence between academics who focused on issues internal to the field and those seeking a connection with public debates and policy. For those with an external orientation, their main reference groups were often outside STS, for example in environmental politics or public health. The internal dynamics of the Australian STS community – its leading figures, publications and activities – had relatively little attraction for those of us primarily oriented to contemporary social issues. Accordingly, I now turn to some of my own activities.

Some STS Engagements

In 1990, I was contacted by Louis Pascal, who had written a long article arguing that AIDS developed from contaminated polio vaccines given to nearly a million people in central Africa in the late 1950s. His work seemed worthwhile to me and I arranged for his article to be published in a working paper series put out by an STS research group (Pascal, 1991). I thus intervened in a nascent scientific controversy, which soon blossomed after publication of the same theory in the rock magazine *Rolling Stone*. The saga of the polio-vaccine theory of the origin of AIDS is a long one, and involved me in extensive correspondence, setting up a website, giving a paper at the Royal Society in London and writing a series of papers. As a social scientist, I intervened in a scientific debate not to support the polio-vaccine theory but only to argue that it warranted consideration and was being unfairly dismissed. This participation in the debate has continued, sporadically, ever since (e.g. Martin, 2010).

Since the late 1970s, I have studied and campaigned for the use of nonviolent action – rallies, strikes, boycotts, sit-ins and other methods not involving physical violence against opponents – especially as an alternative to military defence. For many years, my research and action in this area was not connected with my STS-related interests. In the early 1990s, I had an idea for linking the two domains. A comprehensive nonviolent alternative to military defence implies a transformation of technological systems. For example, centralised energy systems based on nuclear power, coal, oil or gas would be replaced by decentralised systems based on local renewable energy sources. Likewise, communication systems would be designed so that an aggressor could not take over and use them for propaganda or surveillance. The implications are far-reaching, including a change in priorities for research fields, with certain aspects of psychology and sociology becoming far more important. With support from a research grant that employed a research assistant, I interviewed scientists and engineers and wrote articles and a book (Martin, 2001).

In about 2001, I was studying a process called political jiu-jitsu, in which a violent attack on peaceful protesters can be counterproductive for the attackers, triggering greater support for the protesters. This dynamic had been documented, especially by premier nonviolent researcher Gene Sharp (1973, pp. 657–703). But I was aware that violent attacks on peaceful protesters often are *not* counterproductive. I had an idea: perpetrators can use various techniques to reduce outrage from injustice. I developed this idea into a framework of outrage-reduction techniques and corresponding outrage-promotion techniques, and applied it in the following years to a wide range of topics. I collaborated with Sue Curry Jansen to look at censorship backfire and with Steve Wright to look at torture-technology backfire, and studied sexual harassment, whistleblowing, genocide and other topics from this perspective (e.g. Martin and Wright, 2003; Martin, 2007; Jansen and Martin, 2015). One of the areas of

application is dissent, including dissent in science. I now encourage dissidents to look at their situation using this framework.

In 2010, I was contacted by Meryl Dorey, founder in the 1990s of the Australian Vaccination Network (AVN), a citizens group critical of standard government vaccination policy. The AVN had recently come under attack by a newly formed pro-vaccination citizens group called Stop the Australian Vaccination Network (SAVN) that was using a wide range of techniques in an attempt to discredit and destroy the AVN. Although by this time I had studied quite a number of scientific controversies and a wide range of attacks on dissenters, never before had I encountered an attack on a citizens group, whose main approach was providing information, that was so ruthless and unrelenting. I decided to become involved by exposing and analysing the attacks on the AVN.

I wrote a long article about the attack, which involved using standard STS ideas about controversies (Martin, 2011). For my trouble, I came under attack myself. There were abusive comments on social media and complaints to the university. This was an amazing experience. I corresponded with figures on both sides of the debate and gathered ever more information. As the years passed, SAVN managed to win support from government agencies, sectors of the mass media, and politicians. The campaign against any public criticism of vaccination was extraordinary, unlike what was occurring in other public debates in Australia or elsewhere (Martin, 2018a).

Prior to the formation of SAVN, by chance I was supervising a PhD student, Judy Wilyman, who was a public critic of vaccination. She came under repeated attack during her candidature. There were abusive blog posts on social media, complaints to the university, freedom of information requests and hostile newspaper articles. However, these were only a warm-up for the all-out attack launched after she graduated, which targeted Judy, me as her supervisor and the university for allowing her to graduate. I had never heard of anything like it anywhere in the world (Martin, 2017).

As a researcher into suppression of dissent and into scientific controversies, I didn't just have a front-row seat to view the drama: I was also on stage, part of the action as an observer and commentator who was attacked for playing that role. It was an opportunity I couldn't have organised if I had tried.

Assessment

These activities in my career in science and STS are not exhaustive but do capture the main types of engagements. To try to make some sense out of them, Table 1 lists some features of the activities.

Column 2 summarises how I became involved in the activity. What this doesn't sufficiently highlight is the role of chance and contingency. I can't remember how I originally found out about the Science for People group, but

Table 1. Features of selected activities in Brian's life in science/STS.

Activity	How I became involved	Who else was involved?	Audience or outputs	Impacts
Science for People group	Invited or learned about it	Several group members	None	Understanding of members
Critique of science	Reading plus relevance of PhD research topic	People who commented on drafts	Readers	Self-understanding; limited readership
Confronting nuclear power experts	Involvement in Friends of the Earth's campaigning	Other anti-nuclear activists	Readers, including activists, of letters and articles	Countering claims by pro-nuclear experts
Community Action on Science and Environment	Friendship with group organisers	Several group members	Recipients of leaflets	Understanding of members and a few others
Women in Science groups	Invited by organisers	Several group members	Readers	Empowerment of members; setting up a science shop
Suppression of dissent in science	Personal experience; contact with and learning about suppressed scientists	People consulted about cases	Readers; individuals seeking my advice	Wider awareness of suppression dynamics
Dispute over the origin of AIDS	Prior studies of suppression; receipt of correspondence	Several researchers on the origin of AIDS	Readers of articles, website	Greater awareness of polio-vaccine theory
Technology for nonviolent struggle	Prior involvement with STS and nonviolent action	Research assistant, interviewees	Readers of articles, book	Limited
Strategy for dissenters	Contact with dissenters	Dissenters contacted	Readers of articles, website	Insight and advice for dissenters
Vaccination controversy	Prior controversy studies; contact with campaigners	Campaigners, university officials	Readers of publications	Insight and advice for campaigners; defence of free speech

in any case it was a window of opportunity: a few years previously there was no such group in Australia, and likewise by the 1980s most of the groups had folded. Similarly, getting involved in campaigning against nuclear power was a chance outcome of moving to Canberra where there was a vibrant activist group. Confronting pro-nuclear experts depended on my involvement and my background in physics.

Some of the later activities depended on my earlier experiences. For example, because I was known for my work on controversies and suppression of dissent, people contacted me about a wide range of contentious issues. In a few instances, such as the origin of AIDS, I then decided to pursue an issue further.

Life can be likened to a random walk, in which a small particle is bounced by other particles in random directions. When, in the process, particles/persons acquire greater mass and momentum (and some agency), they are more likely to continue in the same direction as before. But the random encounters still make a big difference.

The column 'Who else was involved?' refers to those with whom I was sharing activities. Some of the episodes involved groups whereas for others I was mainly

operating on my own. For me, working in a group is more satisfying than working alone. It is satisfying to interact with others, to share aspirations and tasks, and to provide mutual support and inspiration. Although I've listed people with a variety of roles, for example interviewees, in practice it was the groups that provided the best experiences: Science for People, Friends of the Earth, CASE and WISENET.

The column 'Audience or outputs' refers to materials or activities produced for people outside the primary actors. For example, when organising a rally, the audience is those who attend or learn about the rally. For most of my activities, the main output has been my writing and the main audience is readers.

It is worth noting that activities can be worthwhile even without outputs or an audience. The Science for People group never produced even a leaflet, yet it was valuable to me by providing a place to share ideas in a supportive atmosphere. Over the years, I have done a lot of writing, so the main audience for many of my activities has been readers. Others might do more speaking, networking, teaching or organising.

The final column lists my guesses about the main impacts of the activity. These are varied, and hard to judge. Academics can measure research impact by citations or downloads of articles. However, academic impact does not necessarily correlate with impact in other ways, and there is no simple way to assess the impact of conversations, meetings, correspondence or publications.

Lessons

What lessons or insights can be drawn from this personal story? One is the great importance of contingency (Frank, 2016). Chance occurrences were influential at various times, including immigrating to Australia, working on an environmentally related PhD topic and being in a radical science discussion group – and those were just the contingencies at the beginning of my career. It is worth mentioning one other example. In 1975, I nearly missed being appointed to a tenurable lectureship in physics at Murdoch University, which had just opened in Perth, Western Australia. If, in a parallel universe, I had been offered and taken this job, I would have thrown myself into innovative curriculum design and teaching, a primary interest of mine at the time, and my career trajectory would have been quite different.

As well as noting influences marked by presences, it is also worth trying to notice influential absences. At no stage did I have a major intellectual mentor or model. Nor did I ever undertake formal study in the social sciences. This meant that I just assumed that I would have to figure things out for myself, based on reading widely, thinking and discussing ideas with others who were often no more knowledgeable than me. My primary intellectual mentors were thus the authors whose works I read. In activism, in contrast, I learned

enormously from the guidance of Frank Muller, coordinator of the Canberra Environment Centre, Laurie Shane, a nonviolent activist, and many others.

Another lesson is that there are numerous possible applications of STS ideas for the purposes of activism, campaigning and social change. Examples in my life have included the nuclear power debate, suppression of dissent, and technology for nonviolent struggle.

Since the late 1970s, I have constantly been on the lookout for ideas and frameworks that might be useful for activists, in particular for nonviolent social change. It has long disappointed me that so much research is oriented to scholars and has little to offer to activists. Furthermore, the usual style of writing in the social sciences and humanities is unappealing to activists. Yet at the same time I appreciate the rigour of scholarly documentation and argumentation, knowing that activists need the results of careful examination of evidence and insights from original thinking. I've realised how hard it is, in scientific and scholarly work, to provide anything useful to anyone outside the academic scene. It is even harder to find a group or network interested in trying to do this.

For an STS scholar wanting to do something relevant for activists, I'd recommend attending or joining an activist group with the aim of learning rather than advising. Insights gained can then be used to inform research and writing. For an activist wanting to benefit from academic work, I'd recommend looking at the online profiles of academics and identifying those whose interests could have some relevance to campaigns. Then seek to talk with these academics with the aim of learning what's going on in the scholarly world. Making contact is the crucial step and can be beneficial whether or not a lasting connection is created. If you are rebuffed or disappointed, it just means you haven't found the right person.

I am delighted when contacted by activists and I think many colleagues would feel the same, but few academics or activists take the initiative to initiate new connections, no doubt because of the immediate pressures of tasks to be done, and the comfort of interacting mainly with those undertaking the same sorts of activities.

Several years ago, I discovered research on expert performance, which addresses what is required to become a top performer in classical music, chess, athletics and a host of other areas (Ericsson and Pool, 2016). It is essential to spend thousands of hours in focused practice on skills at the edge of one's abilities under the guidance of a knowledgeable teacher. By my early 30s, I had set myself the goal of contributing to nonviolent social change, more specifically strategy for social movements. To get really good at this requires practice, and many of the activities in which I've been involved have contributed. However, unlike athletics or classical music, there is no widely accepted approach for becoming better at social movement strategy, and no well-established programme for daily practice. If I have made progress in this direction, it is due to a combination of circumstances and opportunities. There is now more information available for developing a programme for being an activist, but also more distractions from putting in the long-term effort to become a really good one.

It has been useful for me to reflect on some of the significant activities in my life in science and STS. In reflecting on these, I am providing a narrative that highlights some features and submerges others, and no doubt misses important presences and absences. For better or worse, the narrative helps shape my future decisions and my advice to others. Whether reading this narrative is of value to anyone else I am happy to leave for others to decide.

Postscript

In the prologue, I presented an analogy between science and religion, and between the scientific establishment and the church. Being involved in the radical science movement was akin to heresy, and some STS projects also generate hostility from defenders of scientific orthodoxy. Indeed, STS as a field came under attack during the so-called ‘science wars’ that peaked in the 1990s.

One measure of the threat posed to orthodoxy is the vehemence of the response from its defenders. There are quite a range of science defenders, including some scientists, journalists and commentators. Among these defenders, the Skeptics movement stands out as particularly aggressive. The Skeptics are noted for being critical of psychic phenomena and alternative health modalities, among many other areas, but hardly ever apply their scepticism to mainstream science and medicine. One arena where Skeptics have sought hegemony is Wikipedia, where many non-orthodox viewpoints and figures are portrayed unfavourably (Association for Skeptical Investigation, 2019). I saw this in a personal way when, in January 2016, my Wikipedia entry was rewritten and turned into an attack piece (Martin, 2018b). The attackers zoomed in on my support for a fair treatment of the polio-vaccine theory for the origin of AIDS, and for my alleged views about vaccination. My approach of seeking fair treatment for heterodox views was recast and castigated as being support for those views, and condemned on that ground. I have found it both informative and amusing to be targeted in this way. Where would the church of science be without its inquisitors?

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