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British Nuclear Testing in Australia: Performing the Maralinga Experiment through Verbatim Theatre

PAUL BROWN

Abstract: This paper reports and comments on, in a way that is relevant to historians of science, an outcome of the 2002 Adelaide Festival of Arts, which initiated a program of cultural activities associated with Maralinga, the site of the British permanent testing facility from 1956–67. In its original conception, this particular festival focussed on themes of ecological sustainability, truth and reconciliation and cultural diversity.

Keywords: Maralinga, Adelaide Festival of Arts, theatre, nuclear veterans

CONTEXT

Since 2002, reflection on British nuclear testing has intensified in Australia and New Zealand, as the fifty year anniversary of each test program passes, and the implications of the tests are variously acknowledged and evaluated [1]. At the same time, in those countries which hosted tests and in Britain, the quest intensifies for compensation for traditional owners of contaminated country, nuclear veterans and other affected communities. The Royal Commission into British Nuclear Testing, established in 1984, and which reported at length in 1985, anchors the public understanding of how the Australian tests were conducted, and details the serious social and environmental consequences they caused [2].

Nuclear test veterans in Australia and Britain have never felt great comfort from the conclusions of the Royal Commission. The findings do clarify the dangers veterans faced, and the breakdown of protocols which may have caused their illnesses. The inquiry also helped explain the fears veterans still experience due to secrecy and mismanagement on the part of scientists and authorities. However, the Commission recommendations have offered little assistance for veterans in their struggle for recognition and compensation. In the years since the blasts, in both Australia and Britain, only a handful of veterans or their families have achieved victories in compensation cases. This is largely because procedures place burden of proof on veterans to demonstrate first that they attended the tests, and second that they re-

ceived a radiation dose at the test site that has been responsible for their illnesses [3]. The Royal Commission itself recognized the technical difficulties in veterans making such a case, and the absence of documentation (due to loss or obfuscation) worsens their situation [4].

RESPONSE THROUGH CULTURAL PROJECTS

The purpose of this paper is to report and comment (in a way that is relevant to historians of science [5]) on an outcome of the 2002 Adelaide Festival of Arts, which initiated a program of cultural activities associated with Maralinga, the site of the British permanent testing facility from 1956–67. In its original conception, this particular festival focussed themes of ecological sustainability, truth and reconciliation and cultural diversity [6]. Many of the projects involved an exploration of scientific and technological concerns. An objective was:

‘to re-examine the cross roads of science, technology, ethics and religion. It is imperative, as technological and scientific research changes the way that we inhabit the world around us, that we explore and identify meaningful ways to create space for ceremony and for engaging with current ethical debates’ [7].

Pursuing these objectives, the festival, through its directorate, its Artists Advisory Committee and teams of professional artists, embarked upon ten Maralinga projects, including performance and visual arts, and featuring both the Aboriginal experience and the experience of other Australian communities [8].

In this context, the Australian Nuclear Veterans Association, with funding from the Australia Council for the Arts, began an oral history and 'verbatim theatre' project in 2003 [9]. The approach involved establishing a research team of academics and theatre workers who conducted taped interviews with surviving veterans, widows of veterans and veterans' children. The focus has remained on Maralinga, although the stories of Monte Bello, Christmas Island or other tests sites are of equal importance [10]. Carefully transcribed, the interviews have become the basis of theatre workshops and ultimately a play script, which in coming years will be performed by major theatre companies, schools and community groups. In 2005 the project broadened to include research, interviews and workshops with British veterans and theatre workers, and to date, public readings have taken place in both Britain and Australia, with seasons of the play planned in both countries for 2006 and beyond [11].

The play, with the working title 'Half a Life', creates a dramatic structure for the performance of stories owned by Australian and British veterans and their families. Interview fragments or 'grabs' are edited together to create monologue or dialogue for actors [12]. The project trades on current interest in forms of documentary theatre made popular in both Britain and Australia, where analysts have remarked on the potential for constructing 'truth' through documentary theatre for a society no longer trusting of government reports, newspaper stories or other forms of 'official' history [13]. In theatrical circles, 'Half a Life' is also cutting edge because it brings together environmental and cultural activity, while contributing to the collection of 'verbatim' plays devised in Britain and Australia over the last decade.

IMPLICATIONS OF ROYAL COMMISSION FINDINGS

Although since 1985 there have been many analyses and public campaigns associated with the atomic tests, the Royal Commission into British Nuclear Testing, presided over by Justice Mc-

Clelland, remains the most extensive social, political and scientific 'negotiation' to have taken place. The inquiry heard testimony from Australian and British nuclear veterans, and taking also the advice of scientific experts, produced a number of findings relevant to veterans' health. For example, the Royal Commission found that so-called 'safe-firing' protocols were underpinned by the pre-1958 'paradigm' which assumed there were 'safe levels' of radiation dose, prescribed via the concept of a 'permissible weekly dose' (Conclusion 50) [14]. The Commission concluded that, within this paradigm, policies on radiation exposure were 'reasonable and compatible with international recommendations applicable at the time' (Conclusion 51).

However, the Commission found there were serious and minor departures from *compliance* with internationally recognised procedures (Conclusion 52), and that overall many of the tests violated 'safe firing' protocols. The Commission also concluded that the Atomic Weapons Tests Safety Committee (AWTSC) headed by Ernest Titterton [15] had been unwilling and unable to intervene (Conclusion 47). Further, the Commission argued that safety measures taken in the 1950s would be considered inadequate by today's standards, noting that since 1965 radiation protection measures have been based on the assumption that 'any exposure may involve some risk' (Conclusion 53).

Such findings set the scene for an exploration of the health issues now affecting veterans, who were variously deployed in a wide range of tasks associated with the preparation and aftermath of bomb tests. For those men working in forward areas immediately before and after tests, and for personnel observing the explosions, protocols were relatively well delineated [16]. However, the Commission findings imply that relaxation of rules, discipline and protocols in the weeks and months *between* tests created an uncontrolled experiment into the effects on servicemen working on contaminated land, exposed frequently to dust, with a vast array of equipment, some of which would have been radioactive.

In a finding that continues to frustrate veterans, the Royal Commission concluded that illness, disease or abnormality cannot be unequivocally associated with radiation exposure, except possibly in a case of exposure well above the dose limit (Conclusion 62). The Commissioner went further, stating that 'Their exposure to radiation as participants in the trial program has increased the risk of cancer among nuclear veterans' but that this increased risk cannot be quantified (Conclusions 74, 75); further, there is now little prospect of carrying out any worthwhile epidemiological study of those involved in the tests (Conclusion 201). At the same time, the Commission pointed to serious inadequacies in official reports on human health impacts and other outcomes of the tests. For example, the Commission found that the report by the Australian Ionising Radiation Advisory Council was not an adequate scientific account of the testing program; nor could the Donovan Report [17] be regarded as an adequate epidemiological study of the health of atomic test personnel (Conclusions 195–200).

Since the Commission's report in 1985, there have been attempts to systematically study the health of veterans, there have been new revelations as government documents are made public, and evidence has been brought forward in a number of compensation claims by veterans [18]. Equally systematic has been the defensiveness and counter-argument by government departments in both Britain and Australia. In terms of negotiated public understanding of the tests, the causal link between service at Maralinga and veterans' health problems remains as controversial as it was at the time of the Royal Commission. Because of this, we could say simply that the Maralinga experiments are incomplete: If one purpose of the tests was to assess the behaviour and resilience of men under atomic fire, then the results of that experiment are not yet confirmed.

Indicating other uncertainties, the Royal Commission also found that 'Operation of the need to know principle and the minimal amount of information given to participants has been a factor contributing to participants' concerns and fears regarding what might have resulted

from their experience at Maralinga' (Conclusion 132). There has been no systematic assessment of the long term psychological impact of the tests, even though anecdotally it is widely known that many veterans have sought psychiatric counselling [19].

These circumstances – an incomplete scientific testing program and abiding fear and uncertainty amongst veterans – indicate the need for new knowledge, if possible to be constructed through integrated social processes. This is the context for the 'Half a Life' theatre project.

EXAMPLES OF FINDINGS FROM THE ORAL HISTORY AND THEATRE PROJECT

The 'Half a Life' oral history and theatre project parallels and complements work by veterans in both Australia and Britain to understand more completely the impacts of their service at Maralinga and other test sites. Consistent with the Royal Commission findings, 'Half a Life' indicates veterans themselves had little understanding of the overall plan for the tests, and of the exact nature of the scientific experiments involved. Yet veterans and their families have the wherewithal to extend or make new knowledge about their ill health; this is knowledge relevant to overall understanding of the tests. It is knowledge which, if communicated through public processes and through veterans' networks, can address the 'fear of the unknown' that haunts many veterans and their families. Once complete, the play script for 'Half a Life' will report some of this new knowledge about the British nuclear tests at Maralinga. What follows here is a brief and selective summary of findings, drawn from interview transcripts and from the processes of play-making which have involved theatre workers, researchers and veterans.

HIDDEN EXPERIENCE

Secrecy has played an important part in the lives of veterans and their families. Men who have remained silent about their experience at Maralinga have done so because of continuing

allegiance to the secrecy agreements they signed at the time of the tests. But for some this has meant their families remained ill informed until serious illness or psychiatric counseling cause details to emerge. Secrecy, when coupled with government inaction, and with the methodological difficulties indicated by the Royal Commission, has delayed for up to fifty years individual attempts to gain compensation; this greatly exacerbates the problem of proving a causal link between illness and radiation exposure. The 'Half a Life' project is one way that previously hidden experience can be consolidated and revealed. In some cases, the interview process itself becomes the means by which knowledge is extended and communicated within the families, as shown in this exchange between Ric Johnstone, President of the Australian Nuclear Veterans Association, and a veteran's widow. The interviewer asks what the widow knew of her husband's job at Maralinga. Ric answers:

Ric (RJ/bb): 'Total response, that's what it's called, yeah. All sorts of things, they have buildings out there, two story buildings, which they built [for testing in the blasts]. They had brick buildings, concrete buildings, prefabricated buildings. They had ah, all sorts of vehicles, trucks, tanks ... aircraft put around at different places. And ah, one thing that most people don't know is, that they had lots of animals too. They had goats and pigs and, and rabbits in cages, they had ah, carrier pigeons. And we had an animal mortuary, where we used to take the animal carcasses back to. That's the sort of thing Reg would have been doing, go out with a truck to bring ah, carcasses back or something, and take them to the mortuary ... Some of em were actually just boxed and sent back to the UK. And then, the next day, they're burned and the ashes are tested for Strontium 90 or Radium 223 or whatever the element might be they're looking for. It was a big deal.'

Bev (BB/rj): 'No he didn't talk much about it.'

Ric (RJ/bb): 'Only to me and, and Lex and the others, when we all got together [in the 1970s] we sort of started talking about it' [20].

HEALTH IMPACTS

Several of the interviews for 'Half a Life' convey details of cancer and other illnesses affecting veterans and their families. For example, the following account is laced through with the humour often found in veterans' testimony, even when describing horrific circumstances.

Ric (RJ/sc25): 'I came back from Maralinga, and got married as you know, and then we came back over to New South Wales ... But I'd been getting these bouts of nausea n' diarrhoea n' stuff, and ah, the doctors' at Richmond decided I had radiation poisoning ... So they put me in hospital and put me in a ward on my own, with a verandah outside ... and ah, every now and again, they'd wheel somebody past on the banana cart ... and on this occasion, they wheeled a guy past who was sort-of sitting up ... but, sorta laying down, but in a sorta situp sort-of position, and he looked in and saw me, and I saw him, and waved because I recognized his face, 'cos he was also at Maralinga ... The next, time the doctor came into my room, I said, 'That bloke next door's a mate-o-mine', ah, and I was up, I was able to get up and walk around, so I said, 'I'll go in and say g'day to him, and see him', n' he said 'no ya can't do that, ya can't', and I said, 'well what's he in there for, what's he being treated for?', and ah, the doctor said 'That's all, private information, we can't tell you about our patients'. But the next day the male nurse came in ... and I said, 'What's up with my mate next door there?', n' he said 'Oh he's got a broken leg' ... I said 'Oh really, a broken leg, how did he do that?' He said 'I dunno, fell off a truck or something' ... 'Oh righto' I said, 'Well can I get up and go and see him?' He said 'Oh no, you're not allowed in there' ... and I said 'Oh-alright'. I never, never saw him again and never, what I should-of-done was gone in anyhow, but I didn't ... And a couple of days later, I said 'How's me mate goin' next door?' and they said 'Oh, he died' ... I said 'Died of a broken leg!?' And they said (laughter) 'There were complications.' ... So I think he was there for the same reason I was. But this ah, and this orderly told me later, that he had some sort of blood condition too, which is why I was there, and eventually when they let

me out, they said I was lucky because they had blood, leukemia going on. My red cells were eating the white cells or something, was how it was described to me, or the whites were eating the reds, I think, yeah I think the whites were eating the reds ... but I suspect the guy next door ... his bone marrow didn't pick up again ... But my bone marrow had come good, and was starting to regenerate fresh, blood cells, so I survived' [21].

The veterans' testimony also includes descriptions of health impacts suffered by their 'genetically impaired offspring'. The project findings emphasize that even where direct causal links cannot be proved, it is the *fear* that illness may be associated with radiation exposure at Maralinga which plays out prominently in the later part of veterans lives, especially each man's fear that he has imparted genetic defects to his family. A British veteran conveys this alongside his humorous recounting of his accidental exposure to radiation:

Rev John (REVJ6): 'I must be the only Church Minister with a radioactive bum. We were up there one day in the forward area, and it was boiling hot and I'm a 19 year old, at the time. Entirely innocent, this is just a great lark and a holiday. And ah, it was boiling hot and, and the Sergeant said, 'Lets have a break'. So what I did, and two or three others, is that I actually crawled inside the rim of one of our great big lorries, lorries. And so you put your bum here, and your rest, feet rest there and you put your shoulders on a bit of the curve of the inside of the rim of this great lorry. Well of course the lorry had been driving around the forward area and so all the dust is, is hot. And what happens, that transfers, not only through your overalls, this so-called protective layer, but into your bum. And lo and behold for 4 or 5 of us ... and when it came to our bums, ding, ding, ding, ding, they were all clanging cymbals and great, loud noises. And we had to scrub and scrub and scrub, with just ordinary running, running water out of a shower, until the Geiger counter went down sufficient and we were counted to be safe. So this was why I laugh and say, 'The Reverend John Walden, only Minister in the world with a radioactive bum.' I'm quite

unique.'

Rev John (REVJ62): 'The other side of the story is, that, last August, I had my first grandchild, from my youngest son. He didn't know it but I was most careful in asking questions about this birth, was she normal, you know, has she got two heads, or fifteen arms or whatever, was she breathing properly, were all the tests done on her ... And she was a perfectly normal baby. He doesn't know why I was asking that, but I was greatly concerned in case there was going to be something wrong with this baby. And until I die I might well have a huge conscience that some form of deformity was passed through my genes' [22].

LIFE BETWEEN THE BLASTS

One of the most important types of testimony emerging from the 'Half a Life' project is the detailed description of camp life between the blasts. Previous public records (films, news stories and even the Royal Commission) have given emphasis to the experience of the men during and immediately after the blasts. Such testimony is certainly important, as the men recall and eloquently recount the sights and sounds of the blasts. But in 'Half a Life', interviews have also explored the daily lives of the men in the long periods of preparation and then clean up associated with the tests. Men were typically assigned for up to nine months, even though bomb tests were clustered within just a few weeks. This meant long periods with minimal work, with the opportunity for exposure to radioactive materials through a wide range of recreational and other 'unofficial' activities. Several examples are contained in this scene titled 'Hot Zones', as follows.

Danny (DM49/51): 'There were weeks, sometimes months, between the bomb tests. You just wandered where the hell you wanted. We were told it was safe.'

Dawn (DC48): 'People think that there was a big fence around everything ...

Danny: 'I can't even remember if, there must have been military police in the camp though, there must have been military police in the camp, I can't actually remember seeing

any. It was very, very relaxed security.'

Malcolm (MS13): 'There was equipment left everywhere.'

John (JM11): 'We worked on vehicles, which had been driving around here, there and everywhere, and we worked on them and underneath them, and obviously all the dust and dirt and so on, er, even to the minor thing like changing a wheel, er, y' you were liable to dislodge dirt and dust from under the vehicle.'

Bob (BS29,79): 'Most of the normal dust, they'd never bother with decontamination ...'

Malcolm: 'And the first thing you did after you'd serviced the vehicle was get a shower, and get the ooze off you know.'

Bob (BS50): 'We used to race the ferrets, the ferrets had supposedly been, or dingos rather, scout cars had supposedly been decontaminated. We had a racetrack down in the bush.'

Dawn (DC48): 'For each, each blast, there was something to be built, so you were, you were passing where this one had been built for a previous blast, to build, eh, build the other one. So you were passing where it's been.'

Rick S (RS7,8): 'So we were working in radio ... in contaminated area.'

Avon (AH25): 'And we were actually working there for a few weeks before we found out there was even a bomb let off there ... But the scientists would often come, used to often come dressed immaculately but with a pair of white rubber boots on, an' no-one took much notice of that, at first, but then it became evident they were takin' precautions not to get their boots contaminated. So they wore them while they were at these sites where they were aware that it was contaminated, but we weren't ... an it made some of us think' [23].

COMMENTARY

The 'Half a Life' playscript is built from material such as the fragments and scenes above [24]. The findings raise some issues of concern to analysts of knowledge formation, science and technology systems. The remainder of this paper provides brief comments on selected well-known themes.

UNRULY TECHNOLOGY

Official accounts of scientific experiments or of the introduction of new technology typically give focus to the intentions of the experiments and to the results as measured against those intentions. The physical dimensions and direct impact of the blasts, the short term effects on structures, equipment, and men in the field – all these were efficiently recorded at Maralinga. Likewise there was an 'orderly' character to field studies of the spread of atmospheric pollution, even though these were not without their controversy [25]. However, the British nuclear testing program has also been an open-ended experiment, with outcomes never anticipated, and ways of measuring those outcomes never foreshadowed.

Bryan Wynne has used the term 'unruly technology' to emphasize the unintended consequences of experiments with science and technology, and to highlight the threat to technical systems that arise from uncontrolled and uncontrollable circumstances [26]. That Maralinga experiments were 'unruly' is made clear by 'Half a Life' participants, in the stories above, and, as a further example, in this testimony from an officer's daughter who was eight when her father served at Maralinga:

Dagmar (DR7): 'Ah yes, ah yes each time he came back [to base near Adelaide], he would be, the ... they um, they suggested that mum put a bunk in the ah the ah bunk bed, in the corner of the kitchen for him and then they put a yellow tape about 3 feet around the whole area and we'd hand him his meals on a tray ... um, and we'd all ... the whole family would all be interviewed by ASIO and the British Officers, yeah and.. just did what they told us um ... they took off rather quickly after they arr took their radioactivity measurements. (DR8) Yes ... and we weren't allowed to approach him, um and we were meant to stay outside the barrier of the tape ... um so he was ah ... probably really as far away as, as ever ... And we weren't allowed to go and play ... so one day he called the dog and the dog ran over to him and um ... ah ... Dad grabbed me when I went for the dog. He grabbed me and just held me' [27].

In this story fragment, the imperatives of

family relations intervene in the orderly conduct of science. Making use of Bryan Wynne's terms, these imperatives provide a 'contextualisation' which challenges the universality normally believed (by scientists, by the public) to be the possible and desirable outcome of scientific research. The 'technical system' of a properly conducted atom bomb test is unable to allow for a dog, an eight year old daughter or an emotional man, which break down the integrity of the testing regime in an uncontrolled way. On the other hand, this doesn't mean an understanding of such 'unruly' outcomes is unattainable.

PUBLIC UNDERSTANDING OF SCIENCE, KNOWLEDGE AND TRUST

Briefly surveying the debates about so called 'Public Understanding of Science' over the last fifteen years (and Wynne's analysis sits in this context), we can notice that the idea that science should be undertaken in public has taken deep root [28]. So too has the need to bring alongside science other forms of knowledge, such as 'lay' and 'indigenous' knowledge, and with this to privilege equally *contextualised* knowledge alongside the *universal* knowledge claims of science [29]. In practice, to do this requires sophisticated processes of public participation in knowledge production, and we can look to examples such as science shops and consensus conferences, standing committees of stakeholder experts, and other forms of participatory democracy that attend decision making processes. These have been reasonably well studied across many fields [30]. Taking this further, analysts of controversy and public participation processes have noted the importance of *trust* in all its forms. In his seminal discussion of 'suspended doubt', Gavan McDonnell has described the processes by which participants in decision making processes put aside their disagreements and their (sometimes) seemingly incommensurable values and assumptions, in search of the knowledge that is needed to make sense of everyday life. In such processes, which should be allowed to play out over time, provisional trust

becomes a pre-condition for knowledge formation [31].

A project such as 'Half a Life' indicates the possibilities for engendering suspended doubt, developing trust, and from this, producing contextualised knowledge. As an example of a Community Cultural Development (CCD) project, 'Half a Life' uses processes which are just as intentional, just as institutionalised, just as governed by set protocols as is the official production of scientific knowledge. CCD is characterised by participatory activities in which community members of various backgrounds and beliefs work with (commonly but not always) professional arts workers, to make creative works that deal with issues and concerns important to the community. Meanwhile these activities enhance that community's capacity to make decisions, take actions and undertake further developmental work. Typical procedures include steering groups, partnerships between organisations, workshops, training sessions, rehearsals, exhibitions, performances, with feedback and cross-checking mechanisms such as trial readings, discussions groups, web-based interaction, surveys, and media documentation [32].

In all such activities, information and ideas circulate in an environment of suspended doubt, often ostensibly for the purpose of making a common creative work. This is how contextualised knowledge is produced. Such ways of making knowledge through arts and cultural projects, and the importance of this for decision making, are increasingly well understood. For example, in the British experience, long range studies have evaluated the feedback loop between cultural activity and government policy across many sectors, with the arts influencing policy through discoveries made in participatory projects [33]. Meanwhile, the interpretations made in this paper are underpinned by a broader study hosted by the Australia Council for the Arts. This research has confirmed the connections between CCD and policy and programs across sectors such as health, environment and rural development [34].

DECISION MAKING WITH CONTEXTUALISED KNOWLEDGE

For the nuclear veterans' associations in both Australia and Britain, 'Half a Life' is a participatory way of telling their story, creating advocacy, improving networking and awareness, and bringing to public attention a new body of oral history material reporting long term social outcomes of the atomic tests. By its process, the 'Half a Life' project is a 'meeting' between the veterans community and a younger generation of researchers, theatre workers and veterans' descendents, all wanting to understand and keep alive the story of nuclear testing, then able through performance to communicate this story to the public and to veterans themselves [35].

The 'Half a Life' project supports 'transformative' cultural activities [36] by which the veterans' situation is recognized and legitimated, fostering a sense of justice and healing, with prospects that both the process and the public outcomes (such as readings, performances, media coverage, and documentation) will have impacts within decision making realms. To be specific, the knowledge generated through the 'Half a Life' process, can assist in the following ways.

1. The project will increase sharing of stories, advice and resources between British and Australian communities of nuclear veterans. Through this, 'bonding social capital' will increase as the project links people inside the community of nuclear veterans in each country. The opportunity to tell their story, first hand, to other interested community members will be validating and rewarding for participants, and this alone can help deal with the residual fears that veterans experience.
2. 'Bridging social capital' will be enhanced by the capacity to communicate the story to new arenas. It will take the message from nuclear veterans into other communities and groups (especially other non-nuclear veteran groups and also young people, academic, and political groups). This will potentially assist with decision making, for example in deliberations about veterans entitlements in the follow up to Australian government's recent Review [37].

A NOTE ON LIMITATIONS OF CONTEXTUALISED KNOWLEDGE

We have to be careful not to suggest communities might generate all the knowledge needed using their traditional methods or community processes such as CCD, and there are subtleties at Maralinga that are important to understand. In a famous incident, Maralinga Tjarutja leader Archie Barton upbraided a government official for saying that the long term problem of recording and monitoring contamination could be left in the hands of traditional people who could understand it through their 'dreaming'. Barton's rejection of this suggestion is based on the need communities have for western science to be *part* of their decision making. Maralinga Tjarutja know that western science does have some uses! Monitoring nuclear radiation is one of them [38].

The same logic applies to the knowledge generated through the nuclear veterans oral history and theatre project. As a community, veterans will make use of the ideas and information generated and circulating in the 'Half a Life' project. But in their approaches to government for compensation, veterans remain hopeful that new techniques could become available for scientifically demonstrating that particular forms of illness *must* have resulted from radiation exposure. Veterans associations in both Britain and Australia continue to work closely with scientists as a way of influencing government policy and achieving recognition and compensation [39].

CONCLUSION

British Nuclear Testing in Australia and New Zealand follows the well mapped contours of colonial science. Bomb experiments were devised at the 'centre' by British scientists requiring remote country which they could devastate in search of results relevant to Britain's Cold War political imperatives. Meanwhile, at the 'periphery', the Australian public and indeed the Australian scientific community remained marginalised, with decisions made on their behalf by British politicians and scientific teams, aided by a most compliant Prime Minis-

ter Robert Menzies [40].

Perhaps the historical study of Australian and New Zealand science has also typically followed these contours, with focus on the relationship between ‘peripheral’ scientists and the perceived ‘centre’ of knowledge production. The ‘Half a Life’ project is a different way of constructing a history of a scientific experiment, with focus on a ‘peoples history’, in this case the experience of nuclear veterans and their families. Beyond this ‘meta-science’ function, the project also produces knowledge about the impacts of nuclear testing, in a way that helps complete the experiment itself. The 1985 Royal Commission report, a trail of unsuccessful compensation cases, and recent government initiatives such as the Clarke Report into Veterans Entitlements, all point to a deficit in official knowledge about the outcomes of the tests, and to the insurmountable difficulties in making health impact assessments using ‘normal’ science. The processes of community cultural development constitute a participatory and transformational form of knowledge production, with findings relevant to policy and decision making. In this case the contextualised knowledge made between researchers, theatre workers and veterans helps our understanding of the nuclear testing experience, and of the long term social and health outcomes for men exposed to the dangers of the atomic tests.

REFERENCES AND NOTES

- [1] The key British tests were Emu 1953, Monte Bello Island 1956, Christmas Island 1957–58, Malden Island 1957, Maralinga 1956–1957. Details are widely available, for example in the report of the Royal Commission into British Nuclear Tests in Australia, 1985, or on the website of the British Nuclear Test Veterans Association.
- [2] The Royal Commission, led by Justice McLelland, recommended, in summary, extension of compensation provisions to cover civilians as well as military personnel, the establishment of a register of civilian and military participants, a new clean-up of the Maralinga site with costs borne by Britain, control of access to the site, and compensation for traditional owners, the Maralinga Tjarutja.
- [3] The British and Australian approaches contrast with that of the US government. Under Ronald Reagan, the US Congress voted a form of blanket compensation for veterans of US nuclear tests. In this approach, 22 types of cancer are accepted, on a presumptive basis, as related to the service of atomic test participants. Being there for a test and having the prescribed disease is sufficient for compensation and health care to be provided. This detail is from the Australian Government’s 2003 Report of the Review of Veterans’ Entitlements (The ‘Clarke Report’), accessible at <http://www.veteransreview.gov.au/report>.
- [4] Obfuscation and loss of documents by government authorities are commonly reported by veterans, for example see submissions to the Clarke Report (see note 3), which notes that in Australia, of the five compensation cases heard by courts, the Commonwealth won all but one of them.
- [5] This paper was first presented at the conference of the Australasian Association for the History, Philosophy and Social Studies of Science, Dunedin, December 2005.
- [6] The politics and outcomes of the work by 2002 Adelaide Festival director Peter Sellars and his creative team are controversial. Sellars was effectively sacked shortly before the festival, with his community-based program overturned in part by the Festival’s conservative hierarchy.
- [7] Peter Sellars, 2002 Adelaide Festival Program overview.
- [8] The author was a member of the 2002 Adelaide Festival artists advisory committee.
- [9] The author is the facilitator and script editor for the ‘Half a Life’ project, making this paper an ‘insider’ perspective.
- [10] As I have noted elsewhere ‘Ultimately, the choice to focus on Maralinga relates to the need for time and space ‘unity’ in a dramatic structure. This perhaps indicates one of the limitations of theatre, rather than any sense that Maralinga has greater importance his-

- torically than other test sites. However, it can be said that the Maralinga experience is representative of the testimony of other test veterans; and that of all the sites, Maralinga saw the greatest numbers of service personnel across its decade of operations'. See Paul Brown, Maralinga: Theatre from a Place of War, in Gay McAuley (ed.), *Ground Work: Performance and the Politics of Place*, Peter Lang, Berne (2006).
- [11] The four public readings, each at a different stage of script development, have been at Sydney's Belvoir Street Theatre on 8 December 2003 and 7 June 2004, at the University of Leeds on 18 November 2005 and at Leeds Civic Hall on 20 November 2005.
- [12] A more detailed description of the process for the 'Half a Life' project will be published with the playscript. See P.F. Brown, *Half a Life*, Currency Press, Sydney, in preparation.
- [13] The possibility that verbatim theatre is 'truth' is highly contentious. The author has previously discussed verbatim theatre in the context of an earlier oral history and verbatim project concerning the 1989 Newcastle earthquake, suggesting that it is 'a fabrication, just like any other drama spun from a writer's head. Perhaps it will seem like 'the' truth. But it remains only one truth and the construct of a particular process: in this case a terrible event, provoking an idea for a play, interested people to steer the project, then research, taped interviews, transcription, culling, editing, cut and paste, structuring, re-cut and re-paste, and (turning a new corner) exploration by cast, director and crew, new arrangement of the text, production (all the usual elements) and finally the storytelling that takes place in performance ... Each exploration by cast and crew – like an archaeological dig – is bound to make new discoveries.' This extract is from P.F. Brown, *Aftershocks*, Currency Press, Sydney (1993), page vi. For a seminal analysis of verbatim theatre, see Derek Paget, Verbatim theatre: oral history and documentary techniques. *New Theatre Quarterly*, **3**, No. 12 (1987).
- [14] The numbered conclusions are from the 1985 Report of the Royal Commission into British Nuclear Tests in Australia, Vol. III, Conclusions and Recommendations, Parliamentary Paper No. 484/1985.
- [15] It would not be overstating it to say that the Royal Commission laid a great deal of blame at the feet of Titterton, as the most senior Australian scientist, and clearly a man willing to place safety concerns below the logistical needs of atomic testing.
- [16] For example, a special force of 'Indoctrinees' was trained for deployment at close range to the blasts. They were issued with full protective clothing. It was also customary that all personnel on the range would be invited (along with selected members of the public such as politicians, and media), to witness the tests. Protocols included facing away from the blast with hands tightly shielding the eyes.
- [17] This report is by Donovan et al., *Health of Atomic Personnel*, Commonwealth Department of Health (1983).
- [18] In the 1990s, British researcher Sue Rabbitt Roff assembled data on veterans' health, making use of information from nuclear veterans, and newly released government documents. See S. Rabbitt Roff, Mortality and morbidity of members of the British Nuclear Test Veterans Association and the New Zealand Nuclear Test Veterans Association and their families. *Medicine, Conflict and Survival*, **15**, Supplement 1 (1999). Rabbitt Roff's findings were strongly attacked by the British Government. In Australia, the Commonwealth Government Review of Veterans' Entitlements (the 'Clarke Report', see Note 3) highlighted the need for a new cancer and mortality study, and has established a scientific advisory body to oversee this. One objective is to reconstruct the doses veterans would have received – an approach that has been met with skepticism by veterans themselves.
- [19] The veterans associations in both Britain and Australia argue this.
- [20] Ric Johnstone and Beverley Beaver interviewed by Paul Brown. Bracketed annotations, e.g., (RJ,bb), indicate fragments or 'grabs' within the original transcript.

- [21] Ric Johnstone interviewed by Paul Brown, with veteran's widow Sandy Caporn also present, October 2003.
- [22] British veteran, Reverend John Walden interviewed by Lucy Skilbeck and Paul Brown, April 2005.
- [23] This extract is from the performance script used for a reading of the play at Leeds Civic Hall on 20 November 2005. It is constructed from interviews with several veterans (Danny McNulty, Rick Soweby, Bob Smith, Malcolm Smedley, Avon Hudson, John MacIntosh), and one of the widows (Dawn Chasty).
- [24] For the play script see P.F. Brown, *Half a Life*, Currency Press, Sydney, in preparation. Also see a longer version of this summary in P.F. Brown, Maralinga: theatre from a place of war, in G. McAuley (ed.), *Ground Work: Performance and the Politics of Place*, Peter Lang, Berne (2006).
- [25] The story of Hedley Marston and the testing of animals around Australia is replete with controversy. See, among other sources, R. Cross, *Fallout: Hedley Marston and the British Bomb Tests in Australia*, Wakefield Press, Adelaide (2001).
- [26] Brian Wynne is a well known sociologist of science. Among several relevant publications, see B. Wynne, Unruly technology: practical rules, impractical discourses and public understanding, *Social Studies of Science*, **18**, 147–67 (1988).
- [27] Dagmar Richards interviewed by Paul Brown, Sydney, 2003.
- [28] Brian Wynne reviewed this argument, for example, at a Melbourne University conference on Public Understanding of Science, in 2003.
- [29] See A. Irwin, *Citizen Science: a Study of People, Expertise and Sustainable Development*, Routledge, London (1995).
- [30] See various discussions in the journal *Public Understanding of Science*.
- [31] This greatly simplifies McDonnell's study, which is in G. McDonnell, Scientific and everyday knowledge: trust and the politics of environmental initiatives, *Social Studies of Science*, **27**, 834–835 (1997). Elsewhere I have given more detail of the relevance of McDonnell's ideas in the realm of community cultural development and specifically the Maralinga project. See P.L. Brown, Maralinga: theatre from a place of war, in G. McAuley (ed.), *Ground Work: Performance and the Politics of Place*, Peter Lang, Berne (2006).
- [32] There is a wide range of literature on Community Cultural Development in Australia. Definitions, policies and case studies are readily available from the Australia Council for the Arts.
- [33] See the range of reports produced by the Comedia organisation, for example F. Matarasso, *Use or Ornament? The Social Impact of Participation in the Arts*, Comedia, Stroud (1997).
- [34] D. Mills and P. Brown, *Art and Wellbeing*, Australia Council for the Arts, Sydney (2004). The Australia Council is the federal government's arts funding and policy body.
- [35] Unpublished Report in 2004 by the Australian Nuclear Veterans Association to the Australia Council on the first stage of the project.
- [36] The 'instrumental' uses of the arts are well understood, for example in the way the arts can be used for educational purposes. 'Transformative' arts projects are those with deeper impacts on policy and decision making and can imply the need for change in institutions and other social structures.
- [37] Findings of the review are in the 'Clarke Report': see Note 3.
- [38] This incident is discussed by Jim Green in his web article *Maralinga: a host of indiscretions, short cuts and cover-ups*. The government official was Geoff Williams who in discussing the problems of long term record-keeping suggested to a government committee that traditional 'Dreamtime stories' would provide a methodology. He said, 'hopefully, the Aborigines themselves – they have a very good way of keeping records. I think they have records going back beyond our sort of memory, do they not? They have their own way of recording things.' Archie Barton branded his comments 'an insult to the culture ... it's an issue that's been created by white man. How the hell do you get that in

a Dreamtime Story?’

[39] In the case of Joyce Northey, one of a handful of British veteran’s widows to gain compensation, the key evidence included a photograph that demonstrated her husband was present in the test zone, and technical evidence that the cancer he died from was highly likely to be the result of radiation exposure. For a concise summary of links between veterans’ campaigns and scientific research, see

About Us on the website of the British Nuclear Test Veterans Association.

[40] The Royal Commission concluded that evidence did not exist to contradict the view that, in agreeing to provide Australian territory for atomic tests, Prime Minister Menzies acted alone, without consulting even the Australian cabinet. See also Anna Binnie’s previous paper in this issue.

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CONTENTS

Vol. 139 Parts 1 and 2

PENCHEVA T., HRISTOZOV I. AND SHANNON A.G. A Modified Approach to an Analytical Solution of a Diffusion Model for a Biotechnological Process	1
BINNIE, A. Atomic Australia and Nuclear New Zealand	9
BINNIE, A. Oliphant, the Father of Atomic Energy	11
PRIESTLEY, R. Ernest Marsden's Nuclear New Zealand: from Nuclear Reactors to Nuclear Disarmament	23
BROWN, P. British Nuclear Testing in Australia: Performing the Maralinga Experiment through Verbatim Theatre	39
O'MEAGHER, M Prospects for Enrichment: New Zealand Responses to the Peaceful Atom in the 1950s	51
ABSTRACTS OF THESES	
GARVEY, J. M. An Early Carboniferous Fossil Assemblage from Fish Hill, Mansfield Basin, Australia	63
STEPHENS, C.J. Impacts of Environmental Weed Invasion on Arthropod Biodiversity and Associated Community Structure and Processes	65
AISBETT, B. Pacing Strategy and High-intensity Cycling Performance	67
ANNUAL REPORT OF COUNCIL FOR THE YEAR ENDED 31 st MARCH 2006	69

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