

Article

Science as theatre: a New Zealand history of performances and exhibitions

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ABSTRACT: In colonial times in New Zealand the portrayal of science to the public had a sense of theatre, with nineteenth and early twentieth century grand exhibitions of a new nation's resources and its technological achievements complemented by spectacular public lectures and demonstrations by visitors from overseas and scientific 'showmen'. However, from 1926 to the mid-1990s there were few public displays of scientific research and its applications, corresponding to an inward-looking science regime presided over by the Government science agency, the Department of Scientific and Industrial Research. The subsequent development of science centres with their emphasis on visitor participation has led to an increase in the audience for science and a revival of theatricality in presentation of exhibitions, demonstration lectures, café scientifiques, and science-related activities.

Introduction

Theatrical science activities could be considered to occur at a point along a continuum between participant-directed activity and an activity directed by a professional performer, and similarly between structured and spontaneous activity.¹ An example of a structured and performer directed science activity is:

A professor in a white coat sweeps into the room. The lights fade. The first slide of a Powerpoint presentation on chemical reactions screens behind the professor, only to be dimmed by a brilliant flash of light and the crack of explosion from the bench in front of him. Members of the audience are variously alarmed or enthralled by the spectacle.

Science can indeed be theatrical, the podium a stage, the professor an actor: New Zealand's National Science-Technology Roadshow² has captured another audience. In contrast, an example of a participant directed activity, which although a structured (i.e., designed) activity has an element of spontaneity because the behavior of the participants cannot be predicted, is an earthquake simulator:

Five girls cram themselves along the bench seats facing each other in a model house. One girl pushes a button on the wall, and the little house begins to lurch and shake, with deafening noises. The suspended light fitting swings like a pendulum, flickers and goes out. The girls scream as a recorded voice tells them they are experiencing an earthquake of magnitude 7.9, the same as that which devastated the city of Napier in 1931.³ In less than a minute it is all over and the girls are off to sample another Earthworks exhibit.⁴

The above paragraphs describe typical visitor experiences at science centres in contemporary New Zealand. Such theatrical performances and activities have featured – albeit to varying extent and effectiveness – in the presentation of science to the New Zealand public for nearly 150 years, as this paper describes.

Exhibitions of science and technology: colonial stage-sets

In late nineteenth century colonial New Zealand – then only a few decades old – showed its industrial and artistic achievements to its own citizens and to the world through a series of exhibitions⁵ which, like

those in Europe and North America, mirrored the exhibition at London's Crystal Palace in 1851.⁶ Such exhibitions were spectacles – theatrical sets if you will – which served to reflect a concern of the time about drama that “To touch our emotions we need not the imaginatively true, but the physically real. Everything must be embodied for us in palpable form ... all must be made palpable to sight, no less to feeling.”⁷ These large exhibitions were held in the southern cities of Christchurch and Dunedin, at that time the centres of New Zealand's commerce and industry, and were housed in impressive if temporary buildings, often with opulent salons to accommodate the displays. Perhaps appropriately for a young country still exploring its natural resources, rocks, minerals and soils were prominent among the displays; but there were courts that displayed manufactured goods, from furniture and sewing machines to traps for game and fishing gear, from musical instruments and jewellery to works of art and “women's work (counterpanes, lace, etc.)”.⁸ It seems unlikely that the visiting audiences were particularly excited by displays of rocks and minerals inside the salons and plots of different grasses growing outside the buildings, but some of the exhibits did invite public participation. In the “demonstration of modern statistical operations” at the 1889 New Zealand and South Seas Exhibition in Dunedin, for example, 4664 people each paid sixpence to have personal data recorded and measurements of their bodies made for compilation in the operating “punching, sorting and tabulating machines”.⁹

Even more impressive would have been an area at the rear of the 1906-07 International Exhibition of Arts and Industries in Christchurch where visitors could wander through a replica of a geothermal area designed by A.S Wohlmann,¹⁰ the Government balneologist, the ‘expert’ on geothermal springs and their perceived medicinal properties. This was “a marvellously exact copy of some of the more remarkable features of the thermal regions, such as may be seen within a small compass at the Whakarewarewa Geysir Valley [near Rotorua]. A square enclosure open to the sky was surrounded by a high brushwood fence of the manuka [a New Zealand native shrub] that is the universal shrubbery of the geysir regions. Entering a gateway surrounded by Maori carved figures, the visitor found himself at once transplanted to the land of sulphur and wai-arikis [water spirits], geysers and steam holes.

“The scene was in every detail a bit of Geysirland, even to the background, for above the manuka fence ran a canvas (130 feet in length) that was an excellent piece of scene painting; it pictured the great broken sombre volcanic hills forming the background of the Rotorua plain looking east and south – a typical Geysirland landscape. Everything within was in harmony with the wonders of Hot-Spring-Land, even to the stunted manuka that grow in clumps and tufts in the clefts of the siliceous rocks and alongside the sulphurous springs. Jets of steam issued from the rocky earth, and in the centre of the enclosure rose the geyser-cone, a replica to a large extent of the mound of the beautiful Waikite Geyser at Whakarewarewa. Vapour came in soft white clouds from the geyser-well and every now and then the puia [hot-water spring] burst forth (regulated in some occult fashion behind the scenes...) and hurled its glittering columns of water and spray into the air with all the fuss and commotion of ‘the real thing’. The fact that the spray when it fell on one was cold in no way detracted from the general effectiveness of the imitation puia.

“In constructing the rocky cone of the imitation Waikite, with its smoothly polished geyser-lips, its silica incrustations, steps and terraces, and miniature pools, Dr Wohlmann made considerable use of plaster casts obtained from the actual geyser-mound at Whakarewarewa so that it was to the smallest detail a faithful reproduction of the finest of Geysirland's great puia. To the left of the geyser was a solfatara, an exact imitation of one of the steaming sulphur-holes which are to be seen in their thousands in and around Rotorua: the escaping steam mixed with sulphurous acid-gas, deposited crystals of sulphur on the surrounding rocks. There were a number of fumaroles sending out here and there gently sighing steam jets. Half-concealed by a clump of low manuka scrub was a grey-hued mud-volcano, an exact replica of one of those at Arikikapakaka between Rotorua and Whakarewarewa. The cone was about 6 feet high, and in its little crater-top hot mud bubbled and plashed just as in its Nature built prototype. Nearby was a typical “porridge pot” or spring of unctuously boiling grey mud, containing volcanic mud specially brought from Rotorua for the purpose.”¹¹

Not surprisingly, ‘Geysirland’ provided the stage for a range of official and unofficial activities during the exhibition, and thereby can be considered a successful interpretation of scenic space and the place of performance.¹²

An equally impressive ‘stage-set’ was constructed beneath the galleries of New Zealand's centennial exhibition held in Wellington in 1939-1941. A labyrinth of winding passages through which visitors could walk imitated the real limestone caves at Waitomo in the central North Island of New Zealand: “every yard of available space was used to display the tunnel and lofty caverns...The tunnels were

lighted indirectly in blue, green and red and an atmosphere as weird and varied as in the real Waitomo Caves was reproduced. A representation of the famous Cathedral Cave was included and the features had an air of depth and sweeping grandeur, heightened by the ingenious lighting system giving a glow of red behind the stalactites and added beauty as they hung from the roof of the cave. A representation of the Waitomo Stream was included and the last few hundred feet in the model were travelled over a duck-board walk surrounded by quietly flowing dark water that reflected the gleam of the imitation glow worms in the ceiling.¹³

These were sets that would have done any theatrical production proud, and are perhaps the best examples of the range of spectacular displays and dioramas developed to showcase the natural science and technological development of a young nation.

Performing on a colonial stage

Public lectures and demonstrations also drew the crowds. As an example, Clement Wragge's astronomy lectures in 1907 at the Wellington Town Hall Concert Chamber were promoted as 'grand scientific entertainments', which were described as 'splendid', 'appalling' and 'sublime', as well as offering "special lectures on radium [which] will be given to a limited number of patrons desirous of seeing the greatest marvel of the universe, with actual experiments, the most wonderful sight that the human eye is privileged to witness, including the amazing scintillations and velocity of the Alpha particles, and the marvelous Gamma Rays, with actual pulsations of the ether."¹⁴ Similarly, a Professor Andrews, visiting from New York in 1905, publicly experimented with liquid air, turning grapes to hailstones, cremating a cigar in its vapour, poaching eggs on ice, making snow in a fire, solidifying mercury, all seeming to "reverse our preconceived Laws of Nature".¹⁵

While these demonstrations were of 'new' science, a scientist with a gift for performance could make even the mundane exciting. One of New Zealand's more controversial early university professors of chemistry, A.W. Bickerton of Christchurch¹⁶, used simple apparatus – "pickle bottles, lamp glasses and other household articles" to illustrate various scientific principles in his public lectures, but "the experiments lost nothing in spectacular effect from being conducted by one whose sense of the dramatic was highly developed".¹⁷ Bickerton also operated a zoo and pleasure gardens at Wainoni near Christchurch, at which the attractions included regular fireworks displays and hot-air balloon rides. Bickerton's performances that linked science and entertainment would not be seen again in New Zealand for another century.

Introspective science and the loss of audience

Until the early twentieth century, science could still be an amateur pursuit and the public audience retained its colonial curiosity about a new land and its possibilities. However, the resolution of many of New Zealand's agricultural and industrial problems needed a more professional and better funded approach than amateur and part-time science could provide. After much prevarication the Department of Scientific and Industrial Research (DSIR) was formed in 1926.¹⁸ Much applied research was successfully undertaken in the more than fifty years that New Zealand science was dominated by DSIR, with its curious blend of innovation and inventiveness,¹⁹ but from a public perspective these were introspective years for science, with research results generally published in esoteric bulletins and scholarly journals or provided to the immediate beneficiaries of the applied research in agriculture and industry. The few public events hosted by DSIR were usually associated with the opening of new laboratory buildings or significant anniversaries. The 80th anniversary of the Dominion Laboratory in 1945 was celebrated by exhibits showing glass-blowing and other simple laboratory equipment²⁰ that were set up in the Wellington Town Hall and Ballantynes Department Store in Christchurch.²¹ Twenty years later the centenary of the New Zealand Geological Survey²² featured samples of rocks and fossils attached to a wall chart organized by geological time, and plaster models of selected New Zealand landscapes – similar to those featured in the earlier exhibitions described in this paper, but on a much smaller scale. This meant that visitors looked at the displays rather than experienced them: they were spectators rather than participants.

At its 50th anniversary in 1976, DSIR promoted its research achievements in print²³, but other than that the celebrations were muted. Twelve "bench-mounted three dimensional exhibits, preferably animated

and preferably relevant to the structure of DSIR and diversity of interests, knowing our part of the world (exploratory aspects of geology, oceanography, Antarctic research, etc.), natural resources and energy sources, pastures and animal products, crop production and processing, agricultural pests and diseases, industrial development (mechanical and electronic aspects), standards and quality of materials, building and construction, transport, road safety, etc., forensic and social sciences, quality of the environment” were commissioned.²⁴ A photograph of this exhibition shows black display panels featuring photographs of DSIR activities, the panels regimented in rows.²⁵ The exhibition toured the country from April to November 1976, with minimal publicity²⁶, apparently with little impact.

Science in the DSIR decades was portrayed in posters as a serious and male-dominated occupation. From the 1940s, the image of a man wearing a white coat and thick-rimmed glasses, holding a test-tube aloft, with microscope and glassware at the ready on the bench in front of him, and buildings with smoking chimneys as a background personified the scientist at work on complicated problems related to industry.²⁷ Whatever the arguments for and against DSIR as a scientific research enterprise, its feeble efforts at promoting its activities were unable to counter declining public interest in science and unfavourable monetarist perceptions of its value; the whole organization was swept away in the early 1990s in favour of more commercially oriented research institutes.²⁸

From that time there has been a decline in the number of students enrolling in science subjects in schools, and a decline in first-year enrolments in science degrees in universities. This last trend is important because the recognition of its potential implications for the survival of university science teaching and research triggered the development of New Zealand’s network of science centres, which are mostly based in university cities.²⁹

Revival of the science stage

The concept for New Zealand’s science centres was essentially that of the earliest Bristol Exploratory and the Exploratorium in San Francisco: robust hands-on exhibits that provided the opportunity to undertake simple guided experiments that demonstrated natural laws, principally of physics.³⁰ The Exploratorium was a very different environment from the typical museum of the times: the only lighting in the venue was associated with the exhibits, which were designed to encourage visitors to interact with them. The exhibits were like actors.

The first New Zealand exhibition of this type, described as a ‘Science Extravaganza’, at the King Edward Barracks in Christchurch in the late 1980s, was reminiscent of the Exploratorium, both in terms of the barn-like setting and in terms of the simple style of interactive exhibits demonstrating natural laws of physics. Unsophisticated the exhibits may have been, but New Zealanders had not seen anything like them before. Not only this, but there were chemistry demonstrations – smells and bangs which added a further dramatic component, evocative of Professor Bickerton’s experiments in Christchurch a hundred years earlier. This temporary science Extravaganza morphed into the permanent ‘Science Alive!’ centre, based in Christchurch, and the National Science-Technology Roadshow Trust which tours New Zealand, with its relatively simple exhibits principally related to physical sciences set up in school halls and in purpose-built trailer-units.

The six other science centres established in major cities had a similar range of interactive science exhibits, although ‘Capital Discovery Place’ in Wellington complemented its science exhibits with a confidence building structure which “mimics a labyrinth of caves and tunnels through a mountain, symbolising the journey of life, [in which] some entrances are difficult to find; they include ventilation shafts, a wardrobe door and mirror illusions”,³¹ “thematic spaces with little nooks and crannies”,³² performance spaces and a television studio. Controversial from its beginnings,³³ it was subsequently reincarnated as ‘Capital E’, providing opportunities for developing children’s creativity and performance. Theatricality of science was in this instance replaced by theatre itself.

Financial realities soon made it clear to those operating New Zealand’s science centres that people would need to visit and re-visit science centres, a pattern of attendance not required in overseas cities with larger populations. Thus, each science centre annually developed or imported an exhibition that toured through the country, giving each centre about six different exhibitions a year covering a range of scientific themes and their applications, which complemented a ‘home’ collection of favourite simple interactive exhibits. Continually increasing the amount of interactivity of ‘exhibits as science performers’ was a major criterion for exhibit design, despite research that showed that relatively low levels of

interactivity were, in fact, the most appreciated.³⁴ Again for financial reasons, several of the centres became more aligned with the museums that were usually housed in adjacent buildings. This began to blur the distinction between exhibits typical of museums and those typical of science centres. This was particularly apparent in the National Science-Technology Roadshow Trust's touring exhibition that lionised Sir Ernest Rutherford, an exhibition which married 'push-button' interactive representations of Rutherford's scientific experiments on determining atomic structure with display panels portraying his life. The impact of these exhibitions on the visitor depended less on the interactivity and the science behind exhibits and more on the appearance of display materials and the successful use of lighting and sound. In effect, the staging of the exhibition became almost as significant as its content. To further bolster attendance, the science centres collectively hired and toured 'blockbuster' exhibitions featuring sport, and computers that had minimal science content. This trend reached its apogee with exhibitions that featured movie special effects in which visitors could star in their own movie in which they might "climb a sheer drop", "ride a roller coaster" or "go down with the *Titanic*". This transformation from 'exhibition' to 'theatrical set' changed exhibition spaces too. For example, Hamilton's Exscite centre was transformed from an award-winning exhibition gallery, where visitors could interact with the exhibits while still looking at the river and parkland outside,³⁵ to a theatrical 'black box'³⁶ with most of the windows painted over.

Despite these changes, the attendances at science centres – both overall and for individual exhibitions – began to show characteristics of the product life cycle.³⁷ Continual changes of types and styles of presentation were increasingly recognized as necessary to maintain visitor numbers.

Revival of the science performer

To complement their exhibitions most science centres in New Zealand now present lectures and demonstrations to their visitors, especially school groups. This was not always the case. The management of the Exscite science-technology centre in Hamilton initially expected that the exhibits themselves would hold the attention of visitors; that they would be the performers. 'Explainers' (coined by the Exploratorium, and equivalent to museum dosents or guides) were an afterthought and for years considered subordinate to the exhibits' 'voice'. However, presenting science to the public at venues outside the science centre has also become popular more recently. Science festivals, of which New Zealand's most enduring is the biennial International Science Festival in Dunedin, provide a programme of field trips, industrial visits, lectures by eminent scientists, and performances by theatre troupes.³⁸ Café scientifiques, in which a short presentation by a scientist is followed by an open discussion in a pub or coffee bar, have also been started in several cities, generally as an outreach activity from a science centre³⁹ or from a museum.⁴⁰ Reminiscent of the performances of Bickerton, Wragge and Andrews in the nineteenth century, such activities emphasise the performer rather than the stage-set, although with the scientist surrounded by café or pub patrons, this could be considered analogous to a 'theatre in the round'. Although recent analysis of attendance at these events does not suggest they have particularly wide community impact,⁴¹ they do put a 'human face' to science and frequently discuss scientific topics that are both topical and reflect current social or political concerns, and of which the underlying science is less readily demonstrated using interactive exhibits.

A rather different approach to scientists-as-performers is represented by CSIRO Discovery in Canberra, Australia. This science centre "contains two floors of glass-fronted, working laboratories where scientists and technicians undertake field crop research. Their presence provides visitors with a view of science research in progress".⁴² An online variant of this concept was New Zealand's national museum Te Papa Tongarewa showing – and video-streaming to its website – scientists at work during the thawing of a frozen giant squid in 2008.⁴³ No science centre in New Zealand currently has a research facility in close proximity; however, sustained teleconferencing between a research laboratory and a science centre across a high speed network⁴⁴ would make a 'proscenium arch' view of research being undertaken and interaction with its staff available to science centre audiences. While there are clearly strong motivations for this approach in terms of enhancing the visitor experience of science,⁴⁵ how willing practising scientists would wish to 'perform' in this way is unclear.

Scientists in a company of arts performers

Science centres in New Zealand have struggled financially, and adult attendance has not thrived. Despite repeated submissions to provide operational funding to science centres, the Ministry of Research Science and Technology opted to fund other initiatives to increase public engagement in science. One such development has been the linking of science and art through ventures involving scientists and artists of various genres collaborating in exhibitions and performances. One such venture was 'The Artists to Antarctica' programme.⁴⁶ Virginia King's installation funded under this programme was "a fluid and subtle reflection on life under sea ice sheets. King's macrocarpa and totara [a New Zealand tree] sculptural forms pivot from strings, allowing the reflective and luminous painted surfaces to glide in a darkened gallery space. These skeletal and fossilised structures belong to an underwater world where micro organisms survive in icy conditions. King magnifies these minuscule diatoms or algae, allowing each form to move freely. As they swivel and turn, the process of regeneration is suggested. In the frozen saline lakes of the Dry Valleys, life is teeming with fantastical creatures."⁴⁷ Although the artists produced work that raised awareness of the history of Antarctic exploration and something of its environment to a limited audience, the links to science were tenuous at best: they were unable to demonstrate that "the final representation should be able to stand on its own as a work of art while simultaneously communicating information".⁴⁸

Potentially more successful is a current partnership between brain researchers at the University of Auckland and local artists, in which "The challenge specific to the researchers was to provide direct information and vital inspiration to the subject, purpose and process of their work. The challenge specific to the artists was to interpret and respond to the work of their research partners in a creative capacity. The envisioned result is an exhibition of new and engaging artworks and a detailed publication pushing the boundaries of the interaction between research and creative engagement".⁴⁹ That engagement has taken the form of an exhibition called "Do you mind?"⁵⁰

With a similar intention of linking science and the arts, Creative New Zealand and the Ministry of Research Science and Technology has previously funded projects that encouraged scientists to collaborate with artists – the so-called 'Smash Palace' initiative.⁵¹ In a press release in 2004, both organizations involved were cautiously optimistic about the outcomes of such collaborations.⁵² The Chief Executive of Creative New Zealand exercised restraint in commenting on the likely outcome of such collaboration, only saying, "Connections, collisions and other surprises can happen when art and science collide". In contrast, the Chief Executive of the Ministry of Research Science and Technology waxed, "Innovation thrives in a climate that supports risk-taking, encourages true experimentation and allows for the possibility of failure – or magnificent success!"

In a report after the first round of funding that was made available in 2002 to those artists and scientists preparing subsequent applications, the observation was made that "the projects chosen in the first Smash Palace round concerned either digital technology or environmental issues", and it was anticipated that "applications from these areas will be strong contenders again".⁵³ The report also contained a veiled plea for interest from a wider range of scientific disciplines. 'Smash Palace' in 2003 included three projects: a project between the Human Interface Technology (HIT) Laboratory at the University of Canterbury and the Christchurch City Library to adapt and exhibit a children's book in the Laboratory's 'MagicBook' format,⁵⁴ a web-based online performance venue,⁵⁵ and a project that sought to increase awareness in the community of the interconnectedness between the human and physical elements within a river catchment. In a later round of the initiative, a further collaboration involving the HIT Laboratory, Ngai Tahu (a principal Māori tribe in New Zealand's South Island), performing artists and Canterbury Museum was funded, this time to make a three-dimensional recording of Māori performers and present it in such a way as to enable the work to be viewed from all angles. In addition, a project was funded between a computer scientist, a music composer and a Māori instrument specialist "to collect and digitise audio samples from the Waitomo Caves and traditional Māori instruments related to water with a view to finding appropriate ways to add selected Māori instrumental and water sounds to the electroacoustic repertoire". Also among the funded projects was one that involved "the collection of data, development of algorithms and concept drawings for public installations that will reflect, and reflect on, the relationship between Auckland's volcanic cones and lizard populations".⁵⁶ Many of these collaborative projects used technology – especially digital technology – to enhance the artist's work⁵⁷: indeed, the artist appeared to gain more from the collaboration than did the scientist. Moreover, the extent of public engagement in the process or

its outcomes seemed minimal.⁵⁸ That said, a project funded in 2010 shows a reversed emphasis: Waking – Sleep Sciences and Performing Science in Dialogue seems more biased towards the study of the science of sleep, with any arts component an afterthought.⁵⁹

A variant on this approach which better favoured the communication of science was the 2005 Smash Palace project, described as: “Ten New Zealand writers reexamine the laws of physics, encountering the sandpile phenomena, entropy, and the untimely death of Schrodinger’s Cat along the way... Bringing some of New Zealand’s top creative writers together with our physicists, *Are Angels OK?* resulted in a science-art festival in Wellington, a collection of writing, and a tour of the UK.”⁶⁰

In fact, there were two collections of writings. One was from writers of fiction (selected by New Zealand writer Professor Bill Manhire) who teamed up with physicists⁶¹ (selected by physicist Professor Sir Paul Callaghan) to write science-inspired fiction for a book entitled *Are angels OK?*⁶² The other was from the same physicists, who had earlier in the project broadcast lectures on radio that introduced listeners to a range of topics in physics, including atomic theory, the origins of the universe, and the age of the Earth, in a book entitled *The elegant universe of Albert Einstein*.⁶³ Despite the project being billed as a writer-physicist collaboration, the impression is gained that, as with other Smash Palace projects, the discussions with the scientists provided a feed-stock for creativity in the range of genres represented in the book *Are angels OK?*, whereas *The elegant universe of Albert Einstein* is a compilation of science tales, possibly motivated by discussions with creative writers, but not unduly influenced by them.

That science is an activity undertaken by human beings and that new scientific techniques have social effects and economic implications is recognised by the institutions that conduct scientific research, but has not always been well communicated to a wider audience. In the preface to a recently published book of conversations, which could be seen in a sense as a sequel to *The elegant universe of Albert Einstein*, New Zealand physicist Professor Sir Paul Callaghan wrote, “It is the responsibility of science to tell its own story, and to communicate as widely and clearly as possible why the scientific view enriches human understanding. The last decade has seen a steady stream of science communication literature through books of remarkable quality aimed at a general audience. This book is one approach to telling the story of science through the conversational genre.”⁶⁴

The Smash Palace initiative is analogous to “the shifting of the paradigm from one of theatre to one of performance that occurred over the last twenty years of the twentieth century [which] has involved a movement away from a culture of theatre based within an architecture that was designed and called a theatre”.⁶⁵ More than that, the scientist making public presentations is becoming more of a raconteur, a story-teller where the experience of doing the science may even take precedence over the science itself.

Conclusion

New Zealand’s nineteenth century exhibitions were elaborate stages on which a young country’s natural resources and burgeoning technology were profiled. High public interest in science was fuelled by performances by scientists, both visiting and local, who showcased both their knowledge of science and their showmanship. The DSIR years from 1926 to the mid-1990s were productive for research in applied science, but the public profile of science and scientists was low. The development of science centres re-created science as the performer on its own stage, even if augmented by demonstrations and lectures. However well intentioned, interactive science exhibits and simulated experiments that are the mainstay of science centres have attracted a following from teachers and school pupils but have not engaged adults. The café scientifiques and initiatives such as Smash Palace are as much focused on the scientist-as-performer as the science: the scientist is cast in the role of story-teller.

Telling stories of science through a variety of genres has been a theme of this paper. The story can be told by the scientist as a sole performer – as in the traditional lecture or in the café scientifique – or in the company of others – typically in art-science collaborations. Alternatively, the story may be told through the set of an exhibit or exhibition – a stage on which the visitors may themselves be performers, as in colonial Geyserland or in more recent interactive science exhibits. The history of the portrayal of New Zealand science to the public reveals all of these styles of theatre.

Acknowledgements

The author is grateful for the assistance provided by staff at Archives New Zealand, by Barbara Brownlie, Ephemera Librarian at the Alexander Turnbull Library, and by Nicola Frean at the J.C. Beaglehole Room, Victoria University of Wellington Library, during a period when the author was research scholar at the Stout Research Centre, Victoria University of Wellington.

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- ²¹ Department stores such as Ballantynes in Christchurch had a tradition of elaborate window displays to attract passers-by and hosted receptions – including for royalty – in their opulent dining rooms; they were certainly places which citizens of note frequented, as described in H.B. Laurenson (2005), *Going up, going down: The rise and fall of the department store*, Auckland University Press, Auckland. Against this background the choice of such a venue for displaying science is less unusual than it might initially appear.
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- ²³ Atkinson's book *DSIR's First Fifty Years* (see note 18) was commissioned for DSIR's 50th anniversary; the achievements of the DSIR were compiled in an expanded version of its annual *DSIR Research* series of publications, viz., *DSIR Information Series*, 120 (1976).
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- ²⁵ Caption to a photograph "Where you'll find much of what makes New Zealand tick – the Department of Scientific and Industrial research's 50th anniversary exhibition which opens in the overseas terminal, Clyde Quay [Wellington] today", *The Dominion* (1976, August 20).
- ²⁶ A small advertisement in the *New Zealand Listener*, 3 July 3 1976, p.38 was "in a favourable position" in the middle of the page, as requested by the Superintendent of Science Information Division DSIR, but was overwhelmed by surrounding larger

- advertisements promoting recently published books). The advertisement announced soberly, “Public exhibition – Science Serving New Zealand: To mark the 50th anniversary of the founding of the Department of Scientific and Industrial Research the Science Information Division has assembled a special exhibit which depicts many of the department’s activities. Of interest to science students and to the general public, this display can be seen at the following centres [after which the schedule for the tour, encompassing 21 towns and cities is given]. Officers will be there to answer questions.”
- ²⁷ Typical of these images was the cover for a brochure *Science in industry – chemistry, physics, engineering*, prepared for the Manufacturers’ Research Committee (1946-1950), Alexander Turnbull Library, Eph-A-Science-1948-01, Wellington.
- ²⁸ The development of one of the more successful Crown Research Institutes is described in: S. Parker (2002), *The Littlest Clue: The Resurgence of New Zealand Science and Technology*, Industrial Research Ltd, Wellington.
- ²⁹ P. Hodder (2010), *Out of the laboratory and into the knowledge economy: a context for the evolution of New Zealand science centres*, *Public Understanding of Science* 19(3): 335-354.
- ³⁰ S. Butler (1992), *Uncommon classrooms*, in S. Butler (ed.), *Science and Technology Museums*, Leicester University Press, Leicester, pp. 77-107.
- ³¹ S. Daniell (1992-1993), *Science colours children’s world*, *ProDesign*, December 1992-January 1993, pp. 38-41.
- ³² M. Wilkins (1991), *The Children’s Museum: a Place to Play?*, MA thesis, Victoria University of Wellington, Wellington.
- ³³ K.J. Wisevich (1993), *Creation and Reception of Exhibitions: Comparison of Provider Intentions and Visitor Responses*, PhD thesis, Victoria University of Wellington, Wellington.
- ³⁴ P. Hodder (2008), *Excitement! The History of the Excite Science Centre*, HodderBalog, Wellington, pp. 145-147.
- ³⁵ In its original form the building received an award from the New Zealand Institute of Architects, for which the judges commented, “A well executed solution to a difficult extension [to the existing museum] problem. It creates its own identity while respecting that to which it is attached. Natural and raw finishes, together with exposed services show off what the place is about – a place to learn. The river and trees are easily seen.” The citation was reported in *Architecture New Zealand* (January/February, 1996), p. 20.
- ³⁶ R. Toon (2005), *Black box science in black box science centres*, in S. MacLeod, ed., *Reshaping Museum Space: Architecture, Design, Exhibitions*, Routledge, London, pp. 26-38.
- ³⁷ Attendance at science centre exhibitions and, indeed, at science centres themselves show some of the characteristics of the product life-cycle, as discussed in A.P.W. Hodder and C. Hodder (2009), *Life cycles of exhibitions in a science centre: A New Zealand case study*, *E-Review of Tourism Research* 7(2): 114-123.
- ³⁸ The International Science Festival website is: <http://www.scifest.org.nz/>; Retrieved October 10, 2010.
- ³⁹ Café scientifiques in Hamilton and Tauranga are organised by science staff at the University of Waikato with financial assistance from the Excite Trust, developers of the science centre in Hamilton: <http://sci.waikato.ac.nz/cafescientifique/>; Retrieved October 10, 2010.
- ⁴⁰ Café Express, offered by Te Papa Tongarewa, New Zealand’s national museum, broadens the concept of café scientifique to include a wide range of scientific, arts, and political discussions, later posting these on its website: <http://www.tepapa.govt.nz/WhatsOn/PastEvents/Pages/ScienceExpress.aspx>. Retrieved October 10, 2010.
- ⁴¹ M. Wilson and K. Otrell-Cass, *Café scientifique in Hamilton and Tauranga, Science in the Public – a One Day Symposium on Café Scientifique and Related Events*, University of Waikato, Hamilton, New Zealand, July 8, 2010.
- ⁴² Overview CSIRO Discovery, <http://www.csiro.au/org/DiscoveryOV.html>. Retrieved October 10, 2010.
- ⁴³ Responding to public interest, the thawing of a giant squid was broadcast via the internet using webcams. <http://squid.tepapa.govt.nz/the-squid-files/>. Retrieved October 10, 2010.
- ⁴⁴ New Zealand has a high-speed broadband network that links all New Zealand universities, the Crown Research Institutes and the national museum (Te Papa Tongarewa). This network – KAREN (the Kiwi Advanced Research and Education Network; <http://www.karen.net.nz/home/>; retrieved October 10, 2010) – is currently being extended to include polytechnics and schools and could be extended to include museums and science centres.
- ⁴⁵ “Scientists are used to seeing extraordinary things happen... Most people never witness such things. Experiment is something which happens behind closed laboratory doors, and only occasionally creeps out. Yet many people discover the excitement of science when they see something strange, and then ask the all-important question, ‘how did that happen?’” From: M. Shortland and J. Gregory (1991), *Community Science – a Handbook*, Longman, Harlow, p. 138.
- ⁴⁶ *Artists to Antarctica*: <http://www.antarcticanz.govt.nz/scholarships-and-fellowships/artists-to-antarctica>; Retrieved October 10, 2010.
- ⁴⁷ *Southbound – Artists to Antarctica*: <http://www.art-newzealand.com/Issue117/southbound.htm>; Retrieved October 10, 2010.
- ⁴⁸ P. Leavy (2009), “Method Meets Art: Arts Based Research Practice”. In Carolyn Jongeward (Ed.), *Bridging the Science Art Divide*, Guildford Press, New York, p. 265.
- ⁴⁹ M. Dowie, E. Forsyth and L. Forsyth, *Brian: The typographical error between art and neuroscience research, Science in the Public – a One Day Symposium on Café Scientifique and Related Events*, University of Waikato, Hamilton, New Zealand, July 8, 2010.
- ⁵⁰ *Do You Mind?*: <http://doyoumind.tumblr.com/>; Retrieved October 10, 2010.
- ⁵¹ The ‘Smash Palace’ initiative is named after a New Zealand film released in 1982. A centrepiece of the film is a car-wrecking yard near the settlement of Horopito in the central North Island actually called Smash Palace. The film has themes of marital estrangement, kidnapping and car chases, but any connection to science is obscure.
- ⁵² *Smash Palace Fund to support arts-science collaboration*, Press release from Creative New Zealand and Ministry of Research Science and Technology, November 1, 2004.
- ⁵³ The *Summary of Sian Ede’s report on her visit to New Zealand, March 2004* was made available by Creative New Zealand to assist prospective applicants to the 2005-2007 Smash Palace Fund; provided to the author by Felicity Birch (Creative New Zealand) November 27, 2009.
- ⁵⁴ This project explores how a children’s book can be transformed into a new type of reading experience through the use of Augmented Reality technology: http://www.hitlabnz.org/wiki/EyeMagic_Book; Retrieved October 10, 2010.

- ⁵⁵ UpStage is a web-based venue for online performance; it is an open source server application that has been in development since 2003: http://upstage.org.nz/blog/?page_id=2; Retrieved October 10, 2010.
- ⁵⁶ Information included in a letter from Felicity Birch (Creative New Zealand) to the author, November 27, 2009.
- ⁵⁷ This is clearly the case in the *Katy Pie* project funded in 2009 (www.katypie.com; retrieved April 13, 2011), where “Smart materials have been combined with robotic techniques to make Māori Kowhaiwai [painted designs] come alive, in a unique mix of art and science”.
- ⁵⁸ These initiatives should be distinguished from those in which science-based enterprises organize exhibitions of scientific images, e.g., the microscopic images of *Unseen Worlds*, available at: <http://www.unseenworlds.co.nz/>; retrieved October 10, 2010.
- ⁵⁹ *Waking – Sleep Sciences and Performing Science in Dialogue*: www.waking.co.nz; Retrieved April 13, 2011.
- ⁶⁰ http://www.royalsociety.org.nz/Site/news/events/Previous_events/angels/default.aspx; Retrieved September 12, 2008.
- ⁶¹ Physicists were an apt choice of scientist for this initiative, since “the idea for the book was dreamt up during the 2005 centenary of Einstein’s annus mirabilis, the year in which he unveiled special relativity, completed his doctoral dissertation and laid the groundwork for the entire field of quantum mechanics”. From D. Larsen (2006), *Heat, light and sound, The Listener* **204**(3454): 22-28.
- ⁶² P. Callaghan and B. Manhire (2006), *Are Angels OK? – The Parallel Universe of New Zealand Writers and Scientists*, Victoria University Press, Wellington.
- ⁶³ R. Priestly and others (2007), *The elegant universe of Albert Einstein*, Awa Press, Wellington.
- ⁶⁴ P. Callaghan and K. Hill (2007), *As Far as we Know: Conversations About Science, Life and the Universe*, Penguin, Auckland.
- ⁶⁵ C. Baugh (2005). *Theatre Performance and Technology: the Development of Scenography in the Twentieth Century*, Palgrave Macmillan, Basingstoke, p. 217.

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HOW TO CITE: P. Hodder, *Science as theatre: a New Zealand history of performances and exhibitions*, *Jcom* **10**(02) (2011) A01.