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Abstract

Contemporary ecological concerns bring with them an opportunity for innovation; to rethink traditional practices and forge new approaches that not only strive for sustainability, but also push intellectual and creative boundaries. Despite this, current notions of sustainability are still dominated by suppositions of creative limitations; the perception that sustainability and theatre do not mix is a common assumption. This paper explores the possibilities of sustainable production practices within the parameters of conventional theatre. Using a practice-led research project, *Helicopter* (Melbourne Theatre Company, 2012), the investigation examines the designer's journey of integrating creative processes with eco-efficiency, aesthetics, organisational considerations and director's expectations. In this context, the designer considers how sustainable strategies might drive the creative process and aesthetics, given altered constraints, requirements and opportunities. While there are challenges and barriers to implementing sustainable approaches in conventional theatre productions, the paper reveals how thinking about environmental considerations creates exciting new avenues for exploration—including new ways of thinking about how scenographies are designed, constructed and distributed for a sustainable paradigm.

Keywords: sustainability, ecoscenography, eco-efficiency, ecological design, sustainable production

Introduction

Contemporary ecological concerns demand new approaches to theatre production. In a world of increasing environmental issues, theatre makers not only have a responsibility to consider the long-term impacts of what we do (such as managing energy usage, toxicity and waste) but also to forge new approaches that strive for sustainability and push intellectual and creative boundaries.

While there has been a growing number of practitioners engaging with concepts of sustainability within the performing arts, sustainable production is regularly met with scepticism and concern—particularly from those who see it as either a limitation to creativity (Lawler, 2008; Barnard & Briscoe, 2015) or do not see its relevance to the performing arts (Morris, 2007, p. 5). To add to this issue, there is still very little research—both in academia and in practice—into how an ecological ethic may be approached in the field of theatre production. The ecological potential of theatrical design has neither been adequately documented, nor have there been well-researched attempts to examine means by which current practices can be reimagined to comply with sustainability (Morris, 2009; Brunner & Mehler, 2013).

Where some see a problem, others see opportunity and a chance to innovate. This paper provides an example of sustainable production within the parameters of conventional theatre practice. Using a practice-led research project, *Helicopter* (Melbourne Theatre Company, 2012), we explore the designer's journey of integrating creative processes with eco-efficiency, aesthetics, organisational considerations and director's expectations. The paper begins with an introduction to eco-efficiency and eco-creative practice, followed by a summary of how these ideas assisted in driving the set design of *Helicopter*, given these altered constraints, requirements and opportunities. Tanja Beer was the key researcher and practitioner implementing the project while Dominique Hes supported the project from a sustainability theory perspective. To ensure this distinction is clear, 'Beer' is referred to when discussing the experience of the practice and 'we' with reference to both authors in relation to reflections, theory development and lessons learnt.

Towards sustainability in theatre production

Like many industries, sustainability in theatre production emerged from a growing concern for the scale of the environmental challenges society faces as well as increased questioning around theatre's sometimes, or often routinely, wasteful and toxic practices. The last decade saw the advocacy of many theatre makers raise the profile of sustainable practice in the performing arts. As theatre maker Damond Morris contends:

> The theatrical industry is broken, plundering the earth of valuable resources without a thought for the wellbeing of future generations. While other industries are taking on board green practices, the theatre industry is painfully unaware

> … In the 20th century there were, modestly, hundreds of thousands of productions that moved through millions … of tons of waste. This waste, classified as construction and demolition waste, is one of the most prevalent materials in our landfills. To curb the waste we create in the theatre industry we must find new ways of thinking and new ways of working without it. (2007, p. 2, 43)

In *What is Scenography?* renowned scenographer Pamela Howard also draws attention to theatre's unsustainable habits, claiming that performance makers:

> have a responsibility in these times to address the problems of today and to fuel change and alternatives … to show that rich and beautiful theatre can be made without creating mountains of waste … scenic construction that can rarely be used again does not set a good example to spectators who diligently recycle bottles and newspapers, and grow their own vegetables. (Howard, 2009, pp. 222, 216)

The advocacy of Morris (2007), Howard (2009) and others has been accelerated by mainstream exposure to the risks of climate change and global degradation. Such publicity has been a driving force in focussing attention on the unsustainability of theatre practice. Broader media coverage, such as that which highlighted the climate change summits of 2009 and 2015, and documentary films, for example Al Gore's *The Inconvenient Truth* (2005) and Josh Fox's *Gasland* (2010), have presented a call for action that has begun to filter through to even the most reluctant sectors and industries. Since then, the sustainability movement in the performing arts has progressed rapidly with an increasing number of theatre practitioners engaging in what might be called the 'ecological turn' of the last decade.[1]

An introduction to eco-efficiency in theatre production

While there has been an accelerating interest in environmentally responsible practice, most sustainability approaches in theatre production are modelled on eco-efficiency and do not embrace the creative integrity and potential of the scenographer. Originally coined by the World Business Council for Sustainable Development (WBCSD) at the 1992 Earth Summit in Rio, the term 'eco-efficiency' is the most widely used sustainability approach. It largely originates from scientific, technological, industrial, and economic influences of the Industrial Revolution

[1]The 'ecological turn' is a reference to a 'turn in thinking' within the humanities which is concerned with the complexity of ecological issues in the 21st Century (climate change, resource consumption, coal extraction, coral bleaching, species extinction) and places a critical emphasis on the interrelationships of the more-than-human world. The term has been influenced by multiple thinkers (such as Donna Haraway, Bruno Latour, Timothy Morton and Jane Bennet) and draws attention to the increasing number of academics, writers and artists addressing ecological issues within their works.

(Eisenberg & Reed, 2003, p.1). Eco-efficient practice has been defined as having a 'carrying capacity' approach to minimising waste, pollution and natural resource depletion while still satisfying human needs (DeSimone & Popoff, 1997). Commonly referred to as the 'three R's' (reduce, reuse, recycle), the appeal of this approach is that it works within a business-as-usual context and is therefore relatively straightforward to implement within conventional circumstances.

Modelled on broader industries, the eco-efficiency approach has been popular in the performing arts largely because it does not significantly challenge the current status quo of operations (Brunner and Mehler, 2013, p. 26). In many cases, eco-efficient considerations (such as reusing materials and minimising waste) can be implemented without the need to alter design discussions, construction methods or aesthetics. While still in its infancy, conventional practice in the performing arts is changing to include eco-efficient strategies for theatre buildings and stage production.[2] Organisations such as Julie's Bicycle (UK), Creative Carbon Scotland (UK), Greenie in Residence (Australia), Broadway Green Alliance (US) and Mitos21 (EU) offer measurement tools, consultancy, workshops and seminars on 'how to do sustainability' from an eco-efficient perspective. Many performing arts organisations are demonstrating how eco-efficiency has resulted in large areas of improvement in conventional performing arts practice—including how careless energy over-expenditure and excess waste can be mitigated through the use of locally sourced materials, reclaimed objects, reuse and LED lighting.

Despite its effectiveness in mitigating negative impact, eco-efficiency has traditionally been more about measurement and procurement, rather than thinking about sustainability as a way of activating creative potential. While eco-efficiency has played a vital role in advocating and supporting ecological change, it only works towards the economically and technologically efficient ('technocratic') components of sustainable production and does not integrate the creative component of theatre-making. Eco-efficiency's emphasis on 'limiting' or 'restricting' practice constitutes a lack of vision and inspiration that is not conducive to creative industries that pride themselves on artistic integrity and innovation. Regularly regarded as 'tedious' or 'boring', engaging with eco-efficiency in the performing arts is seen as a chore placed upon the production or an obligation hidden behind closed doors. In most cases, eco-efficient strategies are incorporated only after the design concept has already been conceived (for example, see Morris, 2007) and are therefore not seen as an integral part of the scenographer's ideas, processes and aesthetics.

Resistance to adopting an eco-efficient approach is entrenched in the industry's fear of limiting creative process (Peeters, 2012, p. 85). No artistic director will tell his or

[2] Examples include: Arcola (London, UK), Arts Admin (London, UK), Arts House (Melbourne, Australia), Mo'olelo Performing Arts Company (San Diego, USA), National Theatre of Wales (Cardiff, UK) and Sydney Theatre Company (Australia).

her designers to 'limit themselves' in order to reduce consumption and waste generated by their productions (Lawler, 2008, p. 59). Instead, the energy dependence and waste in the performing arts is fed by its appetite for spectacle and the need to continuously begin anew. Many producers and directors encourage designers to create a visual experience that serves the audience's 'high quality' expectations: a 'world' that is both sophisticated and entirely different from other previously seen designs (Morris, 2007). These considerations remain at the heart of the sustainability challenge (Beer, 2013).

Eco-creativity: Placing creativity at the heart of sustainable practice

While theatre practitioners engaging explicitly with sustainability still exist in the periphery of conventional theatre, there has been a recent surge of designers exploring the potential of embedding ecological responsibility into their creative process.[3] These artists often describe their process as one which activates a 'creative engagement with sustainability'—a way of working with an ecological ethic which might be defined simply as 'ecological creativity' or 'eco-creativity'. For many of these designers, adopting an eco-creative approach is dependent on the possibilities of each project, organisation and director. However, there is a growing enthusiasm for exploring ecological opportunities through a renewed interest in repurposing found objects and recycled materials—something many designers have done for years out of necessity, but which is now also fuelled by ecological aspirations. Award winning designers and sustainability advocates Pamela Howard (UK), Soutra Gilmour (UK) Donyale Werle (US) and Anna Tregloan (Australia) are demonstrating how working with an ecological ethic is not a limitation, nor are sustainability and high quality aesthetics seen as mutually exclusive. Working sustainably celebrates innovation and challenges these designers to think about what is at hand as well as what is possible. As Werle (who works almost exclusively with salvaged materials) explains in her interview in American Theatre:

> Any kind of trash can be material … You get this stuff and you wrestle with it … All the time, I'm like, 'Okay, this is what we've got. This is what's in front of us. How do we use it?' (Werle in Kompanek, 2012, p. 30)

The first step to adopting an artistic approach to sustainable theatre production requires that designers consider eco-creativity as a fundamental component of their process. Embracing sustainability as a concept that is intrinsically 'eco-creative' emphasises the scenographer's capacity to place ecology and "its principles of resilience and strength, creative regeneration, and respect for the earth" (Tickell, 2012) at the core of the artistic vision. For theatre makers Dan Barnard and Rachel Briscoe, engaging with eco-creativity is a case of "saying ecological design 'is my starting point', rather than 'this is limiting me as an artist'" (Briscoe, 2013). The

[3] See www.ecoscenography.com.

merging of ecological thinking with creativity—a form of thinking that is co-creative—allows scenographers to weave in broader expertise across multiple fields, opening up new forms of artistic practice. Here, sustainability is positioned within the creative practice itself and therefore goes far beyond superficial notions of 'tinkering around the edges' (Barnard & Briscoe, 2012). This merger allows creativity to inform ecological practice as much as ecological practice informs creativity.

Even within more conventional contexts, designing with eco-creativity need not be seen as a limitation, nor should sustainability and high quality aesthetics be considered mutually exclusive. As set designer Justin A. Miller posits, every production is "an opportunity to be more environmentally conscious" which "involves thinking ahead, remembering the big picture, and resisting the 'way-it's-always-been-done' in favor of innovation"—a process which requires as much creativity as it does organisation (2012, p. 199). Each production can be an opportunity to explore new materials and processes, allowing for better informed choices and learnings that can be further investigated in the next design. Here, the scenographer considers sustainability as part of the planning stages and 'creative dreaming' where thematic, aesthetic and ecological considerations can be simultaneously explored from the beginning.

At the same time, opening up to new forms of practice through the eco-creative process also brings about an element of risk and uncertainty to a field already challenged by lack of time and resources. Unlike eco-efficient strategies, which can be easily monitored and quantified, creativity is not measurable or predictable and therefore brings in a level of uncertainty into the design process. However, this 'uncertainty' is also what drives innovation. As the late scenographer Joseph Svobada has argued, "experimentation is obligation, and real creativity involves the acceptation of risk" (Svoboda cited in Burian, 1974, p. 22). In response to Svobada, we posit that it is through the very acceptance of risk as a vital part of the production process that designers are able to fully embrace sustainability as a creative opportunity. As Alison Tickell (2012) of Julie's Bicycle reminds us, "creativity is the most sustainable and renewable energy source on the planet. Let's use it".

Introduction to *Helicopter*

In 2012, *Helicopter*—a Melbourne Theatre Company (MTC) production—was chosen as a pilot study for a wider investigation into examining the potential of ecological design for performance as part of Beer's PhD research on 'Ecoscenography'. Beer was contracted as set designer for a performance season at The Lawler Theatre for a new play by writer Angela Betzien, directed by Leticia Caceres. Without a sustainability policy in place, all ecological design considerations for *Helicopter* were required to fit within MTC's business-as-usual approach. As an investigative project, the pilot had three broad aims: 1) to assess the current challenges associated with the implementation of eco-creativity in conventional theatres; 2) to examine how

ecological parameters and opportunities might drive the creative process and overcome preconceived obstacles, and; 3) to inform further investigation of ecoscenography.

The majority of Beer's inquiry was developed through practice-led research. Practice-led research is defined by Carole Gray as research which is initiated in practice, where questions, problems, challenges are identified and formed by the needs of practice and practitioners; and a research strategy that is carried out through practice, using predominantly methodologies and specific methods familiar to us as practitioners (1996, p. 3). Similarly, Donald Schön describes how the 'research-practice exchange' is "triggered by features of the practice situation" where "reflection-in-action is its own implementation" (1983, pp. 308-309). Schön highlights how the primary objective of practitioner-based research is one that focuses on an improvement in practice (1983, pp. 49-56). While the practice-led researcher is interested in "understanding the situation", she is primarily focused on active research for the service of change and the betterment of the field through an iterative process of problem setting, tacit knowledge and reflection-in-action (Schön, 1983, p. 147). This methodology supports the scenographer as a catalyst and facilitator of change in instigating ecological improvement and potential. Here, Beer's knowledge creation was established through the very process of developing the *Helicopter* design, where problems were not only identified on the job but also practiced to resolution (Haseman, 2007, p. 147).

Pursuing sustainability within an organisation such as the MTC and across a range of stakeholders (director, lighting designer, production and stage managers, costume and props departments, scenic artists and the Occupational Health and Safety (OH&S) officer) was a challenging prospect. Whilst the company was not exactly unsupportive of green initiatives, sustainability was still far from being a notable consideration in production meetings and building procedures. As a result, there were limitations as to how far we could push the sustainability agenda in the design process. Working within the parameters of MTC's operational model, the design for *Helicopter* adopted an eco-creative approach that was primarily focused on design for disassembly and recyclability. Eco-efficiencies of 'reduce, reuse, recycle' were integrated into the creative process and became a form of creative questioning and awareness building in Beer's pursuit of ecological practice. In this context, assumptions and barriers to ecological practice were questioned and explored, with a focus on building greater knowledge of sustainable materials and processes.

Another objective of the pilot project was to consider the use of quantitative and qualitative measurement tools for broader research. *Helicopter* tested Julie's Bicycle's Industry Green (IG) Tool—a carbon calculator tailored for sustainable production in the performing arts. While the IG tool is used widely in conventional theatre production (with a focus on measuring energy expenditure, as well as the

carbon impact of materials such as timber, aluminium and steel in set building), it failed to accommodate less conventional materials, such as additional props and paint sourced for the production. Collecting data on energy and material usage was also difficult as we were heavily reliant on MTC staff for information that was not part of their job description. As a result, we did not have adequate information to conduct an in-depth quantitative analysis of the work. Another complication was that the IG tool does not measure toxicity, and therefore was not able to satisfy a key issue for *Helicopter* (as highlighted below). This inadequacy resulted in the decision to abandon quantitative methods to focus instead on qualitative, practice-led results which proved to be more suitable and reliable for the focus of Beer's research. The method used is based on Jennifer Mason's (1996) 'literal, interpretative and reflexive' approach. That is, an approach to qualitative analysis adapted into a data collection method which we referred to as 'Mason's Table' (see Tables 1-4). Mason's Table was used as a systematic data collection format for taking notes throughout *Helicopter*'s development. The tables are included in this paper as a way of providing more detailed evidence of the eco-creative process.

Conceiving the *Helicopter* design

Various platforms have demonstrated how the earliest stages in the design process have the greatest influence over environmental impacts. Eco-arts scholar Sacha Kagan highlights how imagination can be a powerful tool in the initial process of envisaging sustainable futures (2012, p. 32). Treating sustainability as part of the 'creative dreaming' allows for aesthetic and environmental considerations to be simultaneously explored from the beginning. In the theatre, this form of 'creative dreaming' is highly collaborative and "determined designers" also require "encouraging and flexible" directors to engage with the possibilities and challenges of ecological practice (Pickard, 2013).

The design for *Helicopter* began with the director, Caceres, and Beer identifying what was essential to the underlying themes of the text. Set primarily inside an affluent family's house, the play's heightened dialogue inspired a skeleton frame design of tilted beams prominently placed centre stage. The stark aesthetic depicted a world that was dark, clinical, cold, precarious and porous: a family comes to terms with being responsible for the death of an African neighbour's child as their 'perfect white world' crumbles beneath them. The notion of 'emptiness' (both psychologically and spatially) was important to *Helicopter*'s troubling themes while simultaneously supporting aesthetic, ecological, economic and practical considerations.

Responding to the cold and clinical themes of the play, Caceres and Beer chose to work with a minimalist aesthetic which focused on creating a sparse but effective design (see Table 1). Renowned architect John Pawson describes minimalism as "the pursuit of simplicity, as a way of thinking; exploring the possibilities that it offers

Mason's Table: Documentation and Analysis

Date	**Activity**	**Actions** **Issues**	**Tools** **Considerations**	**Outcomes** **Questions**
17/04/12	Concept meeting			
Literal	The aim was to work through design ideas and issues with the director and the writer where a sketch model (made from scrap materials) was used to facilitate discussion.		The writer requested a "white space". I proposed white pillars, instead of white walls. Could creating a minimalist set design help minimise environmental impact?	The set design concept was accepted and a minimalist aesthetic welcomed. Ecological thinking was incorporated into considering the general needs of the production—OH&S, aesthetic, budget. Overall, ecological ideas were discussed, but not made a centrepiece of the discussion.
Interpretive	I presented the model without furniture—as a way of depicting the sparseness of the space. I worked from the central idea that 'less is more'.		A series of platforms (MTC stock items) created areas for actors to sit on, hide behind and elevate themselves. The idea is that this would make a stronger statement (referencing the starkness of the play) than having real furniture on stage.	With no furniture, the platforms are going to be crucial to the blocking of the play—hence, the need for an accurate rehearsal set-up….
Reflexive	If designers begin designing with less materials and introducing this concept into early conversations with the creative team—can we avoid superfluous design elements?		This is an exercise in using a minimalist aesthetic as a tool to reduce our carbon footprint. Can we get a good result with less?	A minimalist aesthetic is not going to suit every designer and director. Depending on the materials and level of toxicity, minimalism does not necessarily mean eco!
Testing preconceived notions of sustainability: does sustainable design need to look unpolished? *Helicopter* required a high quality aesthetic as the play was set in a house of a high income family. How do we create a sense of opulence without being opulent? Does opulence contradict sustainable approaches? A minimalist approach was chosen to reduce material costs and waste—stock rostra was used to reduce material costs and waste.				

Table 1: *Helicopter* concept meeting: literal, interpretive and reflexive analysis

for working creatively" (1996, p. 7). Questioning creative decisions through a minimalist lens encouraged the creative team to think more carefully about the transitions, spatial relationships, movement, texture, colour and visual symbolism of the work as well as reducing unnecessary set construction. As the creative team entered the rehearsal process, minimal set building also meant that Beer could

spend less time in the workshop and more time collaborating with Caceres on the spatial dramaturgy of the piece. This helped unify and enhance other elements of the production, positively informing the work.

Complementing the tilted steel beam framework, platforms (made from MTC stock rostra) provided opportunities for multi-levelled staging (denoting rooms of the home) without the need for walls or furniture (Fig. 1). The lack of furniture also challenged the performers to focus on the essential elements of the narrative—to consider how a dinner scene might be constructed without tables and chairs (Fig. 2), a bedroom without a bed and a swimming pool without water—and to move seamlessly from scene to scene. Within this minimalist setting, our focus rapidly shifted from the static set elements to engaging with the way in which the actors embraced the potential of the space (see Table 1).

Helicopter design development.

The design development for *Helicopter* was initially informed by exploring MTC's pre-existing stock (e.g. rostra, furniture pieces and staircases). Using what was already available was not seen as a limitation, but rather as a way of accessing vital information for eco-creative possibilities. As sustainability advocate and stage designer Soutra Gilmour explains, "For me, my job is about responding to a theatre—almost as if the production were site-specific." (Soutra cited in Senter, 2014). Seeing the theatre space as 'site' activated the eco-creative process, offering the possibility to access local resources and found materials, as well as exploring opportunities that exist within the site itself. Visiting MTC's set and props store early in the conceptual process allowed Beer to consider how she might make use of available resources that could be reconfigured and re-imagined as inspiration for the design. Using stock rostra to build up the flooring to suggest rooms in the *Helicopter* house eliminated the need for walls—further maximising artistic, economic and ecological efficiencies (Fig. 3). When purchasing additional elements specifically for the show, a key consideration became how it might return to stock to be reused again by other designers. Here, the design was not seen as an 'end' point, but rather as a 'transition' point for further design and construction. Unlike traditional theatre productions, where opening night takes precedence, *Helicopter* considered pre-production, production and post-production processes as part of its overall design intention, aesthetic and outcome.[4]

[4]This framework is integral to 'ecoscenography': a practice Beer defines as the integration of ecological principles into all stages of scenographic thinking and production (Beer, 2016b).

Figure 1: *Helicopter's* skeleton frame set. Photo: J. Busby

Figure 2: *Helicopter* dinner scene using multi-levelled staging as furniture. Photo: J. Busby

Figure 3: Using stock rostra to denote rooms in *Helicopter* rehearsals. Photo: T. Beer

Using existing construction frameworks and conventional design methods, eco-efficient processes proved to be both cost effective and straight forward to implement within a theatre organisation with limited knowledge about ecological strategies. An ecological mindset was welcomed by the company if it could maximise efficiency, i.e. reduce costs and minimise time. In fact, if an ecological design project could be framed entirely within an efficiency agenda, a designer could largely pursue sustainable strategies without mentioning the word 'sustainability' at all. Given the negative assumptions that the industry can associate with the term—expensive, boring, time consuming and potentially limiting high quality aesthetics—this was a useful discovery.

We also discovered that if sustainability concerns could be framed within MTC's OH&S policy, they were welcomed into discussion. For example, when Beer requested non-toxic paint for the scenic art of the *Helicopter* set design, it was easily approved as part of the company's OH&S regulations. While this seemed like a plausible approach at first, Beer soon discovered that OH&S restrictions could also go against environmental considerations, particularly in the use of flame retardant. In organisations such as MTC, strict fire measures mean that all combustible set materials (such as timber and fabrics) require flame retardant regardless of individual OH&S assessments. Containing toxic substances, flame retardants are contradictory to ecological considerations and present further complexities and challenges for the

scenographer in choosing 'sustainable' materials.[5] Further, according to Victorian State regulations, strict measures on toxicities mean that most flammable products (such as timber and cardboard) that contain flame retardant cannot be recycled. In this situation, strategies centred upon a 'closed loop' system or continued 'in-house' usage (as well as reusable non-combustible substances, such as steel) can be a much more appropriate sustainability choice. While fire has long been a concern of theatres (and rightly so), we suggest that perhaps there is a bigger broader conversation to be had around covering sets in toxic chemicals without an independent assessment of the dangers at stake.

Flame retardant was an issue on *Helicopter* and did influence creative decisions on the production. While Beer originally favoured reclaimed timber for the construction of the stud-frame design, knowledge of flame retardant issues prompted her to seek alternatives. Once it became clear that steel would be required for structural reinforcement, Beer chose to use steel beams without timber fabrication to avoid toxic substances. Through this process, she found herself attracted to the original shape of steel rather than to that which might be cladded in timber (Figs. 4, 5, & 6). By eliminating mixed material fabrication, Beer was also assuring that the design elements could be easily stored for future use (see Table 2).

Figure 4: Painted steel beams created the frame for the *Helicopter* set. Photo: T. Beer

[5]Flame retardants such as polybrominated diphenyl ethers or PBDEs are organobromine compounds linked to health hazards such as cancer, lung and kidney disease, reproductive disorders, birth defects and decreased nervous system development (Cribb 2014). Julian Cribb, author of *Poisoned planet* (2014), explains how manmade chemicals move rapidly in time and space: travelling on the wind, in water, soil, dust, combining with particles and influencing ostensibly natural global food chains that can have effects as far away as polar bears in the arctic. See also R. Dietz et al. (2012).

Figure 5: Original *Helicopter* model depicting a white cyclorama background and thicker pillars of cladded steel. Photo: T. Beer

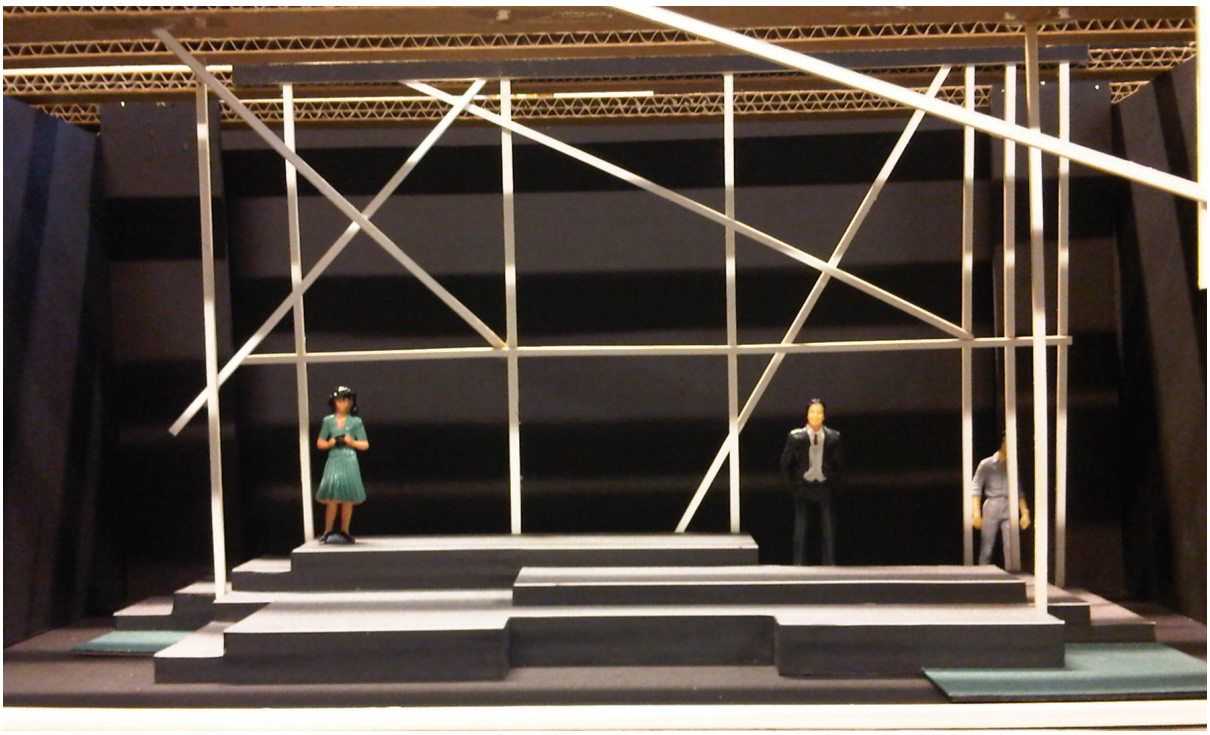

Figure 6: Revised model features painted steel studs creating the structure of the *Helicopter* design. The black background was due to budget restrictions on cyclorama hire, leading us to rely on the existing curtains and flats in the theatre instead. Photo: T. Beer

Date	Activity	Issues Barriers	Outcomes Questions	Tools Considerations
14/05/12	White card review			
Literal	A white card model of the design was presented to the production team at MTC. The design consisted of timber pieces in varying widths suspended in the space to create a frame of a house. The production team highlighted that all the timber struts needed to be reinforced with steel, adding a significant cost to our very small budget.		The steel and timber fabrication came in over budget so a major alteration of the design needed to be considered.	I reduced the number of struts in the design and then removed the timber fabrication on the steel pieces. 18/05/2012: The design still came in over budget, but by removing timber cladding from the struts, MTC are happy for us to use their stock steel as it can be re-used again in-house—here an ecological choice becomes a win!
Interpretive	The design is no longer looking particularly ecological as we are introducing steel into the construction. Incorporating fabrication of steel and timber is less likely to result in it being dismantled and recycled after the show closes.		If the beams are re-enforced with steel, the ply (or timber) becomes only decorative. The question is, do we use timber at all?	Overcoming the need for "over" decorating the design: is ecological design about what we need and what we can do without?
Reflexive	Just because a design is minimalist, does not mean it is environmentally conscious.		Is ecological design about questioning the need for a more decorative approach?	What am I losing in the aesthetic of the design by adopting a more minimalist and ecological aesthetic? How far is too far? Do I feel limited by this decision?

Table 2: *Helicopter* White card review: literal, interpretive and reflexive analysis

Despite Beer's success on the central design element, a few days before opening night she was informed that the two metre pile of second-hand plush animals (sourced from charity shops; see Table 3) would require flame retardant treatment as a result of the electrics inside some of the feature toys (see Table 3; Fig. 7). Due to the timing of the discovery, reconsidering these props' inclusion in the show and coming up with eco-creative alternatives was not an option as they had already become a central part of the narrative and dramaturgy of the play.

Date	Activity	Issues Barriers	Tools Considerations	Outcomes Questions
30/07 – 1/08/	Toys and fire proofing			
Literal	I find out that the animals in the shopping trolley pile will need to be flame retarded due to electrics being inside of them!		There is no negotiation on the matter: the toys must be flame retarded if there are electrics inside them—this is an OH&S mandate!	The trolley of toys is flame retarded outside the theatre by the costume maintenance person… She is clothed in gloves, jacket, and mask to do the job. The flame retardant container is unlabelled… I touch the toys and my hands soon become dry and itchy. I try to do some adjusting of the toys with gloves, but give up as the odour is still present.
Interpretive	I wish I would have known about this issue before we decided to use electrics in the toys.		Is the trolley of toys (coated with flame retardant) outfitted with electrics worth the effect? Are there other ways to tackle this problem?	I am trying to source the name of the fire retardant product and its ingredients. It is possible that MTC may have been using a borax/boric acid mixture, which is commonly thought to be relatively safe, however this mixture did trigger itching and a sore throat.
Reflexive	If I would have known about the electrics, would this have made a difference to the decision to have electronic toys that move and light up?		MTC's OH&S person is currently investigating the flame retardant, and looking into better options for future productions. Yay!	Initial research into the substance was unable to determine its chemical composition, user safety, or whether toxic compounds are released when it is combusted. Further research indicated that Visual Coatings supplies Insulcote, a common flame retardant for theatre. This substance is likely to be poisonous if taken internally or inhaled in large quantities. Verdict: more effort needs to be taken to consider toxins in theatre production and look for alternatives.

Table 3: *Helicopter* production (fire-proofing toys): literal, interpretive and reflexive analysis

Reflections on *Helicopter*

Overall, the creative process of developing a set design concept within an ecological framework did not differ greatly from Beer's previous professional experience. Being inspired by ecological considerations from the start enabled us to unify ecological and creative solutions throughout the development of the design process, so that it became an inseparable part of the project's day to day experience.

Figure 7: Flame retardant being applied to the *Helicopter* toys outside the theatre. Photo: T. Beer

While adopting an ecological ethic was welcomed by the director, environmental considerations were not intended as a feature of *Helicopter*, nor did they dominate design discussions. As a designer, Beer is familiar with juggling numerous concerns and possibilities, so addressing ecological issues did not radically change her process, it simply became part of the parameters within which she worked. Integrating ecological thinking into the design process early on also enabled Beer and Hes to question the need for more 'things' and to ask: how might we 'do more with less'. As such, we found ourselves in continuous dialogue with the ecological considerations, practicalities and the visual aesthetics of the design. In the end, the highly minimalist design for *Helicopter* was as much a result of economic and aesthetic considerations as it was about incorporating an ecological mindset.

While the visual aesthetic and functionality of the design was well received, *Helicopter's* ecological credentials were not openly acknowledged, valued or celebrated by MTC and, as a result, audiences were not aware of this aspect of the work. This left us with a series of questions to consider: given increasing global concerns, is it necessary for the audience to know about a design's ecological credentials? Should the ecological considerations, processes and outcomes of the design have been articulated in the MTC program? And, if the environmental responsibility of the design had been articulated, would this have made a difference to the way the audience responded to the work?

In summary, the pilot project revealed that ecological design is not only about the consideration of materials, it is also about changing practice, finding ways to break down barriers, question existing practices and explore new ways of doing things. In practice, this means understanding that each project comes with its own collaborators, agendas, parameters, policies and processes which are often varying and contradictory (Robertson, 2014, p. 314), and to date "there are no easy recipes

or ten-step plans" to achieving this (Hes and du Plessis, 2014, p. 212). Thinking with complexity requires the ability "to critically reflect on your own thinking, being constantly vigilant against logical fallacies, dangerous assumptions and specious argumentation" (Hes and du Plessis, 2014, p. 212). Challenging preconceived ideas—such as questioning the assumption that certain materials, products and services are more sustainable than others—is an important start to engaging with sustainability. Therefore, opening up to eco-creative thought processes requires the ability to question existing structures and paradigms while embracing the autonomy of finding one's own path through the complexities.

It is clear that without top-down organisational, policy-driven or governmental support, it will be difficult for individuals to address sustainable issues successfully. There were times when Beer was able to speak openly about her environmental concerns on *Helicopter*—for example, when it came to asserting her choice of buying from charity shops rather than $2 stores (see Table 4). However, in most cases, sustainability was pursued cautiously (and in retrospect, perhaps too quietly) to avoid confrontation in an organisation that was paying for Beer's design services and not for her eco-credentials. A key outcome of the investigation was realising that confronting unsustainable practices requires confidence, determination and commitment. A collaborative dedication to ecological values is also necessary for creating a more conducive environment for change. A major consideration will be the need for theatre companies to reassess their institutional constraints and policies (such as flame retardant) so that these do not become obstacles in moving towards a sustainable future.

More importantly, *Helicopter* highlighted how the limitations of sustainability are largely determined by the paradigm in which designers are working. Scenography is a highly collaborative art form, and as such, there are a number of personal and organisational factors that can make ecological practice difficult. This is further exacerbated by the fact that most organisations in the performing arts do not yet have sustainability policies in place, making it harder for a designer to implement these approaches. There is no doubt that these contexts will require a stronger level of determination and commitment than others. In many cases, designers who find themselves in the hands of an ecologically minded director or production manager will have a better chance at implementing sustainability than those working where environmentally responsible design is not a priority.

Date	**Activity**	**Issues Barriers**	**Tools**	**Outcomes Questions**
10/07/12	Rehearsals			
Literal	The script requires 100 "IKEA" soft toys on stage. We have only $100 ($1 per toy) which is a big challenge.		I suggested finding toys from charity shops—if we could colour code the toys this could make the design more IKEA-like.	I suggested teddy bears (readily available) with red ribbons (Africa - AIDS) as these would be easy to find at charity shops. However, the director wanted to go with African animals which might be very difficult to find!
Interpretive	Each toy signifies 100 child workers from China. The play has a strong social message about child labour.		Buying new toys is not only challenging from a budget perspective, it also goes against the social message of the play.	The director did not want to exclude the option of buying new toys for the show if necessary.
Reflexive	I feel that we also need to be respectful to the social and political message in the design realisation. I realise that there are 'limitations' on the design if we are to adhere to the integrity of the play. However, the social integrity is more important than upholding a strict design vision and I am willing to be flexible and make it work.		The production assistants suggested buying the animals from $2 shops—I feel 'sick in the stomach' at the idea of buying new toys when the play is commenting on Chinese child labourers. I am aware of wanting to stress my opinion (being an activist-designer) and at the same time, not wanting to jeopardise or compromise my relationship with the artistic team. I feel caught between the two.	I spend time in rehearsal thinking about different options. I look online at the prices of new toys, speak with my design assistant, and look at existing toys from MTC. Finally, the director suggests the option of using bright colours to help match in non-African animal toys. I decide to give the charity trip a chance.
11/07/12: I bump into the writer outside MTC and she agrees that ethically the toys should not be purchased from a $2 shop! Quick phone call to the production assistants who are sourcing toys at charity shops—they are having success and finding some African animal toys for a very cheap price. We should be careful to assume what we can and cannot find at a charity shop! 12/07/12: Exploration of the charity shop animals in rehearsals reveals that there are some wonderful talking toys that could be incorporated into the action of the play. The toys have led us to a creative incentive—the director and artistic team are excited. Design flexibility—if a designer is willing to improvise a little (rather than hold on to a preconceived design and specific idea), then we open up to more possibilities in the rehearsal process…and more openness for ecological solutions. Yay!				

Table 4: *Helicopter* rehearsals: literal, interpretive and reflexive analysis

Conclusion

This paper has provided insight into the opportunities and challenges of incorporating 'eco-creative' practices in the performing arts. While it has discussed the 'ecological turn' as an exciting new territory for the performing arts, it has also highlighted important barriers to the implementation of ecological practices in conventional theatre. However, rather than focusing on these limitations, the paper revealed ways in which designers can embrace sustainable challenges and creative possibilities.

In summary, we propose that the concept of eco-creativity offers a tool for understanding and implementing sustainability and brings a much-needed artistic side to exploring an ecological scenography in conventional theatre. Using *Helicopter* as a practice-led case study, the paper demonstrates how considering wider socio-ecological factors of scenographic work leads to a renewed investigation of materials and processes. This not only entails the scenographer acquiring new knowledge and skills in design pedagogy and training, but also a willingness to consider a wider perspective of aesthetics, where long term design considerations are brought into the ephemerality of scenographic practice (Beer, 2016b, p. 206). This willingness includes a concern for the 'unseen' effects of making spaces and implies a kind of interaction with an 'invisible scenography'—that which may not be immediately evident in the making of the work (unrecyclable set elements, flame-retardant and $2 shop props) but which we acknowledge has causational potential to form an agentic by-product of the 'visible' and 'experienced' (adding to landfill waste, air pollution and the production of child labour).

Holding onto old paradigms has led to sustainable design being construed largely as one of 'limiting' or 'restricting' existing artistic practices. In reality this need not be the case, but the perception is one that must be overcome to bring ecological design into the day-to-day operations of performance practice. Sustainability needs to be inventive, inspiring and engaging for the performing arts to turn around intrinsically unsustainable modes of practice. Bringing creativity into the core of sustainable practice is an essential component of encouraging environmentally responsible behaviour. It is only by embracing the creative potential of sustainability that the theatre industry will find new ways of doing things that extend beyond eco-efficient measures. Most importantly, this study revealed that opportunities for ecological practice correspond directly to the scenographer's own values and commitment to sustainability. It is evident that more research into sustainable production is needed for theatre to meet the challenges and opportunities of the twenty-first century.

References

Barnard, D., & Briscoe, R. (2012, October 27). *Perspectives from a rowing boat on starting points and new beginnings*. Retrieved from https://fanshentheatre.wordpress.com.

Barnard, D., & Briscoe, R. (2015, July). *The one about the tree falling in the forest: A practice-based reflection on the stories we tell and who we tell them to.* Paper presented at the Performance, Ecology and Research Symposium, University of Christchurch, Canterbury, New Zealand.

Beer, T. (2012, October). An introduction to ecological design for the performing arts. In *Cultural ecology: New approaches to Culture, Architecture and Ecology* (pp. 92-98). Geelong, Australia: Deakin University.

Beer, T. (2016a). Ecomaterialism in scenography. *Theatre and Performance Design*, *2*(1-2), 161-172.

Beer, T. (2016b). Reimagining the ruins of scenography. *Association for the Study of the Arts of the Present Journal*, *1*(3), 487-511.

Briscoe, R. (2013, September 13). Theatre in a giant emmental powered by exercise bikes—why ever not? *The Guardian Online*. Retrieved from http://www.theguardian.com/cultureprofessionals- network/culture-professionals-blog/2013/sep/13/cheese-fanshensustainable-theatre.

Brunner, P., & Mehler. M (2013). Theatre design and production reimagined: Four principles for a sustainable future. *Theatre Design & Technology*, *49*(3), 23-32.

Burian, J. (1974). *The scenography of Josef Svoboda*. Middletown, CT.: Wesleyan University Press.

Cribb, J. (2014). *Poisoned planet: How constant exposure to man-made chemicals is putting your life at risk*. Crows Nest: Allen & Unwin.

DeSimone, L.D., & Popoff, F. (1997). *Eco-efficiency: The business link to sustainable development*. Cambridge: MIT Press.

Dietz, R., Rigét, F., Sonne, C., Born, E., Bechshøft, T., McKinney M., Drimmie R., Muir, D., & Letcher, R. (2012). Three decades (1983-2010) of contamination trends in East Greenland polar bears (Ursus maritimus). *Environmental International*, *59*(2013), 485-93.

Eisenberg, D., and Reed, B. (2003). Regenerative design: Toward the re-integration of human systems within nature. In Environmental Building News (Eds.), *Pittsburgh Papers: Presentations from the Greenbuild Conference*.

Gray, C. (1996). Inquiry through practice: Developing appropriate research strategies. In P. Strandman (Ed.) *No Guru, no Method? Discussion on Art and Design Research* (pp. 1-28). Helsinki: University of Art and Design. Retrieved from http://carolegray.net/Papers%20PDFs/ngnm.pdf.

Haseman, B. (2007). Identifying the performative research paradigm. In E. Barrett & B. Bolt (Eds.), *Practice as Research: Approaches to Creative Arts Enquiry* (pp. 147-158). London: Tauris.

Hes, D., & du Plessis, C. (2014). *Designing for hope: Pathways to regenerative sustainability*. Hoboken: Taylor and Francis.

Howard, P. (2009). *What is scenography?* 2nd ed. New York: Routledge.

Kagan, S. (2012). *Toward global (environ)mental change: Transformative art and cultures of sustainability*. Berlin: Heinrich Böll Stiftung.

Kompanek, C. (2012). For Donyale Werle it's easy being green. *American Theatre, 29*(7), 28-31.

Lawler, M (2008). Mike Lawler on theatre and sustainability. *American Theatre*, 25(7), 59-61.

Mason, J. (1996). *Qualitative researching*. London: Sage.

Morris, D. (2007). *Towards a recycled theatre: Industrial ecology theatrical applications for the next industrial revolution* (Master's thesis). Western Washington University, Bellingham, USA.

Miller, J.A. (2012). The labor of greening *Love's Labour's Lost*. In W. Arons & T.J. May (Eds.), *Readings in performance and ecology* (pp. 191-201). New York: Palgrave Macmillan.

Pawson, J. (2004). *Minimum*. London: Phaidon.

Peeters, J. (2012). Imagination, experience and meaning as quality of life: The performing arts and sustainable development in Flanders. In J. Janssens (Ed.), *Ins & outs: A field analysis of the performing arts in Flanders* (pp. 85-96). Brussels: Vlaams Theater Instituut.

Pickard, J. (2015). On eco-theater. In C. Svich (Ed.), *Innovation in five acts: Strategies for theatre and performance* (pp. 115-125). New York Theatre Communication Group, Inc.

Robertson, M. (2014). *Sustainability principles and practice*. London: Routledge.

Senter, A. (2013). *The Scottish play for today*. Retrieved from https://www.thestage.co.uk/2013/02/page/6/.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Tickell, A. (2012). Sustainability should be at the heart of our collective artistic vision. The *Guardian Online*. Retrieved from http://www.theguardian.com/culture-professionals network/culture-professionals-blog/2012/oct/25/sustainability-arts-council-julies-bicycle.

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