Resilient Design: Mitigating Trepidation About Environmental Disasters

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Abstract: As our environment grows increasingly unstable and our awareness of a new breed of natural disasters weighs heavily on our collective consciousness, the anxiety resulting from our vulnerability within the changing world has been elevated. While design works towards adapting to our contemporary ecological challenges, alternative approaches that prioritize not only the systems and material considerations relevant to sustainability but the needs of our psychological condition must be considered. Such an approach, therefore, must expand the application of emotional design in fostering desire, love, attachment, and functionality, in the promotion of mental and emotional wellbeing. This paper investigates these ideas through a case study involving the development of speculative furniture designs. The artifacts proposed employ empathy, humor, creativity, and play in an aim to foster resilience around seismic events, and offers a timely precedent in support of sustainable design practice through the development of meaningful and durable design relationships.

Keywords: Emotional design, resilience, speculative design

1. Introduction

Capturing the current moment in design, what design historian Victor Margolin (1998) calls the “culture of sustainability” (p. 85) refers to efforts in the design industry that aim to acknowledge and rethink the environmental impact of design practice and products. To engage with this complex reality, designers are required to devise approaches to design practice that more effectively address design from social, cultural, and psychological perspectives. One such approach is “emotionally durable design” (Chapman, 2015), a design strategy that seeks to reduce the environmental impact of design by increasing the longevity of product lifespans through the encouragement of meaningful relationships between users, objects, and experiences. Emotionally durable design is a theory and practice that encourages designers to look beyond concerns of material resource and production. These approaches invite designers to look closely at people, not as easily categorisable users or consumers, but as complex social and psychological beings. This paper presents a case study entailing the development of speculative furniture designs that aim to mitigate the psychological impact of natural disasters through an application that builds upon the concepts of emotionally durable design in fostering resilience through the use of empathy, creativity, humour, and play.
Our contemporary environmental crisis is fraught with trepidation and anxiety for which design is uniquely prepared to allay. After all, design and its far-reaching consequences may be understood to play an instrumental part in this condition: “In many ways the environmental crisis is a design crisis” (Van Der Rohe & Cowan 2007, p.24). Aptly coined the long emergency by author James Howard Kunstler in his provocative book of the same title (2005), we find ourselves braced for the projected yet unpredictable impacts brought upon by the consequences of unsustainable industrial development or, more precisely, how we make, consume, and dispose of things. The changing forces of climate change, scarcity of resources, economic instability, and potential collapse of social systems loom in the future while massive impacts to our ecosystem are being negotiated in the present day. With these changes is the increasing threat of natural disasters. According to the United Nations International Strategy for Disaster Reduction (2013), as human society’s population, assets, interconnectedness and activities increase over time, disasters resulting from the societal impact of Earth’s natural systems are increasing in frequency and intensity. Globally, the ongoing increase in changing climate patterns and disaster effects is seen as a serious problem, so much so that insurance companies will no longer insure against extreme weather events (Davies, 2015; Van Der Ryn & Cowan, 2007). As events go, disasters are fundamentally unpredictable. Disasters are often described as a result of the combination of the exposure to a hazard, the conditions of vulnerability presented by the hazard, and insufficient capacity or measures to reduce or cope with the resultant potential negative consequences (The United Nations Office for Disaster Risk Reduction, Retrieved 30 November, from https://www.unisdr.org/we/inform/terminology).

2. Design, sustainability, and resilience

In the context of our increasingly unstable environment and our awareness of a new breed of natural disasters on the foreseeable horizon, the anxiety resulting from our vulnerability within the changing world has been elevated. While design works towards adapting to our contemporary ecological challenges, alternative approaches that prioritize not only the principles of sustainability but the needs of our psychological and social condition must be considered. By looking at the parameters through which relationships are built and sustained, Chapman (2015, p.15) advocates that design can address the root cause of ecological crisis, rather than merely treating its symptoms. Such an approach requires an expanded application of the principles of emotionally durable design in an effort to effectively promote psychological well-being through our design provocations. In an effort to foster emotional durability through design, a reorientation of the priorities of design practice must take place. Such an approach should avoid the trap of obsolescence through the prioritization of the longevity of product lifespans and design outcomes that encourage meaningful relationships between users, objects, and experiences.

While it is well established that objects exert a powerful presence in human experience (see for example, Csikszentmihalyi & Halton, 1981 and Matthews, 2006), excesses of production and consumption have meant that the majority of today’s products lack intrinsic value and enduring memory as things. Accordingly, this raises the question of how we might imbue things with meaning that surpass mere practical utility (Walker, 32). As Chapman (2015) frames it, “waste is symptomatic of failed relationships” (p. 24) because, while a successful relationship involves growth and adaptability, at present, “material possessions remain hopelessly frozen in time. This incapacity for mutual evolution renders most products incapable of sustaining a durable relationship with users”
Chapman’s concept of emotionally durable design ultimately proposes that we must consider the development of products “that reduce the consumption and waste of resources by increasing the resilience of relationships between consumer and product, presenting a more expansive, holistic approach to design for durability, and more broadly, the lived-experience of sustainability” (2009, p. 35). This requires that designers address and engage with the temporal life of things, acknowledging that “[m]eaning, expectation and memory are all interconnected components of psychological function that collectively serve to craft and form the specific character of any given human experience” (2015, p.43).

“In order for human society to be sustainable on Earth we must become sufficiently resilient to future shocks.” (Davies 2015)

These perspectives on the empathic and emotionally meaningful potential of design offer significant value for mitigating the harmful psychological effects of disasters. As a design approach it requires the cultivation of psychological resilience: between people and things, as well as between people and the environment. Resilience, by definition, is the capacity to recover quickly from difficulties; to bounce back from adversity (Oxford Dictionary Online, Retrieved 23 November 2016, from http://www.oxforddictionaries.com/definition/english/resilience). Although disasters may not be foreshadowed, resilience approaches acknowledge the existence of anticipated threat and prepare for the unexpected (Park et al, 2012). The concept of resiliency has become increasingly interlinked with sustainability and, as the prevalence of natural disasters is tied to environmental instability (Gow, 2009; Lee, 2016), the application of resilient thinking to disaster design specifically is both warranted and timely. Such an approach promotes a transformation regarding how design is conceived and valued and offers hopeful, resourceful and proactive strategies that build resilience by alleviating the negative impacts resulting from our precarious ecological condition.

### 3. Case study: Speculative Earthquake Furniture

The implications regarding how material culture is designed and the values that design should uphold in light of our environmental crisis present a significant creative challenge. Accordingly, the case study outlined in this paper demonstrates the application of such approach through the design of speculative furniture that aims to mitigate the negative psychological impact of earthquakes. Critical and speculative design are recent concepts and approaches applied in the design industry that aim to address wicked problems, such as design’s role in environmental instability. Through the creation of speculative design proposals and products, the current model of design production and consumption and its impact are provoked and interrogated. In their book Design Noir: The Secret Life of Electronic Objects (2001), designers Anthony Dunne and Fiona Raby outline the practice of critical design, arguing that design too often unquestioningly reinforces the status quo of industrial and technological progress, and that its purpose is, uncritically, “still to provide new products – smaller, faster, different, better” (p. 58). They advocate using the medium of design to “challenge industrial agendas” (p. 58), and provide “a critique of the prevailing situation through designs that embody alternative social, cultural, technical or economic values” (p. 58).

Carl DiSalvo (2009, p.55) has argued that speculative design objects succeed in prompting critical reflection and debate by employing the formal and aesthetic expertise of designers to create imaginary products that “appear like we envisage such ‘real’ products would appear”. Having
established an object of design that looks plausibly consumable, the purpose is to introduce a sense of strangeness, the aim of which is “to encourage the viewers to ask themselves why the values embodied in the proposal seem ‘fictional’ or ‘unreal’, and to question the social and cultural mechanisms that define what is real or fictional” (Dunne & Raby, 2001, p. 63). Beyond critiquing modes of production, speculative design also challenges the idea of the ideal user or consumer, and with that, dominant understandings of need and function. For example, a primary goal of critical design is to grapple with the “complexities of human experience” in order to question “the limited range of emotional and psychological experiences offered through designed products” (Dunne and Raby, 2007). Illustrating this position, the project Designs for fragile personalities in anxious times by Dunne and Raby and interior designer Michael Anastassiades consists of furniture objects designed to acknowledge “the consumer/user as a complex existential being” (Dunne & Raby, 2004-5). For example, Hideaway furniture, includes furniture objects that a person can fit inside, and was designed specifically for those who fear abduction. Rather than dismissing fears of alien abduction or nuclear war as paranoid or irrational, Designs for fragile personalities in anxious times “are concrete examples of a very different way of designing for how people really are rather than how they are supposed to be. They explore how psychological realism can be applied to designed objects” (Dunne & Raby, 2004-5). This critical epistemological stance is a salient context for the following case study as it moves furniture objects beyond physiological and spatial function to consider the role it plays in complex psychological, social, and cultural states.

Earthquakes and furniture have a long-standing relationship: when experiencing a seismic event we are instructed to “duck, cover, and hold” beneath a table in order to avoid injury from falling debris (NZMCD 2012). Within this context a common table undergoes an instantaneous transformation in becoming a shelter thus adapting a new role according to the particular circumstances at hand. While design in this instance may meet the needs of the physical implications endured in a seismic event, the direct experience of an earthquake can be traumatic and enduring, extending far beyond the period of the tremor as an ever-present source of anxiety. The disaster-prone condition in which we reside which, to an extent, is a symptom of our ecological instability, can be understood to contribute to a sense of enduring vulnerability and hopelessness regarding our precarious relationship with the environment. In the face of unpredictable natural disasters such as earthquakes, this sense of vulnerability is heightened by traumatic stressors that may affect an individual’s expectations about the future, challenging their existing worldviews, and triggering a number of cognitive and emotional reactions (Cherry 2009). Of the six basic emotions – happiness, sadness, fear, anger, disgust and surprise – “fear is a dominant emotional reaction no matter what people’s behavioural response is to earthquake shaking” (Lindell et al, 2015). While earthquakes impose immediate physical threats, the psychological reactions induced by exposure to serious seismic events (such as fear and anxiety) often result in long-term suffering in the form of Post-Traumatic Stress Disorder (Werner, C. M., & Altman, I., 2000). According to a study by the National Center for PTSD (2000) up to 60% of the adult population of earthquake victims sampled suffer from PTSD. Furthermore, when an earthquake occurs, the victims have to live with the fear of potential recurrence, or aftershocks, as several earthquakes often occur in succession. “When people live with the fear of a recurrence of a disaster, apprehension and worry are likely to follow” (Bodvarsdottir, I., & Elklit, A. 2004), and this ultimately translates to poor emotional well-being and strained relationships between people and the greater environment.
Chapman’s Emotionally Durable Design (2015) outlines a practical framework that prioritises the need to build resilience into relationships between people and things as a counterpoint to our ‘throwaway society’ (p. 174-5). This “six-point experiential framework” provides useful criteria to evaluate the development of emotional longevity and perceived value in products through the application of narrative, detachment, surface, attachment, fiction, and/or consciousness. These “pathways” (p. 175) provide a way to materially, narratively, and psychologically imbue designed objects with layers of meaning to support durable and resilient relationships. In proposing a shift from physiological to psychological needs and an expanded understanding of the potential role of design in the face of natural disasters, the artifacts outlined in this case study reflect these criteria as well as empathy, humor, creativity, and play in an aim to foster psychological resilience around seismic events.

3.1 Case study overview

This case study consists propositional objects that challenge common notions of functionality through the prioritization of their psychological impact on the end user. The four interrelated projects define a body of creative research currently under development by a co-author of this paper: Seismic Cabinet, Earthquake First Aid Kit, Earthquake Bench, and Seismic Memory Boxes.

As the following descriptions and discussions will expand upon, the designs in this project combine material, cultural, aesthetic, and psychological knowledge to reflect upon the complexity of everyday life in the wake of disasters. In the context of environmental instability, and the new challenges it raises, action research, with its goal of initiating change and novel practice, is an appropriate research approach to the design work discussed here. In such a wicked problem, action research presents a starting point, as according to Muratovski (2016), it “should be based around a problem, dilemma, or ambiguity from the situation in which practitioners find themselves” (p. 193). Further, Crouch and Pearce (2012) observe parallels between design and action research “in its iterative, exploratory nature, and is thus well suited to resolving design problems which typically require review, amendment, adaption and refinement as the initial concept is developed and the problem tackled” (p. 146). Action research is an iterative methodology involving “processes of observing, reflecting, planning and acting, with the end result being the development of new practices” (Crouch and Pearce, 2012, p. 145-46). The following discussions are reflections on design iterations in the ongoing research process.

Figure 1. Seismic Cabinet (Sweet, T. 2015)
SEISMIC CABINET

The Seismic Cabinet celebrates the enduring experience of earthquakes within the context of a material palette representative of a New Zealand housing vernacular. While seismic events expose people to feelings of anxiety and helplessness, the Seismic Cabinet aims to mitigate these negative emotional responses through playful interaction: as the user slides the cabinet door, an analogue “seismic arm” is triggered resulting in a process of perpetual mark-making. The act of mark-making pays homage to the memory of past earthquakes while also supporting an attitude of resilience towards future seismic events.

Beyond the physical interaction with the cabinet, this piece elicits meaningful connection with the user through the considered application of material surfaces that support a visual and tactile narrative enriched by an evolving patina that celebrates age, wear, and interactivity. Accordingly, this emotionally durable approach fosters resilience and sustainability by offering a design solution that promotes an enduring relationship between the object, the user, and time itself.

Figure 2. Earthquake First Aid Kit (Sweet, T. 2016)

EARTHQUAKE FIRST AID KIT

Research shows that the consumption of alcohol increases following seismic events and other natural disasters (CERA 2014). The Earthquake First Aid Kit aims to raise awareness about the threat of substance abuse as it relates to earthquakes, as well as to foster psychological resilience in regards to the day-to-day stress and anxiety associated with the imminent threat of seismic events. The contents within the Earthquake First Aid Kit – a set of single-serve liquor bottles and accompanying shot glasses – are only accessible in the event of substantial seismic motion: upon being triggered by an earthquake, a sensor releases the door making it ajar and availing the contents safely secured within.

According to the quality of surprise and the quirky nature of the interaction enabled by this object, the Earthquake First Aid Kit elicits a compelling relationship. This relationship relies on a conflicting desire on the part of the user who looks forward to witnessing the cabinet come to life, and the understanding that this anticipation requires the trigger of a significant seismic event. Ultimately this object fosters psychological resilience by effectively transforming the threat of disaster into a pleasurable, anticipatory experience.
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Figure 3. Earthquake Bench (Sweet, T. & Sweet, K. 2016)

EARTHQUAKE BENCH

The aim of the Earthquake Bench is to acknowledge the prominence of seismic faults and events upon New Zealand’s collective national identity, and to challenge the negative associations residents have to earthquakes by eliciting a playful, interactive, user-controlled experience that celebrates seismic activity. Designed for public use, the bench measures approximately two metres in length enabling multiple users to engage with the bench at a single time. Formed from a monolithic laminated wood beam, the bench is shaped with a subtle curve where it meets the ground thus allowing for a rocking motion to be experienced. The top surface of the bench is milled with a tactile topographical map of New Zealand complete with major fault lines and markers signifying major seismic events that have occurred over history.

This object elicits emotional attachment by providing users (in this instance, residents of New Zealand) with a meaningful and sensory-rich experience that is contextually relevant and personally identifiable. As a physically interactive artefact, the action generated by the playful exchange between user and object – an implied earthquake simulation – fosters a positive re-association with potentially threatening events, and through this promotes psychological resilience.

Figure 4. Seismic Memory Boxes (Sweet, T. 2016)

SEISMIC MEMORY BOXES

Fear and anxiety are as intangible and uncontrollable as the natural forces that propel earthquakes. The Seismic Memory Boxes have been developed under the premise that “relative to other signs such as emotions, or ideas, objects seem to possess a unique concreteness and permanence” (Csikszentmihalyi, M. & Halton, E., p.14). These objects – intimate, interactive wall cabinets activated
through a combination of digital and mechanical instruments – function simultaneously as alert systems for regional seismic events, and as generators and receptacles for the memories of these events. Each of the four boxes offers a distinct interpretation in meeting the criteria for resilience:

- **Earthquake keepsake generator**

  Utilising a live, internet-dependent data stream from Geological and Nuclear Sciences (GNS Science), the *Earthquake keepsake generator* alerts users of major seismic events (Magnitude 4 or higher) within a specified local range. In the event of that an earthquake strikes, the object prints a “receipt” of the account complete with textual information regarding location, time, and magnitude supplemented with a visual map indicating the origin of the earthquake. The receipt functions as a momento of the event, commemorating the moment and proximity of the disaster. The object doubles as a repository for the momentos produced, thus providing the user with the opportunity to store recallable memories of otherwise fleeting, immaterial events. The *Earthquake keepsake generator* functions to foster resilience by enabling embodied “memories” to develop and accumulate between object and user, while also forging psychological resilience between the user and the environmental phenomenon of recurrent seismic activity.

- **Disaster drawing box**

  This object entails a digitally activated mark-making instrument that replicates a traditional seismometer. In the instance a seismic event occurs a continuous arcing line is drawn as paper feeds automatically over the front surface of the box. The resulting drawn image, devoid of any additional information regarding magnitude, time, or location, functions as an abstract graphic representation of the event: a poetic visualization of disaster that may be appreciated for its beauty or regarded according to the potential destruction that it conveys. Through the ungovernable creation of implicit visual narratives, users are invited to discover, reflect, and reinterpret their emotional response to earthquakes.

- **Seismic candy dispenser**

  The seismic candy dispenser functions to foster psychological resilience through the association of delight with seismic events. During a localized seismic event, a single jelly bean is dispensed, the magnitude of which is indicated according to the colour of the candy dispersed: white: 4+; cream: 5+, yellow: 6+; orange: 7+. The material evidence produced, an ephemeral and sweet treat to be enjoyed, is simultaneously anticipated and feared. Through engagement with this contradictory play the user’s psychological reservations towards earthquakes are challenged, enabling the establishment of a positive re-association to disaster.

- **Tsunami comfort box**

  In coastal regions severe seismic events come with the threat of tsunamis. The tsunami comfort box functions as both an alert system for potential tsunamis and as an object of meditation. In the instance of a severe localized event an audible alarm is triggered. Simultaneously, through the dispersal of water onto a hydrochromic surface on the front of the box, a visual tsunami warning is revealed. Like the transient passing of an earthquake and subsequent threat of tsunami, the image
displayed is ephemeral, remaining visible only until the surface dries. This object fosters psychological resilience and positive object-attachment through the cultivation of a temporal, surprising, and anticipatory relationship between user and artefact.

4. Conclusion
The anticipation of natural disaster, particularly for those living in high-risk regions, is part of everyday life. In this sense, these events become intertwined with the complexity of the everyday, including not just the highs and lows of human experience, but the objects that life is lived with and through. In the above discussion and case study we have sought to demonstrate how the complex experience of those living in the shadow of natural disaster, and ecological instability in general, can be augmented through design that fosters psychological resilience and emotionally durable relationships. The speculative furniture artefacts introduced utilise seismic activity to inscribe empathy, humour, creativity, and play into these events, and invite a shift from physiological to psychological needs in proposing an expanded understanding of the potential role of design in the face of natural disasters.

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