Empathising with Nature: A Heart of Stone or a Stone with a Heart?

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Abstract

Cultural and historical sites nested within natural environments are an important part of an area's identity and heritage. However, presenting information in open, outdoor spaces can be challenging, often making it difficult for visitors to have an engaging and meaningful experience. Technology has the potential to convey the cultural value and raise awareness about the environmental changes that have occurred. Nevertheless, there remains a notable gap in how to achieve this using unobtrusive, seamless technological interfaces. This work aims to address this gap by designing tangible artefacts to induce empathy with nature.

Keywords

empathy, nature, tangible, culture

1. Introduction

The natural world has always been very influential on the culture of an area. Rivers and mountains have shaped the borders between countries, while raw materials like papyrus enabled writing, and others like marble had a big effect on architecture. From a historical perspective, some natural landscapes are connected with important figures, incidents, and rituals and have been the protagonists in numerous myths, folk stories, and songs.

However, navigating cultural sites nested within nature can become uninteresting for young visitors without prior knowledge of the place or immigrants with different backgrounds. Agreeably, the display of information becomes more difficult in open spaces. Attempts of making navigation more impactful include mobile applications [1], and sensory maps [2]. Bertmark et al. [2] created sensory maps and postcards with the goal of making navigation within cultural environments more empathetic. Two of the postcards featured illustrations of trees and stones with eyes, accompanied by the question: "If the stones or the battle oak could talk, what would they tell you?" This imaginative interaction invites visitors to consider the natural elements not as passive scenery but as active participants with stories to tell.

It is interesting to notice that natural landscapes are alive and, thus, they change unavoidably over time, which would make the experience of being in one very different in the past or the future. Changes that can be observed through the human senses include sounds, temperature, humidity, and biodiversity. The reason behind this is climate change. Human land use and activity resulted in an important loss of biodiversity, as underlined by Newbold et al. [3]. Newbold continues that, if strong policymaking is mitigated, these changes could be reversed, and even result in gains in local richness. Therefore, increasing awareness and encouraging action are crucial.

1.1. Research Goal and Research Questions

The goal of this research is to make the navigation in a cultural site more memorable by inducing empathy in people towards natural elements. The motivation behind it is to raise awareness about climate change and provide historical information. The target population includes people above the

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age of 15, potentially immigrants. In so doing, this research project aims at supporting the Sustainable Development Goals (SDGs) set by the United Nations[1], namely, SDG 11 for cultural heritage, and 15 on awareness raising on climate change.

The main expected research contributions of the project are artefacts and advances in knowledge concerning their design. The research methodology followed is Research through Design (RtD), in which *designed activities along with designed artefacts are the chief elements in the process of generating and communicating knowledge* [4]. RtD allows exploration, especially in context-specific situations, where theory does not provide defined guidelines [5]. It has been a preferable method for the creation of artefacts that provide an embodied experience and show different perspectives [6]. A literature review is on-going to map this research landscape. The research questions driving it are as follows:

1. What strategies are used to induce empathy with nature?
2. Can technology be used to induce empathy? If so, what type of technology?
3. What kind of indicators of induced empathy can be used?

2. Background: Terminology

There is a variety of terms in HCI concerning people's interactions with nature. Examples are *connection to nature*, *nature engagement* , *empathy with nature*. These concepts share common concerns, thus it is important to consider similarities and differences between them. In this section, an overview of the two most used terms is provided, *nature engagement*, and *empathy with nature*.

2.1. Nature Engagement

There are many reasons why HCI is concerned with nature engagement. Some of them are learning about nature, protecting it, and exploring views on coexistence with nature from other cultures [7]. Such a variety of views is not surprising, given that *engagement* is a multidimensional concept, that is context dependent [8]. For instance, regarding engagement in learning, Fredericks et al. defined three main types of engagement—emotional, behavioural and cognitive [9]. An effort to define nature engagement in HCI has been made by Webber et al. [8], according to which nature engagement includes "sensing, capturing, learning, analysing, enjoying, shaping, utilising, protecting, and nurturing". This is a broad definition, which appears to overlap with empathy with nature, as analysed in the following.

2.2. Empathy

Empathy is a term widely used in the social sciences. A common ground across definitions is the notion of understanding and sharing another person's experiences [10]. For the scope of this project, we are using the definition of empathy proposed by Cuff et al., which is the following:

> *Empathy is an emotional response (affective), dependent upon the interaction between trait capacities and state influences. Empathic processes are automatically elicited but are also shaped by top-down control processes. The resulting emotion is similar to one's perception (directly experienced or imagined) and understanding (cognitive empathy) of the stimulus emotion, with recognition that the source of the emotion is not one's own.*

As stated above, the term *empathy* is restricted to its affective component, else "the experience of emotion", and the cognitive part of empathy, else "the ability to understand another person's feelings", is represented by the term *empathic understanding*. Factors contributing to empathy are both permanent inclinations and state influences. In the context of empathy with nature, Tam defines these factors as *dispositional* and *induced* empathy with nature, respectively [11]. Induced empathy, Tam continues, is the result of a stimulation.

2.3. Empathy with Nature

Tam mentions that, in environmental psychology, some thinkers have described *empathy with nature* as "the understanding and sharing of the emotional experience, particularly distress, of the natural world" [11]. According to Weber, *empathy with nature* is the same as *environmental empathy* [12].

It is important to disambiguate which natural entities empathy with nature is concerned with. Examples mentioned by Tam include mainly animate nature, except for one example that mentions wind as the empathy-triggering entity. Other researchers in this field have given some attention to empathy with animals and trees. For example, Berenguer has conducted research evaluating empathy with birds and trees [13], and Li et al. have studied empathy with animals [14]. Other researchers consider empathy with nature to go beyond experiencing the emotions of other beings, complying with Hall and Schwarz's definition of empathy [15]. Musitu Ferrer is an example of this, who considers 'damage in the environment' a part of empathy with nature [16].

Therefore, in the field of empathy with nature, the focus is on the following natural elements: animals, plants and trees, processes and natural disaster phenomena. It remains unclear whether Tam's conception of *empathy with nature* extends to non-animated parts of the natural world, e.g. soil, stones, etc. The definition he proposes focuses on the emotional connection with nature as a whole, yet it does not explicitly address entities that cannot themselves experience emotion.

After examining both *nature engagement* and *empathy with nature*, it appears that they are distinct and overlapping concepts. *Nature engagement* refers to interaction and experience and has been used with different meanings, among which are learning, sensing, and connecting. The term *empathy with nature* is used when there is arousal of feelings and potentially perspective taking of another entity. In the scoping review of HCI Research on "Engaging with Nature through Technology" by Webber et al., there is a small body of work relevant to *empathy with nature*, although it is not presented with this terminology. This work is mainly found in the categories "Experiencing nature from other perspectives" and "Natureculture". *Empathy with nature* has been linked with increased environmental concern and conservation behaviour, according to Tam. Thus, this concept is considered more relevant for this work.

3. Preliminary Literature Review

In this section, a preliminary literature review is presented for each research question presented above.

3.1. RQ1: What strategies are used to induce empathy with nature?

The strategies of inducing empathy differ based on the natural elements. Examples follow.

3.1.1. Perspective taking

One strategy of inducing empathy with nature, mentioned by Tam, is perspective taking of nature in distress. This is achieved by showing life from the perspective of the animal, which is facing a difficulty. Most popular means of showing include storytelling, pictures [13], and videos [17]. In this example by Li et al., empathy was induced in preschool children by reading a story [14]. According to the story, animals were living happily in the forest until people arrived, cut down all the trees and left them homeless. After the reading, researchers discussed with the children and guided them to identify the emotions of the animals (empathic understanding) and describe their own feelings. In this story, animals were also portrayed as having human concerns or habits, such as going out with their friends, revealing a second strategy for inducing empathy, which is attributing human-like characteristics.

3.1.2. Attributing Human-like Characteristics

This strategy refers to either adding human features that don't exist in the specific natural element or emphasising the already existing similarities. When it comes to animate nature, an example of

emphasising the similarities with humans is the work by Stepanova et al., which featured synchronising people's breathing with an animal, in this case, a jellyfish [18].

Inanimate nature shares fewer similarities with humans, so a potential strategy for generating empathy with it is adding human features. It has been seen that as human likeness in an object increases, people tend to feel a stronger sense of affinity towards it. However, Mori noticed that once this likeness reaches a certain threshold, empathy is replaced by a feeling of unease or even repulsion, a phenomenon he named "the uncanny valley" [19].

3.1.3. Projection

Since objects lack mental attributes, one approach of empathising relies on projection, as mentioned by Safdari Sharabiani [20]. In this case, a person empathises by imagining themselves in the position of the object, and thus assigning emotions to it through personal experience. Projection could also apply to animate nature. For example, upon seeing a tree destroyed from harsh weather conditions, with branches that lean towards the ground, a person might think: "If I were this tree, I would be very tired.''. In this case, tiredness is the mental state projected in the tree.

A potential approach of this project is first-person storytelling narration coming from a natural element in the chosen cultural site, with emphasis on human features.

3.2. RQ2: Can technology be used to induce empathy? If so, what type of technology?

Different technologies have been used for inducing empathy, classified in virtual reality and unobtrusive.

3.2.1. Virtual Reality

Manney explores how technology could affect people's empathic capabilities [21]. Manney mentions that there are some technological projects, for example, virtual reality games, that have been seen to enhance the storytelling experience, which is, he continues, the most effective medium of cultivating empathy. An example of virtual reality being used to induce empathy with nature is provided by Stepanova et al. [18], with the strategy of breathing synchronisation. In this project, two players enter a virtual environment where they observe two jellyfish and a coral. They soon realise that each jellyfish is synchronised with their breathing. When both players align their breathing, the coral begins to grow.

3.2.2. Unobtrusive technology

When it comes to motivating a connection with nature, especially for children, the potential of unobtrusive pervasive technology is highlighted by many researchers. This is defined as "technology without main attention" [22]. It is preferred in nature interaction as it does not distract people's attention from nature. For instance, Caiola et al. created an unobstrusive tangible game for children [23]. In the sensory quiz they conducted, the sense of sound, followed by the sense of touch, and then smell, was found to be the most stimulating for children, enabling them to recollect memories. Two major design guidelines came up from this research. Firstly, technology should enable a more "engaging, still respectful way of interaction", e.g., children cannot break branches but artefacts simulating them.

The second guideline is that technology must minimise stimulation. The focus of the children should not be on how the technological object works and its capabilities, but rather on the natural elements, e.g., screens are to be avoided as they are distracting. For similar reasons, the focus of this PhD project is also on unobtrusive tangibles, specifically designed for a chosen cultural site. The design process and materials will be informed of future contextual investigations.

3.3. RQ3: What kind of indicators of induced empathy can be used?

According to Newman et al., different validation tools have been developed for empathy starting from the 1940s [24]. These tools target different components of empathy: affective, cognitive or both. New-

man et al. provide a review of empathy assessment measures developed after 1991, dividing them into 3 categories: self-report instruments, behavioural observational methods, and neuroscientific approaches. Self-report instruments include questionnaires in a paper form. Behavioural observational methods include responses to a stimulation, as an image, or performance in a test. Neuroscientific approaches include brain imaging techniques (such as fMRI), methods for assessing central nervous system activity (like EEG), facial electromyography (EMG), and measures of autonomic nervous system activity (including skin conductance and heart rate). All methods have certain advantages and disadvantages. The authors conclude that the plethora of empathy measurement tools available could be interpreted as a need for context and population-specific evaluation of empathy in research. One of the measures not included in this review is the Interpersonal Reactivity Index (IRI) developed by Davis in 1983 [25]. IRI was used in measuring dispositional empathy with nature by Tam.

4. Conclusion

Inducing empathy with nature in visitors of a cultural site has the potential to make the navigation more impactful, while at the same time creating awareness about climate change and the historical events that occurred there. Technology and, more particularly, tangible interfaces are an important tool towards this direction, due to their potential to stimulate the senses. However, they have been less explored. The next steps of this research are a review of the work conducted on navigation in natural sites and museums with unobtrusive technologies and prototyping.

Declaration on Generative AI

During the preparation of this work, the author used Grammarly for grammar and syntax correction. Further, the author used Wordtune and ChatGPT-4o mini in order to paraphrase and reword. After using these tools/services, the author reviewed and edited the content as needed and takes full responsibility for the publication's content.

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