



# The Balance of Attention: The Challenges of Creating Locative Cultural Storytelling Experiences

DAVID E. MILLARD\*, HEATHER PACKER, and YVONNE HOWARD, University of Southampton  
CHARLIE HARGOOD, University of Bournemouth

There is a long history of research exploring how augmented and mixed reality systems can be used to support visitors to cultural heritage locations, but the technological or application specific focus of much of this research means that our understanding of how these experiences work is more of a collection of insights, rather than a coherent theory about how the elements of the experience come together. There is a danger that without developing this knowledge further, our systems will be technologically complex, but experientially simplistic. In this paper we explore how one form of mixed reality experience, digital locative storytelling, can impact the experience of place, and in turn how place impacts the experience of story. We have analysed 33 interviews, and 25 participant observations from 12 story deployments at 2 different sites. Our findings confirm that locative storytelling experiences not only impart information to readers, but also help them to rediscover familiar places and see hidden relationships - especially through time. But our findings also show how the success of the experience is reliant on the balance of attention between the virtual and real (the story and the place), and that issues with navigation, social interactions, and technology are problematic because they can disrupt this balance. Digital locative experiences therefore need to be designed carefully in order to create a balance of attention (for example, by aligning the elements of the story with the topology and character of place). We call this a state of Loco-Narrative Harmony, in which place and story are working together and reader attention is balanced, creating an effect that is greater than the sum of its parts.

CCS Concepts: • **Human-centered computing** → **Hypertext / hypermedia**; **Mixed / augmented reality**; **Interaction design theory, concepts and paradigms**; *User studies*; Mobile devices; • **Networks** → Location based services;

Additional Key Words and Phrases: Locative Literature, Mixed Reality, Augmented Reality, Digital Visitor Experiences

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## 1 INTRODUCTION

Mixed reality systems, where digital technology is integrated with real world experiences, have been identified as an important way in which the public may experience cultural heritage - from digital tours[14] to 3D reconstructions of lost treasures and ruined sites[10].

\*The corresponding author

This work is..

Author's addresses:

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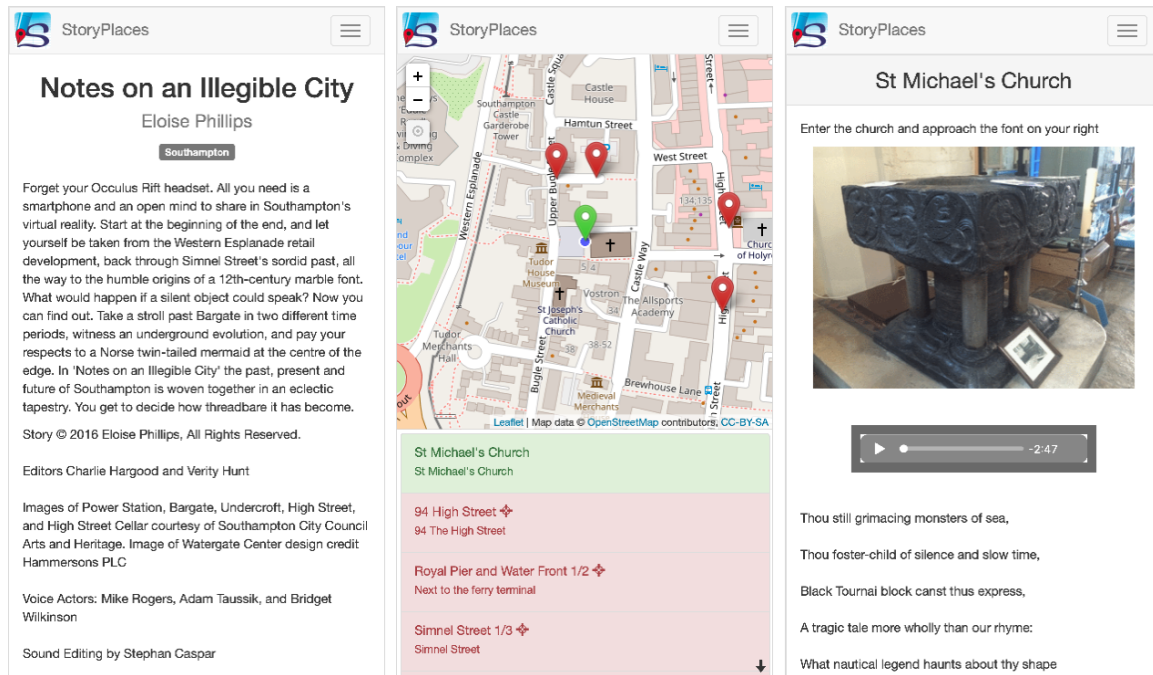


Fig. 1. StoryPlaces running 'Notes on an Illegible City' from the Southampton Deployment

Locative storytelling (also called locative literature[35], or ambient literature[17]) is a type of mixed reality system with a focus on delivering digital content, typically via a location-aware smart device. Content might be authored to be read at a specific location, and may require another to be read before it is shown.

While there are numerous ways for authors to benefit from landscape and environment in their narratives, there has been a relative lack of research looking at how precisely the interactions between story and place affect the readers' experience. Our work is therefore concerned with understanding how locative stories work together with place to create a unified experience for the reader. Our view is that without this knowledge we risk creating experiences that while technologically sophisticated (and benefiting from a novelty factor[57]), do not take advantage of the medium to create a genuinely different cultural experience.

To support our efforts we have developed an open source locative storytelling platform, called StoryPlaces with a simple web front end and powerful backend story engine based on *Sculptural Hypertext* - a constraint-based approach to defining interactive stories that covers a wide range of interactive patterns and story structures[38]. Full details of the system itself can be found in our work on the StoryPlace's platform[26].

Figure 1 shows an example story in the StoryPlaces system. Having selected a story, and read the front page material (left), users are taken to a navigation screen (centre) that shows them a list of pages that they could potentially visit (which also appear as pins on the map). When they walk close enough to the location of a page it turns green, and clicking on a green entry will reveal the content screen (right) where text and images from that page are displayed, and optional audio can be played. Pages have behavior that alters the state of the story, and based on these changes (and because pages have pre-conditions defined in terms of that state) when readers return to the navigation screen the set of pages available to visit next may have changed.

This mechanism allows StoryPlaces to support a wide range of different story structures. In *open* stories readers can see every page on the map from the start, and only have to walk to one in order to read it; in *linear* stories they can only see one page at a time, and that page unlocks the next, guiding them on a journey; and in *branching* stories they are presented with a choice of pages, and physically navigating to one will send them down a particular story route. Other *hybrid* stories are also possible, e.g. a sequence of open spaces that feels like a play unfolding around the reader, or an open set of pages, each leading to a different branching experience [25, 38].

We have used StoryPlaces to engage with writers and readers over a number of different deployments in order to understand how people experience locative stories. In this paper we reflect on two of these deployments, the first in Southampton Old Town, the second around Bournemouth Historic Seafront and Gardens. We worked with authors to create six stories for each, and launched them at different public events (hosted by the Southampton Tudor House, and the Bournemouth Natural Science Society (BNSS)). Our strategy was to take a mixed methods approach to the collection and analysis of participant data, undertaking:

- (1) A quantitative analysis of reading logs across both sites and all twelve stories.
- (2) A qualitative analysis of interviews with readers
- (3) A qualitative analysis of observations of readers interacting with the stories

Two research questions drove our work: how does story affect the experience of place, and how does place affect the experience of story? Our goal was to understand the way in which these two aspects interact in order to inform the design of future locative cultural experiences.

This paper is organized as follows. Section 2 gives an overview of locative literature, how it has been applied in cultural heritage, and previous work to develop design theory. Section 3 explains our mixed methods approach in depth, before Section 4 presents the analysis of the log data, Section 5 the analysis of the interviews, and Section 6 the analysis of the observations. Finally, Section 7 discusses our results, and puts forward our argument for the *Balance of Attention* as a design goal in locative cultural experiences. When balanced, story and place are working in harmony and locative storytelling is at its best, but this balance is hard to achieve and easy to lose. So we discuss the strategies that designers could use to manage this balance, and point to technologies that might help. Finally, Section 8 concludes the paper, summarizes our contribution, and points to future work.

## 2 BACKGROUND

Digital locative storytelling emerged in the 1990s initially in the form of digital tour guides [9]. Systems such as Cyberguide [34] used IR positioning systems for indoor locations, and GPS for outdoors, while GUIDE [14] used beacons to detect proximity to city landmarks. In the 2000s the increased availability of technology saw these initial ideas spread into other application domains. For example, the Chawton House project [62], where children navigated the grounds of an eighteenth century manor house using GPS and discovering stories and activities; or Hopstory [43], an iButton driven cinematic locative story, where visitors activate video in different locations around a brewery in order to see a story progressing from different characters' points of view.

Increases in the power of mobile devices also resulted in experimentation around Augmented Reality (AR) and games [37]. The advent of smart devices brought more mobile experiences, such as Viking Ghost Hunt [48] where players hunt down ghosts on the streets of Dublin, or University of Death [11] where players complete puzzles and treasure hunts around the city of Pullman through the eyes of three different characters.

Locative literature is a broad term that would cover all of these narrative experiences but especially where the emphasis is on storytelling and the connections between text/media and place [35]. Examples include *The iLand of Madeira* [16] which uses located video-fragments to expose the oral culture and traditions of Madeira's main city, Funchal; and *San Servolo, travel into the memory of an island* [49] which created a complex interactive narrative based on a computational version of literary structure.

## 2.1 Locative Literature as Cultural Experience

Bartolini et al. [4] argue that mobile systems are a natural extension of what Bowe [30] calls the move towards “user-centered information dialog” when visiting cultural spaces, and many locative systems have been developed with the explicit goal of helping visitors to engage with cultural heritage artifacts and sites.

Garau et al. [24] identify a number of ways in which mobile technology can be used to support visitors: to create a circuit of more traditional access points such as museums or libraries, to locate educational experiences, and to augment reality with heritage information or media. Locative storytelling fits the last of these definitions. The focus can be on the *content*, such as the Stedr application [20] that supports complex multimedia stories, although the stories are pinned to specific locations as a whole, rather than ranging across multiple locations. Alternatively the focus can be on *navigation*, intelligently creating routes between historic POIs using visitor profiles [23] or thematic analysis of the POIs [2] in order to create an adaptive but coherent experience. Here the story is experienced as a journey, and it is an emergent rather a pre-authored narrative experience.

With historical sources the mapping itself can be a challenge, as in *The Betrothed 2.0*, an app that tells the story of Milan through layered maps reflecting the city at different points in time [7]. In this case the developers needed to overlay historical maps (by Mario Cartaro in 1581, and Artaria and Cagnoni in 1820) with modern satellite imagery - requiring a ‘rubber sheeting’ process to align the older cartography with the modern GIS systems.

Audio is a natural medium for locative storytelling. For example, Pozzebon et al. [50] augment the area of Montagna Pistoiese with the aim of placing real testimonies from locals back into the environment. Alternatively D’Auria et al. [13] create a 3D soundscape and use voice technology to answer direct questions about the environment. In both cases the emphasis is on the sophistication of the delivery (for example, placing the audio accurately so that it guides as well as informs) rather than on the complexity of the interactive structure.

Locative serious games have also been used in cultural heritage, with genres from simple puzzle games to exploratory 3d worlds [39]. Generally, it has been argued that bringing multimodal media into exhibition spaces increases engagement and enhances the experience [33], and that immersive VR technology can increase the involvement of visitors, and improve the retention of knowledge at the end of their experience [1].

Perhaps for these reasons Augmented Reality (AR) has become very popular for digital heritage applications. For example, TowerAR allows visitors to Pisa to view historic buildings as they would have appeared in the past, most notably to see the Leaning Tower begin to list as it grows floor by floor over the period of its construction [18]. AR can also be used within a static context, for example a TV/tablet hybrid was used within the ruined Koldinghus chapel in Denmark to create a portal through which visitors could see the chapel as it once was [36].

AR interfaces are also often combined with storytelling, from the early work in the area, such as the Augorscope device deployed at Nottingham Castle in the UK that allowed visitors to interact with virtual characters in-situ [58], to more recent work in the SPIRIT project based at the Saalburg Roman fort in Germany which transposes video sequences of actors performing a scene into a real world visiting experience [60].

Papagiannakis et al. provide a useful overview of mixed reality methods for virtual museums, highlighting a number of alternative interaction and tracking technologies such as gestures, voice command, back projection and touch screens [47].

## 2.2 Frameworks for the Design of Locative Cultural Experiences

The challenge of designing for locative and AR spaces is well acknowledged, and there have been several efforts to understand how locative cultural experiences work and what affects their success or failure.

Rubino et al. reported mixed success with using location-based games for museum visits, identifying some negatives - such as participants suffering from fatigue, as well as positives - such as children connecting historic details with narrative events [56]. Whilst in a study of family groups interacting with a tablet-based locative narrative in a space science center, Rennick-Egglestone et al. point out the complex interactions between family

members, the site, and other visitors - and how these ultimately frame the visiting experience [53]. Hornecker identifies a problem with mixed-reality environments themselves, which she terms *indexing*. This is where visitors are trying to simultaneously make sense of both a real and virtual place. Hornecker argues that technology that is *spatially contextualized* and *physically embedded* makes indexing easier and thus results in increased engagement from participants [28], although she stops short of suggesting ways in which this can be achieved.

Karapanos et al. undertook a study to identify the impact of reading narratives on location [31], contrasting original locations with physical cues in the environment, with alternative locations with a similar atmosphere but no cues. Their results suggest that while both work well for emotional involvement in the story, it is the physical cues that create a sense of immersion and lead to enhanced mental imagery. Like Hornecker this suggests that place and story need to be designed to work together.

Despite this work there has been a reticence to propose specific design rules, and existing work in developing frameworks for locative experiences has tended to focus on the attitudes and skills required [63] or the process of design instead. A user-centered design philosophy is popular (e.g. an agile approach using personas, scenarios and narrative scripts) [54], for example Díaz et al. talk specifically about the need to bring together design thinking and software engineering approaches in order to create practical deployments that are still effective and emotional [15].

The PIL project suggested a framework for developing museum visits in the form of a process that included content preparation, user interface design, user modeling, and group interaction [32]. Alternatively, PLACE is an interactive approach to designing location-based experiences that consists of six principles [8]: “start small and scale up the fidelity, treat participants as co-designers, test in a representative space, focus on activities more than interfaces, respect authentic social experience, and represent time authentically”. None of these approaches or frameworks captures the way in which location, interaction, and narrative work together to create an experience, instead they provide value by creating a design environment in which successes and failures will be spotted early.

Benford et al.’s work on Interaction Trajectories describes the complex routes that participants take through hybrid spaces [5]. Trajectories capture the journey through space, time, roles and interfaces, and highlight important transitions and traversals. Benford et al. talk of capturing ‘craft knowledge’, the experiential knowledge of artists, designers and performers that is seldom formalized. Alternatively, Benyon et al. argue that rather than seeing mixed reality experience as a sequence of transitions between spaces it is useful to consider visitors to be in a *blended space* which draws on aspects of both the real and virtual but has a character of its own [6].

Other researchers have started to distil craft knowledge. Papagiannakis et al. discuss using mixed reality in the museum context, highlighting aesthetic considerations such as the authentic appearance of light, correct dynamic range, and the lifelike appearance of virtual narrators [47]. Another example of craft knowledge can be found in Nisi et al.’s reflections on the iterative design of the *Seven Stories* locative experience [42]. In their work they noted a tendency for readers to find the narrative fragmented, and to struggle to situate story elements in the real world environment. They solved these problems with a narrator that can direct the readers to look in particular spots, and who provides an overarching coherency to the storytelling; and by using physical markers to situate readers more precisely than GPS and give them active objects to look for in the environment.

Our own work is about finding practical ways in which physical and virtual spaces can be blended, and we share the goal of capturing craft knowledge that will help future designers of locative cultural experiences. However, our work concerns narrative design (rather than AR or games), and is rooted in understanding how story, interaction, and location come together to form a visitor’s experience of place.

### 3 RESEARCH FRAMEWORK AND METHODOLOGY

The challenge of evaluating digital heritage encounters is that we are trying to analyse a ‘transmedial processes of sense making spanning visceral, social, and cognitive domains’ [22] such that narrow analyses of usability or navigation are not sufficient. We have therefore taken a broader mixed methods approach in our work (using log

| Title                              | Author                 | City        | No. Pages | Structure |
|------------------------------------|------------------------|-------------|-----------|-----------|
| <i>The Destitute and the Alien</i> | Tory L. Dawson         | Southampton | 21        | Linear    |
| A Walk In The Park                 | Tilly Edgar Thompson   | Southampton | 5         | Open      |
| Notes on an Illegible City         | Eloise Phillips        | Southampton | 12        | Open      |
| Six Stories Of Southampton         | Megan Humphrey         | Southampton | 9         | Open      |
| The Tale of Molly DeVito           | Emily Derrick          | Southampton | 9         | Linear    |
| The Titanic Criminal               | Charlotte Brind        | Southampton | 10        | Open      |
| <i>The Pathways of Destiny</i>     | James Cole             | Bournemouth | 81        | Branching |
| The Bournemouth Triangle           | C.J. Carter-Stephenson | Bournemouth | 55        | Linear    |
| Seeker of Secrets                  | Laurence Russell       | Bournemouth | 31        | Open      |
| Naseem - Pharaoh's Attendant       | Damian O'Vitch         | Bournemouth | 11        | Linear    |
| Connections                        | Jane Skellet           | Bournemouth | 9         | Open      |
| Butterflies                        | Andy Cochrane          | Bournemouth | 11        | Linear    |

Table 1. The Southampton and Bournemouth Stories

analysis, participant interviews, and observations) applied over two different story deployments (Southampton and Bournemouth). In this section we will explain the deployments and stories in more depth, and then describe our data collection and analysis methodology.

### 3.1 Story Deployments

As part of StoryPlaces we worked to launch locative stories to members of the public in two separate deployments:

- *Southampton Old Town* where we engaged with PhD and MA Creative Writing students to create six experiences set around the old part of the city, with the brief to create stories that reflected Southampton's history as a place of migration over many centuries (especially to the New World). These were launched and data collected at a public event at The Tudor House in Southampton in the Summer of 2016.
- *Bournemouth Natural Science Society (BNSS)* an organization whose roots as a Victorian society of gentlemen collectors has led in modern times to an eclectic collection of natural history artifacts, from geological samples to a menagerie of stuffed birds and mounted insects. We worked with the society and local writers to create six stories, with the brief of exploding their collection into the surrounding town. These were launched and data collected at the Bournemouth Arts By The Sea festival in Autumn 2016, and at a second invitation event at the BNSS in the Spring of 2017.

For both deployments we also commissioned a professional writer to produce a more substantial piece of work that could act as a tent-pole story at the launch events. Table 1 shows the stories, with the two we commissioned shown in italics. The majority are short story length (two to three thousand words), as our goal was to create an experience that took around one hour, and was a short walk. Most authors chose a linear or open structures, probably for reasons of simplicity, with only our second commissioned author creating a branching narrative.

The Southampton writers were asked to create stories that referenced Southampton's past as a hub of migration and the majority of these stories were historical reflections on the city or historical thrillers. Sometimes the contrast between current and past locations was explicitly discussed (e.g. '*A Walk in the Park*', a reflection on the past lives of memorable buildings), and sometimes the text was set entirely in a fictional historical world (e.g. '*The Destitute and the Alien*', a murder mystery in the style of a Victorian page-turner).

The Bournemouth writers had a different brief, based around the eclectic collection of the BNSS. As a result their stories took a wider variety of forms, from treasure hunts (e.g. '*Pathways of Destiny*', a children's story

about a small boy helping an alien visitor to collect information on Earth's past), to collections of flash fiction (e.g. 'Connections', a mosaic of poetic shorts about the spirit of place).

### 3.2 Data Collection and Analysis

Both events were advertised through the host organizations and we were present at a stand during the events to talk to members of the public about the project. StoryPlaces runs on any GPS enabled smart phone using the web browser, so in many cases readers used their own devices. If they agreed one member of the project team would accompany them, taking a formal set of observations while they walked the route and read the story. Readers who returned to our stand were asked if they would participate in a short interview.

**3.2.1 Data Logs.** StoryPlaces stores a limited log of user activity (which users agree to when accessing a story for the first time). The log records which pages have been read and when they were accessed. Users do not log in, so user identification is based on browser instance. We do not store location for reasons of privacy (for example, if the reader were to open the web app in their own home), but many of the pages have a location associated with them, and we can use this to infer some information about the readers' movement.

Location-tracking is a well established methodology for visitor studies, and our analysis of read pages (and their locations) fits the trail-based approach [40]. However, our research objective is primarily concerned with the reader experience itself (rather than their use of the space). So in our work the log data is used to demonstrate that readers have properly engaged with the system, and that they have had different experiences and followed different routes. This then provides a foundation for the main qualitative aspects of the work.

**3.2.2 Reader Interviews.** Interviews were semi-structured, typically lasting 15-20 minutes, and typically occurring within a couple of hours of the reader completing their experience. The protocol was as follows:

- (1) Provide the Reader with an information sheet and consent form
- (2) Begin the recording
- (3) Interviewer introduces themselves, and explains the purpose of the interview
- (4) Interview progresses through the following high level questions:
  - (a) *How did reading the story in location effect your experience of the story?*
  - (b) *How did reading the story impact your experience of the places you visited?*
  - (c) *Has your experience made you think differently about [Bournemouth or Southampton]?*
  - (d) *What do you think are the advantages and disadvantages of this kind of storytelling?*
- (5) Reader is asked if they would like to make any final comments, before the interview is ended.

As this was semi-structured, the interviewer was permitted to explain the questions further if asked, and also to follow up on answers with further questions to clarify the views expressed by the readers. After the events the interviews were transcribed, and an inductive coding was carried out to identify themes and sub-themes in the discussion. This was an iterative process, with themes evolving and changing as each interview was analysed. Appropriate quotes were recorded against each theme, and a record of the number of occurrences was also made.

**3.2.3 Observations.** The Observer was provided with a clipboard, notepaper and map, and made a written record of observations during the experience itself. Observers were free to make any notes they wanted, but we gave them suggestions of what they might look for, including: times the reader stopped or was distracted, any comments or obvious reactions, how easily they found pages or if they got lost, time spent in locations, reactions to the route of the story, any discussion with others, how plans were made, and any questions to the observer.

After the events the observations were collected and an inductive coding was carried out to discover the most significant themes. We then undertook a second deductive coding using the themes and sub-themes that emerged from the interviews. In this way we can see whether the experience as self-reported by the Readers matches their actual behaviour, and can link concrete examples of that behaviour to those higher level perceptions.

## 4 ANALYSIS OF THE DATA LOGS

In this section we present a quantitative analysis of the data logs across the two events in order to contextualize our qualitative investigation. We first present the overall picture of engagement, and then look in more detail at one of the stories as an example and to show the variety of navigational routes experienced by readers.

### 4.1 Overall Engagement

During the two days of the Southampton Old Town and Bournemouth Natural Science Society events, there were 75 readings, where a reading is a unique device opening any one of the twelve stories. However some of these readings were abandoned in the first few pages. Table 2 shows the data on overall engagement.

|                                       | Southampton | Bournemouth | Total |
|---------------------------------------|-------------|-------------|-------|
| number of readers                     | 27          | 14          | 41    |
| average number of readings per person | 1.77        | 3.07        | 2.22  |
| readings                              | 49          | 25          | 74    |
| stopped after first page              | 6           | 2           | 8     |
| stopped after second page             | 3           | 2           | 5     |
| viewed story synopsis                 | 85          | 141         | 226   |

Table 2. Reading Statistics

If we exclude all the people who read no further than two pages, then we have an effective sample of 61 valid readings. The data logs show that 8 of the non-readers did not move from their start location (several nodes were available without moving from the start). This suggests that 8/74 (10.8%) of readings were exploratory, with readers opening up stories to see how the app worked, or to see what the story was like.

Table 3 shows the data collected for each story across both deployments. The number of pages read may be lower than the total pages because of reader choices (in branching and open stories this is particularly noticeable, for example in *'The Pathways of Destiny'* readers make a choice which divides the later parts of the story into seven parts) and can also be higher if they revisit and reread pages (as appears to be the case with *'Connections'*).

| Title                              | No. Readings | Pages Read (Total Pages) | Time (min) | Distance (km) |
|------------------------------------|--------------|--------------------------|------------|---------------|
| <i>The Destitute and the Alien</i> | 2            | 16 (21)                  | 84         | 4.0           |
| A Walk In The Park                 | 12           | 5.8 (12)                 | 27.4       | 0.48          |
| Notes on an Illegible City         | 14           | 10.8 (12)                | 54.1       | 0.92          |
| Six Stories Of Southampton         | 5            | 5.7 (9)                  | 55.7       | 1.0           |
| The Tale of Molly DeVito           | 11           | 7.8 (9)                  | 77.8       | 0.99          |
| The Titanic Criminal               | 5            | 9.3 (10)                 | 110        | 1.27          |
| <i>The Pathways of Destiny</i>     | 8            | 18 (81)                  | 55.7       | 1.42          |
| The Bournemouth Triangle           | 3            | 28.7 (55)                | 28.7       | 2.54          |
| Seeker of Secrets                  | 4            | 16 (33)                  | 100        | 1.15          |
| Naseem - Pharaoh's Attendant       | 4            | 5.7 (11)                 | 27.7       | 0.49          |
| Connections                        | 1            | 10 (9)                   | 89         | 1.84          |
| Butterflies                        | 5            | 5.8 (11)                 | 30.3       | 0.43          |

Table 3. Log Data: Average Pages, Time, and Distance for Each Story



In calculating time taken we excluded a number of clear outliers, most likely caused by participants taking lengthy pauses between pages, or even closing the final page much later in the day. When calculating distance travelled we used straight line distance. The data shows that the majority of readings took between 30 and 90 min, and in that time readers travelled between 0.5 and 2.5 km. Meaning that in the majority of cases our goal of creating a roughly one hour experience over a short walk was achieved.

#### 4.2 Example Story: Notes on an Illegible City

It is impossible to give a full description of all twelve stories, so instead we will look at a single illustrative example<sup>1</sup>. The most popular story was ‘*Notes on an Illegible City*’ by Eloise Phillips, with 14 valid readings. It is an example of an open story: once one of the two starting pages are read the readers can choose the order in which the others are encountered. The story itself is a collection of poetic musings contrasting historical and modern locations in Southampton Old Town. Figure 1 earlier showed StoryPlaces displaying the story.

The log analysis of the various paths taken by participants shows that although there are some common routes taken readers do take a variety of routes through the story as well as choosing alternative pages to begin their experience (here there was choice of two). The logs also show that most of the readers (10/14) did not read the final page, which is activated once all other pages have been read (not a problem given the mosaic and poetic nature of the story).

Our analysis of the data logs shows that all of the stories we deployed found readers, and that within each story there were multiple routes taken through the pages and physical space. This is evidence that the interviews and observations are based on a variety of different experiences and any conclusions are therefore more likely to generalize to different stories and different places (although we still have the limitation that all of our participants used the same StoryPlaces system).

### 5 ANALYSIS OF THE INTERVIEWS

In total, we recorded 25 interviews in Southampton, and 8 in Bournemouth. Our inductive coding resulted in the identification of three themes: (1) Learning - where participants gained knowledge or insight from experiencing a place in an historical or fictional context, (2) Appreciation - where participants experience of the place was altered by the narrative, and (3) Attention - where participants’ described how the focus of their awareness moved between story and place, and in some cases became elevated into a new type of experience.

Table 4 shows the themes, and the six sub-themes, with example illustrative quotes for each (participants are identified by a number *P*). The following sections describes each theme in more detail. Where a theme is multi-faceted we have tried to explicitly indicate the facets by using italics within the text.

#### 5.1 Learning

Many participants described how they had learned about the place where the stories were set through the reading. While some comments were about specific events or facts (which we allocated to the sub-theme ‘Specific’), others were more sophisticated, and alluded to a more holistic appreciation of the place, its character, and the changes it had endured over time (we coded these as ‘Relational’).

*5.1.1 Specific.* Participants mentioned being struck by *Specific New Facts* about the places they had visited during their readings, or general information about the cities. However, their recollection could be hazy:

“I definitely did learn one or two things. So, like the Queen’s carpet that I’ve already mentioned, it was named something else. And, that’s why the Tudor House was set up, I didn’t know that was there.” [P11]

<sup>1</sup>Details of all twelve stories (and links to read them) can be found at <http://storyplaces.soton.ac.uk>

Table 4. Interviews: Themes, Sub-Themes, and Example Quotations

| Theme        | Sub-theme                     | no. | Example Quotes  |
|--------------|-------------------------------|-----|---|
| Learning     | Specific                      | 9   | "I learnt more... for instance, Symes Cottage being deliberately demolished in way for urban development." [P8]   |
|              | Relational                    | 15  | "I think that gets you thinking about perhaps that landscape, those gardens, in the past, and different versions of those gardens. People who have populated them in the past etc. Sort of gets you thinking about all of the different worlds that have been folded into them" [P16] |
| Appreciation | Discovery                     | 8   | "We were certainly looking at things that we wouldn't have bothered looking at ... I only noticed it because we were reading the story." [P12]  |
|              | Rediscovery (of the Familiar) | 15  | "I think it makes you stop and look, when you're walking around you tend not to... But when you're stood there you do tend to actually look at what you're doing, rather than marching past." [P19]   |
| Attention    | Harmony/<br>Fusion            | 53  | "You're physically there at the location that's being mentioned. You almost feel like a sort of special part of it [...] It sort of - it made it almost a little more real." P[11]  |
|              | Discord/<br>Disjunction       | 33  | "there were a couple of them where it would be talking about things in the scenery that were no longer there ... you lost the immersion at that point, it kind of pulled you out of the story a bit." [P22]   |

When the facts were more precise they tended to be information that the participant already knew, these *Recollected Facts* were reinforced by the story.

"I mean it would have been educational to a lot of people to know that was a home oak. They may not have known" [P23]

Very few participants spoke about specific pieces of information that they had learned through the stories (only 9 instances across the 33 interviews), which indicates that this is not a particular strength of locative storytelling. This echoes the view of Falk and Dierking, who suggest (in a museum visiting context) that much of the meaning of locative experiences is in the 'consolidation and reinforcement of previous understandings' [19]. Perhaps for this reason, more memorable for our participants was the way that the stories allowed them to see the relationships between places, and across time.

**5.1.2 Relational.** Relational comments were about how the story enabled the participants to experience the cities from another perspective, and in particular to *Make Links* between modern and historical elements.

"There were a lot of different narratives there, both, sort of, historical and fictional and different types of - and how those, kind of, are overlaid with the present. It's interesting. It makes you think about all different layers of reality." [P4]

Such comments were less focused on specific historical details or elements, and more on the general *Sense of History*, and the realization of the complexity of the places and the changes that had occurred there over time.

"like down this bit where it's, sort of, talking about walking through here at night ... gives you a better appreciation of maybe how things have changed, in the process of changing." [P2]

The narrative seemed to be an important factor in making these connections naturally, leading to a more accessible experience.

"it adds something to, it's a step up on walking around, reading the plaques definitely ... it's more - it was more of a narrative, and less of a history lesson." P[7]

Some participants also discussed how experiencing the narrative in location made the events feel more *Real and Relevant* to them.

“You’re actually there at the spot ... you sort of see this one person, sort of, like, and her father was, you know, killed on this boat and it’s, sort of, like, the emotional toll it took on one particular person ... It makes it a bit more real, doesn’t it, I think?” [P14]

In one case it also led to a participant evoking *Narrativity* as a quality of place.

“I think it’s a really good way of encouraging people to pay attention to a new environment, and to also think about the stories that go into making that environment. Not just histories in the conventional sense of a timeline of events, but rather the narrativity of the history” P[16]

Thus learning about events, places and their relations was seen as a reflective act, a dialogic interpretation of place [61], mediated by the technology.

## 5.2 Appreciation

While it’s clear that the participants did learn about the places the stories were situated in, equally important was how the stories impacted their *Appreciation* of those places. We noted two distinct sub-themes: *Discovery* where participants became aware of a building or place they had not noticed or been to before, and *Rediscovery* where participants saw familiar surroundings in a new light sparking renewed interest.

**5.2.1 Discovery.** As these were urban spaces participants’ existing relationships with them were based on their usual activities (typically shopping or eating out). Taking part in the stories gave them a new way to experience place, and as a result they explored with new eyes, and *Revealed the Invisible*, noticing things that had previously been invisible to them. This has been described in the literature as the ‘the hidden world emerging’ [45] or the recreation of ‘forgotten places’ [3]. These revealed elements could even be significant landmarks, especially if they had little role in their everyday world.

“I’ve been at least once to have a meal at Coriander Lounge opposite and, I don’t think I’d even noticed there was a church opposite.” [P11]

The stories also drew attention to *Hidden Locations*, that were invisible in a more literal sense, giving the participants a greater or extended awareness of their environment.

“I didn’t know about that vault underneath, so, yeah, that’s interesting.” [P5]

The stories also gave participants a sense of *Grounded History* by connecting their general sense of the history of the cities with specific elements within it. For example, linking an otherwise unremarkable residential street with the Titanic disaster (as the place which many of the crew members called home).

“Well, I think we knew a bit about the history anyway, about the Titanic and docks and stuff. I suppose I wouldn’t have connected Chapel Road with it.” [P12]

**5.2.2 Rediscovery (of the Familiar).** The experience also gave participants the chance to see familiar sites and places in a new way.

“It affected how I saw the surroundings. So it made you appreciate them, it made you think about them.” [P31]

Sometimes this was a high level perception of a *Deeper History*.

“It was a totally different perspective on the places ... I’ve never seen it in the light of a, kind of, you know, almost like an archaeological sort of site - a palimpsest of layers of history and fiction and stuff that’s been happening at that site, in that way, at all.” [P4]

However, it could also be quite specific, for example changing a participant's perception of a specific place by making them consider how it would have appeared to other visitors in the past and in *Different Contexts*.

"So, the courtyard that was behind Enio's, I definitely had this sort of, 'Oh, yeah, the walls would have been taller at this point ...' Or, 'that's lended a sinister little air to this quite, otherwise very nice place that I walk through quite often.'" [P11]

Or simply a new feeling or *Sense of Place*, experienced with different eyes.

"it's a town that has been quite fully landscaped, and planned, planned for leisure and pleasure. In a way, reading such a dark story in that environment is in itself quite a jar I think." [P16]

Taking part in a digital experience also gave participants implicit *Permission to Explore*, taking them through social barriers that while weak, were enough to turn them aside in their everyday lives (such as public places where they had previously had no reason to visit).

"I think there were some places that I hadn't seen before, and it was actually nice to walk into the church and look at the font and walk into the space, rather than just be outside..." P[5]

### 5.3 Attention

Although the experience clearly helped some readers to gain new knowledge about the locations, or helped them to see those locations in new ways, by far the most significant theme in our analysis was concerned with the relationship between story and place, and the balance of the participant's *Attention* between the two.

Our sub-themes here represent two opposing reactions. Participants were enthusiastic about the experience when recalling situations where their attention was balanced, and the locations and story were working together in *Harmony*. However, they reported being distracted and feeling dissatisfied when the locations and story where in *Discord* and fighting for that attention.

**5.3.1 Harmony.** Harmony was the term we used for occasions when participants described the story and the place working together, at these times - when their attention was in *Balance* - their vocabulary changed, and they used extremely positive words about the experience.

"I thought the fact that it was sort of in front of you as you're reading it was sort of really powerful" [P7]

"When it did connect, yes, it was a very enjoyable experience. Very uplifting and special. Yeah, a special moment." [P6]

These 'special moments' seemed to bring the story to life, and caused participants to feel *Immersion* in the narrative, and a part of that story.

"It makes everything feel more real to you. You identify, you sort of slip into the fictive world, as it were, much more easily, I think, mentally, and you kind of stay in there. I found that a really fascinating experience" [P4]

The mechanism for this phenomenon was not complex, but rather a *Concordance* between the story and the reader's embodied presence in the physical place. This could be as simple as audio cues.

"there was one page where it was talking about the miniature golf course and, well I mean just for the audio we could hear the golf balls going in the background. It kind of immersed yourself in the story" [P22]

And could lead to the participant *Imagining* scenes unfolding in their immediate environment.

"there was a point by the cenotaph where he's talking about people lifting like children onto the lions and it's much easier to picture it in your head." [P22]

Navigating between the pages of the story in different locations necessarily ended these special moments, but the participants didn't seem to object to this, and instead commented on how experiencing special moments also changed the character of these other more mundane parts of the experience, creating a *Space for Reflection*.

"I personally liked all the walking and the time between, thinking, mulling over things ... just looking at what's going on round about you, or having conversations reflecting on it." P[11]

Special moments therefore seem to create a deeper engagement with the overall story, with participants reflecting on what they had experienced, and looking forward in *Anticipation* to what might come next.

"you're thinking about what you've read and you're looking at the places in this new light - but, also, it's sort of like punctuation. So, you have the moments of the story and then you have the time of reflection, and it actually, and you do think about what you've just read as you're walking to the next one and you're also anticipating as well." P[4]

"So this would be a wonderful example of deliberately enforced quiet time between one event and the next, where the reader actually takes time to think about what they've read and reflect on what they might see next " P[8]

However, the active seeking of special moments also created a *Tension* between the story and physical worlds.

"I found myself stopping from reading the story a lot. And, kind of, looking up and trying to find the bits that were mentioned in the story." P[11]

"You wanted to, sort of, keep looking up as you were reading it." P[7]

This led to problems when those hopes and expectations were not met, or were actively confounded by clashes between the story and the place.

**5.3.2 Discord.** Discord was the term we used when participants described the story and place fighting for attention, these times appeared to be the opposite of special moments, and negatively affected the experience. Examples included occasions when the participant was actively looking for connections, but experienced *Frustration*.

"it wasn't clear exactly where in the surroundings the inspiration was coming from. Whether we were looking at a particular building or, in some cases, that wasn't very clear." [P6]

Or times when they were forced into periods of *Absentment*, leaving the story world for too long a period.

"it was about a five/six minute walk just to the next location and it just felt odd to have three pages in one and then the long time difference... you're almost falling out of the story " P[22]

At these times their attention was too focused on the physical space, leaving participants wishing that there was more story to engage with.

"Oh, we've got to do this to get to the next bit, so, I think maybe if the story took-was a journey, or a character took this route or something, then we would have, sort of, engaged with the actual route more." [P12]

*Conflict* between the navigation in the real space and the navigation of the story also caused problems. At these times the place was the priority for participants, but the system prioritized the story, leading to uncertainty about destinations, and how these matched with real-world plans.

"I think that was to do with where we want to finish, rather than what would be a good walk to do this story to. And, without really knowing the story, it's hard to make a decision about what a good route might be." [P6]

A major cause of discord was the presence of *Distractions* in the physical world, leading to participants focusing their attention too much on the place, and for reasons that were irrelevant to the story.

“It goes ‘oh hole number eight looks like this thing on my planet,’ so you automatically want to sort of go over and look at the holes to see what they’d be like... and half of them were hidden behind people.” [P29]

“Not as much as I thought they were going to, I think. But that might have been partly because the kids were whinging a bit and being a bit noisy.” [P12]

Participants also described the *Cognitive Effort* of navigating a complex physical world as a distraction.

“When you’re reading a book, you shut out the outside world, whereas this, you’re, sort of, like, busy avoiding cars and trying to work out which way you’re supposed to be going next, so, yeah, that was a slight minus.” [P14]

However, the imbalance of attention could also go the other way. In these cases the participants’ suffered from *Absorption* as their focus moved to much towards the story, and they found it difficult to engage with the places.

“Part of the problem is, that when you have to read this thing it’s actually quite difficult to engage with the location you’re stood in. And, I think we did find ourselves spending a lot of the time with our head firmly on the phone, and not really looking at the location” [P6]

This also led to participants feeling *Self-Conscious* about reading on their device in public, which they felt cast them in an unflattering light.

“But, my negative is, I felt quite disengaged from my environment. Because, I was standing in a place that felt a bit in the way. Reading, like, reading my phone ... Like, we were like that person that you’re trying to walk around on the pathway. But, is like always in the way. ‘Cause, they’re not looking where they’re going, ‘cause they’re reading Facebook, or something.” [P5]

“You know, you’re walking down public streets, which are busy, and stopping in the middle is a bit, it’s a bit teenage, Pokemon Go-ish” [P31]

For some participants this discord built to the point where the overall experience was a failure, expressed in terms of *Disconnection* between place and story, or a lack of emotional connection.

“it didn’t tie it together in terms of a narrative, a sequence or anything like that, for me.” [P11]

“I expected it to - I expected to feel something more strongly than I did” [P12]

## 6 ANALYSIS OF THE OBSERVATIONS

We conducted 20 observations of readers engaged with the Southampton stories, and 5 of readers engaged with the Bournemouth stories. We undertook further inductive coding of these notes and identified three new themes, (4) Navigation - how reader’s orientated themselves and moved around, (5) Group Reading - how they read and communicated together, and (6) Technology - issues they encountered with the device and software. We also undertook deductive coding using the first three themes from the interviews. As you might expect the new themes were focused on the reader’s observable behaviour rather than their cognitive or emotional reactions, highlighting the need for mixed methods in order to construct a more complete picture.

Table 5 shows the themes and sub-themes, with instance counts, and example illustrative quotes for each (observations are identified by a number *O*). The following sections describe them in more detail.

### 6.1 Navigation

Navigation is a key part of any located experience and we found evidence of participants wrestling with *Directions* and trying to find their way. For example moments of confusion around how to get to a location:

“Took a moment to orientate ourselves, reader a bit worried about getting lost.” [O16]

Or figuring out if they are doing the correct things for the story:

Table 5. Observations: Themes, Sub-Themes, and Example Notes

| Theme         | Sub-theme           | no. | Example Notes  |
|---------------|---------------------|-----|--|
| Navigation    | Alternate to Map    | 7   | “Made frequent use of street signs to aid navigation” (O4)   |
|               | Directions          | 18  | “Started a little lost, headed south instead of north. Struggled to orient?” (O5)  |
|               | Shortest Route      | 8   | “One Person took the lead - trying to cover it in the shortest route” (O13)  |
| Group Reading | Reading Dynamics    | 28  | “Mostly read individually/in silence.” (O3)  |
|               | Social Interactions | 11  | “While reading: expressed enjoyment in the story, reading out [excerpts]” (O1)   |
| Technology    | Usability           | 28  | “Do we have to read it or will it speak to us?” (O6)   |
|               | In the Wild         | 14  | “worried about battery” (O18)  |
| Learning      | Specific            | 3   | “looking at the info sign in the square while she carries on reading.” (O15)   |
|               | Relational          | 3   | “On walking discusses how the city has changed” (O13)  |
| Appreciation  | Discovery           | 2   | “this is a good way to see bits of the city you wouldn’t normally see” (O16)   |
|               | Rediscovery         | 5   | “In one location notes how it’s pretty + instructs child to imagine it in the past” (O13)  |
| Attention     | Harmony/Fusion      | 18  | “Lined up in-app pictures with real locations” (O4)<br>“Wow, that is really interesting - makes it very powerful. Standing where characters were standing. It’s fantastic” (O16) |
|               | Discord/Disjunction | 25  | “Expressed confusion at location not matching the story” (O5)<br>“Mum is concerned about proximity to roads” (O19)   |

“Along St. Michaels Street - wondering if there is a right way to ‘get’ to the story.” [O6]

Frequently we observed participants resorting to an *Alternative Map*, whether other navigation software (such as Google Maps), or physical aids such as street signs or physical map boards.

Identifying *Shortest Routes* was also important to participants, this was clearly the biggest factor in choosing how to explore the story, although participants were sometimes concerned that this was might not be the best way for them to choose where to go:

“confused about choice of where to go for next - [desire] for closest though unease at choosing for [superficial] reason” [O13]

## 6.2 Group Reading

The importance of the social context of locative experiences has been noted before [53], and while it was not mentioned in the interviews, it was observed to be an important aspect of the experience.

We observed many different *Readings Dynamics* representing different ways in which people could engage with the experience, some as individuals, some as groups. Some groups where also clearly led by an individual who might interact on behalf of the group:

“Dad goes to Canute [chambers] to activate green button. Walks back with text” [O19]

Other groups were more collaborative, and shared the experience more equally:

“Read together, shared device, mostly silent while reading.” [O7]

“Crowd round phone to look at phone and play audio (on speakers)” [O11]

The *Social Interactions* between group members were also seen as significant, often to discuss the story:

“Enjoyed the story and locations, talked about them on the journey” [O2]

“Breaking from the story to discuss it” [O6]”

In fact the social interaction could become the defining aspect of the experience, with groups clearly getting more benefit from them than the stories themselves:

“Group seem to be enjoying themselves, but as a social experience and commenting on specific pieces, not really absorbing the whole narrative.” [O11]

### 6.3 Technology

Observation revealed a number of problems and annoyances with the software and devices, and revealed issues much more like a traditional software evaluation.

Observers noted issues with *Usability*, such as difficulties interacting with the map or problems with the size of text, as well as comments on minor changes or fixes to the software or stories (e.g. adding a back button, using vibration alerts, using more audio, and increasing the clarity of images).

But they also noted issues with using technology *In the Wild* such as concerns over battery, difficulties reading the screen in bright sunshine, interruptions from alerts and messages, and especially with GPS accuracy:

“Frustration at the GPS [received] - confused why refreshing doesn’t solve. Content took a long time to load/acquire GPS.” [O4]

### 6.4 Learning, Appreciation, and Attention

As well as these new themes the observations also verified the themes we have already identified from the interviews. *Learning* and *Appreciation* only appeared a few times, typically in interactions with another reader, but for *Attention* there were many examples.

*Harmony* manifested in actions such as lining up pictures on the device with real world counterparts, orientating themselves according to the descriptions in the text, and attentiveness to the environment (such as pausing to listen to music). Also comments to the observer about the impact:

“Reading in location really effective, helped ground the stories in their place and location.” [O8]

“Comments that ‘it’s more powerful when you are actually here’ ” [O16]

*Discord* was often observed around navigational issues:

“Blocked path a couple of times.” [O3]

“Going back and forth felt weird and annoying” [O9]

or by activities in the environment that were interesting and distracting:

“Distracted by ‘travelling light’ exhibition in lower gardens” [O21]

Balancing their attention between story and place was key, sometimes this required a small correction:

“Building is shown from different angle than photo, so [takes] a moment to spot it.” [O16]

But sometimes they were so absorbed in the story that they made mistakes in how they interacted with the environment, and the consequences more severely broke their engagement with the story:

“Don’t pay much attention to locations (absorbed in phone) but do try to enter church (there’s a service on - oops!) [O20]”



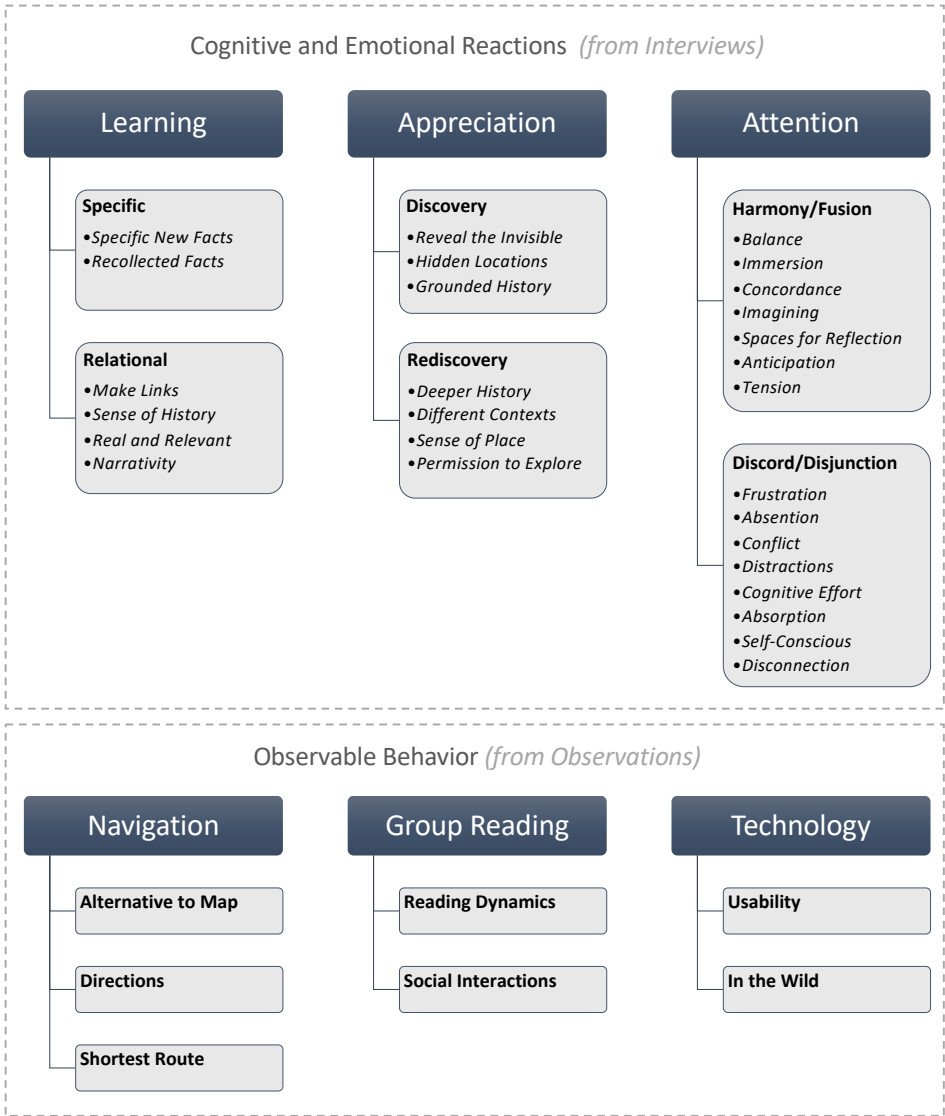


Fig. 2. Overview of the Cognitive and Emotional Reactions and Observable Behavior (Table 5)

7 DISCUSSION

Our work was driven by two research questions about locative cultural experiences: *how does story affect the experience of place*, and *how does place affect the experience of story*? Figure 2 shows an overview of the Cognitive and Emotional Reactions we uncovered in our interviews, and the additional Observable Behavior that we recorded during observations.

Locative experiences and ambient literature in particular are often described in the context of the Flâneur, the somewhat detached city wanderer and observer of urban life that emerged as a figure from nineteenth century

Paris. Whilst the Flâneur is certainly engaged in a similar activity to our readers, that term does not capture the transformative potential of locative literature. Our work reveals a reader who is much more engaged with their environment, a digital psychogeographer [12], who - when the design is working well, and is in harmony - does not just learn new things, but sees with new eyes, and makes new connections between past and current worlds.

## 7.1 Harmony, Immersion and Magic Moments

Our experiences were at their best in those moments of harmony. When the experience becomes a fusion of story and place. What our participants identified as ‘special moments’ were called ‘magic moments’ by Reid et al, who described them as a process that ‘can take you into a parallel world’ [52]. We also identified the same triggers as Reid, particularly physical and virtual collisions (whether accidental or designed, as in Karapanos et al’s physical cues [31]). Although our stories did not have a digital soundscape, and so we did not observe the same sorts of synaesthetic confusion, synaesthesia was still reported between imagined sounds and real ones (such as the sound of golf balls being struck described in Section 5.3.1).

But unlike Reid we would draw a distinction between immersion and magic moments. Nilsson et al describe four different types of immersion [41], two of which are pre-eminent in locative literature: immersion as *a perceptual response* (to the physical environment), and immersion as *a response to narrative* (of the digital story). We argue that when a participant’s attention is balanced it is possible for both types of immersion to occur together, and it is in these moments of harmony that triggers can cause magic moments to occur.

The need to align the physical and virtual aspects of locative narratives has been noted before by O’Keefe et al who argue that the real and virtual must be brought together in a harmonized way, rather than simply overlaying one on the other [44], and Nisi et al who explicitly use their narrator to do this and create harmony by explicitly directing the attention of the reader within the space [42]. Reid noted this challenge too, observing that ‘the challenge for future designers is how to heighten the likelihood of these natural co-incidences without them seeming contrived’ [52].

Harmony and discord also have a mirror in the game design field, which describes the concept of Ludo-Narrative Harmony and Dissonance [27], referring to the question of whether the mechanics of play align with the story being told. In cases of Ludo-Narrative Harmony the story is not just told alongside the gameplay, but *through* the gameplay [51]. In these terms our study could be considered as revealing the need for *Loco-Narrative* Harmony, where attention is balanced between story and place, and each is designed to enhance the experience of the other.

But while we aspire for harmony, our work also shows it is easy for discord to occur. These were the things we spotted in the observations. Distractions in the environment, within the device, and structural misalignment between story and place (such as poor placement of narrative elements, or differences between story structure and navigational routes) can easily disrupt the reader’s balance of attention. Horndecker is talking about discord when she discusses the challenge of indexing - simultaneously making sense of real and virtual place [28], and the difficulty of holding both things in mind at once.

## 7.2 Guidance for Designers

We cannot completely remove the potential for discord, especially in public places and in social contexts, but we can design to maximise harmony and minimise discord - encouraging those magic moments to occur. In retrospect the guidance that emerged from StoryPlaces starts to encapsulate this idea [46], and mirrors observations made by Ritchie about wayfaring, and the importance of spatial storytelling [55].

In summary, the guidance we developed was in three parts:

- *Dealbreakers*, elements of the experience that if mishandled can lead to participants leaving, or never starting, an experience. In particular, the importance of having clear points of arrival and departure that are close to one another, being mindful of the reader’s physical effort to move through space (so avoiding double backs or zigzagging paths), and consideration of the total time to read (matching it to the likely

duration of a visit experience). These are all things with a high probability of creating Discord, mainly through *Frustration*, which implies that this is the most important element of discord to avoid.

- *Pragmatic Considerations*, guidance to ensure that the experience works practically in situ. Encouraging designers to use landscape for navigation (taking advantage of paths to direct people, and bottlenecks for story beats), identifying high cost locations and using them sparingly (or rewarding people for activating them), and to consider points of rest, accessibility, and readers' safety. This is about avoiding *Conflict*, *Distractions*, and *Cognitive Effort* and maximising *Concordance* in order to allow *Immersion* to occur.
- *Aesthetic Considerations*, guidance designed to help align the story and place. Specifically by identifying distinct narrative areas (for example, stages of a journey) and considering the theme and tone of the place and how it matches the story. In addition, encouraging designers to identify and use points of interest, and consider diegetic references. Areas and theme aid *Concordance* and enable *Space for Reflection*, POIs and diegetic references support *Imagining* and increase the likelihood of magic moments.

Our toolkit is intended for guidance, rather than as a set of immutable rules. One can imagine artistic reasons for allowing discord into an experience, for example to set up a juxtaposition between the story embodied by the physical space, and the virtual story overlaid on it (consider the power of the poppy field as a symbol of soldiers lost to war). Some of the guidelines might also call for discord in some circumstances, such as giving participants the opportunity to take a break from the experience. However, our view is that a designer should be aware of this, and creating discord should be a deliberate act, rather than an accident of design.

This guidance does not yet tackle the social dimension, which was an important theme in our observations, and could be key in many cultural spaces often visited by groups.

We observed that when in a group the device acts as a focus around which the experience unfolds. Social interactions with others can keep reader's attention in the physical space, but also offers new opportunities for distraction. Specific design guidance for groups would need to look at how to manage this aspect by specifically directing group attention, and recent work in multi-participant narratives [59] could offer more novel solutions where groups share place, but their experiences are tailored through specific narratives on individual devices.

With sole readers the danger is that the story becomes a hole that they have to climb into and then out of at each different location. Although the experience still works, partly because of the time granted for reflection in the spaces between places, this produces a staccato experience of stopping and starting. Heavier use of audio could offer a solution, and this has become common for content delivery, but may need to be extended to include navigation and interaction. Augmented Reality Audio is a technology that integrates virtual and real world sounds, and could offer novel ways to achieve this [29], similarly Conversational Interfaces may be another way to address the problem [64] (for example, both are used in the work of D'Auria et al. [13]). But more simply, an imaginative use of the landscape, and a reader's physical movement through it, as a means of interaction and decision making could also help to maintain a reader's balance of attention.

### 7.3 Balance vs. Transitions

One way to view our work is as a study of a specialised class of trajectories (as expressed by Benford et al. [5]), limited to the *traversals* between the story on the mobile device and the real world places, and *temporary transitions between episodes* as participants walk between locations. Benford et al. emphasise the importance of continuity in trajectories, and our notion of harmony plays into this idea of creating a single coherent experience, echoing their call for alignment between the parts: 'traversals between physical and virtual worlds are enhanced by matching physical and virtual design'. However, whereas trajectories encourage designers to think of participants as moving smoothly between distinct states of a hybrid experience, the call for a balance of attention implies that they can instead exist in the liminal space between the two, held - at least for a moment - at the point of

transition, and that it is here that ‘magic moments’ can occur. Balancing attention is therefore the route to create what Benyon called ‘blended spaces’[6].

Fosh et al. use the idea of trajectories to create a simple design framework (which they use to create an interactive virtual experience for a sculpture garden) based around five phases: approach, engage, experience, disengage, and reflect [21]. They apply this to each sculpture. With a locative narrative we would apply this structure to the whole experience rather than each location, with approach and engagement occurring at the very start, and disengagement and reflection at the very end (which matches our design guidance on points of arrival and departure). However, holding the balance of attention is very challenging, and doing so for the entire experience phase may not be realistic. So one way to incorporate both trajectories and the balance of attention would be to conceptualise different narrative areas as separate parts of the experience, using trajectories to design a participant’s journey in the transitions between those areas (the spaces for reflection that we noted in our study), while trying to achieve a balance of attention within each area.

## 8 CONCLUSION

In the StoryPlaces project we set out to understand the poetics of locative storytelling, and to gather evidence about how place affects the experience of story, and story affects the experience of place. Through two cultural storytelling events (of 12 located stories in Southampton and Bournemouth in the UK) we have gathered and analysed data logs, semi-structured interviews, and observations, in order to discover both the impact of locative storytelling, and to understand the design elements that enable it to work at its best.

The data logs show the extent to which readers engaged with our stories. The relatively small number of readings collected at the two events is a limitation, and means that quantitative data analysis would have been inappropriate, but the 33 interviews and 25 observations are an appropriate scale for qualitative work and the logs support these by showing the variety of experiences encountered by our participants.

The interviews revealed key themes around *Learning* and *Appreciation*, confirming that locative experiences not only impart new things to readers, but also help them to rediscover familiar sites, and perceive hidden relationships - especially through time. But they also show the importance of *Attention*, and how the balance of attention between the virtual and real (story and place) can create special moments of harmony. Our observations also revealed secondary themes of *Navigation*, *Group Reading*, and *Technology*, these are essentially the main elements that can enable or disrupt the balance of attention, and show that it is easy to slip into discord through poor story or interface design, as well as chance social or environmental distractions.

Previous work has noted these special moments, the problem of holding both virtual and real in mind at once, and the idea that the virtual and real combine to create a new blended reality. Our contribution is to validate these earlier findings, and to show how they fit together under the challenge of balancing attention, to identify the elements in the experience that can enable or disrupt that balance, and to suggest design strategies to avoid them (for example, by aligning the elements of the story with the topology and character of place). Thus locative designers can strive for Loco-Narrative Harmony, which increases the chances of special moments occurring.

In the future we intend to explore how alternative strategies such as markers, narration, and other types of off-screen navigation, might affect the balance of attention, as well as explore new design guidance around social groups. It is also clear that locative storytelling has much to offer in terms of new cultural heritage applications - focused on rediscovery and relationships through time, over novelty and imparting information.

Our hope is that our work will inform the design of the next generation of locative cultural experiences, and encourage designers and researchers to consider the balance of attention in their systems, leading to technology that genuinely enhances and extends the experience of cultural places.

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