

# Magical Realism and Augmented Reality: Designing Apps with Children in a Cultural Institution

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## ABSTRACT

We describe the development and implementation of a 7-month-long project which used a series of creative workshops designed in collaboration with a cultural institution and conducted with children to draw influences from magical realist literature into the development AR applications. The project culminated in the release of an AR app for Android and iOS platforms, *Magical Reality*. After describing the design and implementation of the research we discuss its findings as they support the two facets of our contribution to DIS: First, we assess our attempts to apply inspiration, derived from workshop ideas from magical realist literature with children to the design of AR experiences, making recommendations for future design practice seeking to include comparable influences. Second, we consider the degree to which our workshops were successful in combining specialist knowledges from across the different departments of a cultural organization to answer sectoral challenges and describe both advantages and challenges for future collaborative work.

## Author Keywords

Augmented Reality; workshoping; children; magical realism.

## CSS Concepts

- Human-centered computing~ HCI theory, concepts and models
- Human-centered computing~ User centered design

## INTRODUCTION

Augmented Reality (AR) is currently enjoying a second wave of interest as smartphone programming frameworks have largely removed the need for physical reference points in the form of physical codes or other images. In addition, the increased processing power and camera quality of

contemporary smartphones support the production of stable and convincing AR illusions. Perhaps a still more provocative challenge is presented by the combination of reliable marker-less AR and the portability of mobile phones. Combinations of GPS enabled smartphones and new AR frameworks allow the embedding of AR objects in new and potentially *situated* [42] ways, opening a space of possibilities for designers with aspirations to respond to features of space and perhaps *place*.

We describe a 7-month-long project undertaken in the UK which used a series of creative workshops designed in collaboration with a cultural institution and conducted with children to draw influences from magical realist literature into the development AR applications. The project culminated in the release of an AR app for Android and iOS platforms, *Magical Reality*. These activities took place within the context of a funding call which solicited innovative arts and humanities research input into the development of immersive technology while asking researchers to consider the future sustainability of partnerships between immersive technology providers and cultural organisations. We add to the understanding of design methods and processes in collaborations between designers and cultural organisations and structure our contribution around two factors: First, we assess the success of our attempts to apply inspiration, derived from workshop ideas from magical realist literature with children to the design of AR experiences, making recommendations for future design practice seeking to include comparable influences. Second, we consider the degree to which our workshops were successful in combining specialist knowledges from across the different departments of a cultural organization to answer sectoral challenges and describe both advantages and challenges for future collaborative work. We also note the compatibility of our first contribution with the theme of this year's DIS as we explore both the congruence and the productive friction between two fascinating but separate areas of creative practice: magical realist fiction, and AR.

## BACKGROUND: CHALLENGES

### Arts and Humanities and Immersive Technology

In July 2017 the UK Arts and Humanities Research Council (AHRC) and the Engineering and Physical Sciences Research Council (EPSRC) launched a funding call under their Creative Economy Programme entitled 'Research and

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Partnership Development call for the Next Generation of Immersive Experiences.’ The call, throughout its text, established its relationship to industry challenges in the UK stating that,

*As technology enables experiences to become more immersive we must ensure that UK creative talent can tell its stories, create innovative products and services, and develop startling new experiences within this new medium. [7]*

The premise of the call was that the rapid development of immersive technologies including (but not limited to AR) represents an urgent demand to arts and humanities research to participate in the futuring of innovation in this area. The councils defined three thematic foci: memory, place, and performance to guide proposed activities. Thus, initially our challenge was to identify a research focus that would bring new dimensions to AR while responding to the specified themes.

### **Creative Economy Partners**

The fund was also, perhaps primarily, intended to stimulate collaboration between researchers and industry to create future value by overcoming collaborative challenges in the sector. Within the galleries, libraries, archives and museums (GLAM) sector there is a recognized problem in adopting and sustaining innovation with digital technologies. The UK’s Department for Digital, Media, Culture and Sport (DMCS) [19] identifies a series of barriers to effective collaboration between technology businesses and cultural industries including but not limited to,

- *A lack of shared language and understanding of each other’s industries;*
- *A lack of technical skills and knowledge which could undermine a cultural organisation’s standing with the tech sector;*
- *An imbalance of funding and skills between culture and tech organisations leading to an imbalance of control in the relationship[19]*

Existing methods in the GLAM sector rely on formalised tender processes which translate curatorial knowledge into exhibition designs [33]. Such processes mandate closely defined roles, specified points of interaction between the various teams and a tightly controlled brief. Processes like these necessarily reduce the interaction between institutions and designers to a narrow, transactional funnel and perpetuate the lack of shared understanding and access to technical knowledge identified by the DMCS. They allow little scope for knowledge exchange or for including the perspectives of future users of the technologies. Most importantly for our project, these processes do not support the early creative exploration of more broadly defined areas of interest and as such are poor at generating innovation.

Below we describe how our project responds to the research councils’ problematics and by extension to larger sectoral challenges present in and outside the UK. We focus on the

relationship of our research to this funding call in order to underline how it was, from the outset, proposed in response to sectoral challenges.

### **PROJECT PREMISE**

Our project responded to these problems through a collaboration with Seven Stories, The National Centre for Children’s Books. Newcastle University, where the project was based, has a long-term strategic partnership with Seven Stories (henceforth 7S) in the form of the Vital North Partnership (VNP) funded by Arts Council England and the University. The partnership’s principal goal since its inception in 2005 has been to make Newcastle a centre for excellence in Children’s Literature. Below we describe how our project was designed to speak both to the background challenges of arts and humanities knowledge in immersive technology and also to the difficulties faced by creative economy partners such as 7S.

### **Arts and Humanities research to inspire AR**

We have said that the scope of our funding call mandated a focus on memory, space or performance. Our starting point arose serendipitously with regard to the funding context with the recent acquisition by 7S of the archive of the author David Almond. Since the success of his debut novel ‘Skellig’ in 1988, Almond has written award-winning books for children and young adults in a *magical realist* idiom; most are set in the North East of England, in or near Newcastle upon Tyne. The researchers agreed that Almond’s novels and archive would allow us to address the themes of memory and space in interesting ways, thanks to the importance of setting within the characteristics of magical realist writing.

#### *Magical realism*

Magical realism is an established literary mode that merges realistic and uncanny events [27] and we were interested in the connection between this idea and the experience of using Augmented Reality technology. Both develop expressions of the unreal within everyday reality and we wished to use the scope of our project to build on this initial intuition. Interestingly, we found no previous examples of work in AR or indeed any other technology research that invoked magical realism as an inspiration point, despite the affinities we had identified. The ACM digital library returns 1669 results for a search on ‘magical realism’ but none of these draw on the term as specified. Rasmussen, for instance, discusses the comparison of technological artefacts with various forms of magic, [37] but magic as colloquially understood, not as containing the particular interest of the uncanny merged with everyday reality as in magical realism. Faris identifies a series of five other features specific to magical realism of which two were of particular interest to us in designing for AR. They are that,

*c) Merged realities and blurred boundaries problematise representations of fact and fiction;*

*e) Notions of time, space and identity in the text are similarly destabilized. [24]*



**Figure 1.** Taking notes in the David Almond's archive.

The idea of fictions which blur and blend with everyday reality as well as disturbing everyday notions of time, space and identity seemed resonant with AR and with the Research Councils' challenge to consider memory and space.

#### *Using archives*

The David Almond archive provided the content for our proposed app. The archive holds sketchbooks, notes, correspondence and book drafts for Almond's oeuvre (see Figure 1). The archive was not only a rich resource for both the project and our workshop process but would also answer another institutional imperative: to develop additional value from the resources held by 7S. Others have noted the challenge faced by institutions holding collections in managing both traditional scholarly access and new, previously unimagined uses, including creative ones [10,23]. Our adoption of the papers as a key resource in our project spoke to this imperative. 7S were and are aware of pressures in the GLAM sector to make content from their collections available digitally. Typically, presentations of such material rely on familiar filter and search interfaces (as objected to by [48].) For an organization like Seven Stories, whose key audiences are children and families, and whose collection represents a creative art form, there is a clear motivation to experiment with new modes of exploration of the archive.

#### *Involving children*

Lastly, although research exists on children's interactions with AR (see literature review below), we were interested in how we might relate to David Almond's core audience, noting both the interest of children in magic generally, but also their relative lack of exposure to magical realism (Almond is unusual in writing for children in this genre). We also note anecdotally how comparatively little AR practice is tailored to children (see literature review below for exceptions.) Of the thirty-two projects funded under the same scheme as ours, only one other [31] was aimed at primary age children. 7S are a children's arts organisation and their strategic aspiration to '*empower children and young people to engage with and shape their world*' added another imperative to our project.

#### **Design workshoping within the creative economy**

Adding to the compatibility of our project's fit with the funding challenge was that our partners, 7S, had identified a

lack of digital innovation as a weakness in their operation. In an exit interview the VPN manager noted that,

*Our digital knowledge is patchy across the organisation, we have some but it is limited [...] and sometimes finding digital capacity across the different teams has been a challenge [...]*

We attempted to create a process within which fuller knowledge exchange could be developed between subject specialists at 7S and professional designer/developers while soliciting the views and imagination of children. Crucial to planning this process was the understanding that to be successful it must withstand the constraints of time and money imposed by funding environment for developing innovative digital work in the GLAM sector. Additionally we were aware that it must be founded on a solid articulation of the value of participation to the three parties in a future collaboration, those being the cultural institution, the designers/developers and the children themselves. In developing this collaboration we benefitted from the context of our previous work with 7S and the support of the VPN. Having already co-developed pilot projects with 7S allowed us to identify routes for mutually beneficial collaboration.

#### **PREVIOUS WORK**

We are not the first to observe that AR technologies offer novel opportunities for thinking about space, memory and the imagination or for recognizing that they might be designed to speak specifically to children.

#### **AR, space and place**

Earlier we introduced our aspiration to develop ideas around place and memory from magical realist literature to new AR interactions. Other researchers have also recognized the potential in AR for building connections between artificial and real worlds. Although research exists on the more practical considerations of designing for mixed reality environments [46] other authors note the rich layers of associations which can be built by associating media and real places. Løvlie [34] cites a number of canonical examples of places and literature performatively and reciprocally defining one another's meaning.

*When an author writes a text about a place – be it James Joyce writing about Dublin, Knut Hamsun about Oslo, or Allen Ginsberg about San Francisco – the place changes as a result of it. [34:19]*

Describing an early (2009) smartphone deployment described as AR (though arguably 'locative media' might be more accurate a label) he notes how empowering users to relate real spaces to literary texts may encourage new ways of shaping the cultural landscape.

Harrison and Dourish note the distinction between space (as a 3D structure) and place (as in a form of situated social reality) when developing interactive technologies observing that, "places" are spaces that are valued.' [28:69] Of particular note here is the authors' assertion that '[d]ifferent media have different spatial properties' [28:74] and that

consequently different socio-spatial behaviours can be expected around them. We were excited to investigate what, if any such behaviours could form around magical realism-inspired AR.

Some contemporary AR practice has taken up the opportunity to leverage new meanings created by combinations of place and technology to intercede subversively. Errazuriz, an artist working in AR, used the medium's affordances to mock the 'installation' of a sculpture by the artist Jeff Koons [22]. Supported by the social media company, Snapchat, Koons' sculpture took the form of an enormous, gold, balloon dog available virtually in Central Park, New York. Errazuriz quickly 'vandalized' the sculpture by creating his own app which placed an identical dog, covered in graffiti, in the exact same spot.

### **AR and children**

A number of authors have explored the potential for children of AR technologies, primarily in educational contexts. Alakärppä et al. describe the development of an AR application for 6-12 year old children which used natural objects such as leaves and pinecones as markers [1]. Produced as an educational tool, the application was intended to provide a demonstration of the viability of using natural markers with the intention of keeping children's attention centred on their surroundings. The authors concede however that they were not always successful in this aim, with many children focusing on the goals of the game rather than their natural environment.

Oberhuber et al. [36] explore the affordances of a marker-based AR app for Android tablets in supporting children to produce creative content for gaming. Children were challenged to design content for an AR-supported treasure hunt game and their creations were compared with what they produced when given only analogue media (paper and pen). The researchers found favourable results with the AR game usefully structuring the children's planning and helping them to create visually richer artefacts.

In a study exploring the capacity of AR to support technical prototyping of physical mechanisms for children, Kang et al. explore some elements of co or participatory design [30]. Their project, like ours, involves children in the design of AR technologies, but does so at a much later stage in the design process, by when the principle functionality had already been defined.

### **Design innovation workshops in cultural organisations**

The Secretary of State for Digital, Culture, Media and Sport in the UK reported that in 2018,

*'We heard that a number of cultural organisations feel held back by a lack of infrastructure or resources, that they need better digital skills and to focus more time on leadership training; there are often communication barriers when working in a cross disciplinary way, and the pace of change in technology itself has resulted in a fragmented approach.'*[20]

Responding to challenges for digital innovation in the cultural sector has motivated a significant body of previous research exploring, *inter alia*, the co-creation of tangible exhibits [17] co-designing displays [15,16] or assessing the digital literacy of museum staff to support innovation work [9]. Our work contributes to the understanding of possibilities for innovation in museums by trialling a process extending from the earliest design explorations to a finished project in dialogue with staff and future audiences.

### **PLANNING PARTICIPATION: DESIGN AND VALUE**

We are sensitive to possible criticisms that because our work is not participatory design e.g. as described in [8,12,18,38,41,44] or co-design as in [14,17,49], we were unmindful of the agency of participants and the nature of their participation. Our project was intended to balance as closely as possible the value for various participant groups; each of our planning sessions and resulting documents formalized what we believed the value for all concerned was. However, it was not within the scope of our project to do extensive preliminary work with potential participants in order to more thoroughly determine the possibilities for their participation and involvement and we are mindful that we, the researchers, set the agenda. Similarly, while we engaged in significant discussion with our project partners and 7S contributed to the writing of the funding bid, children as future users were not involved in either the planning or the writing up stages of the project.

Iverson et al. develop a structured hierarchy of relationships between professional and participant designers and develop their own formulation of children as protagonists in PD processes [29]. In this role,

*Researchers encourage children to be the main agents in driving the design process and thereby to develop skills to design and reflect on technology and its role in their life.*[29:30]

Drawing on their summations we observe that our process contained elements of a number of the roles these authors defined while departing in other respects. Although the 'protagonists' to the authors' projects are held to be the 'main agents driving the design process' and the children in our project were not, it is also true that our workshops sought to critically and creatively contextualise technology within the children's lives (a process held as important by those authors in considering participation.) Our workshops sought to gauge the children's own views and values towards magical realism, archives and AR so that these could be reflected in the app design and its technical development. Although children eventually tested and commented on prototypes of the app we were developing, it was at least as important to us that they engaged with the project context and took value from the workshops beyond their role in informing the design of the app. In other words, we were interested as much as making the children protagonists in thinking about magical realism, space and technology as we were in empowering them as app designers.



**Figure 2.** Scenes from our workshops showing (left to right) Children and researchers imagining movements in imaginary spaces, collections staff introducing participants to the David Almond Archive and glow sticks as portholes to unseen worlds.

### Benefits for children

Our workshops were fun creative sessions which took inspiration from the experience of the research team as teachers of critical creative computing in higher education, the background of one researcher as a trainer in communicative teaching strategies and from the daily practice of colleagues from 7S in designing explorative, imaginative story telling. A key feature of our process was that the workshops should have value *independent of the app design process*. The planning process for each session entailed a discussion of the value for participation for each of the various kinds of attendees. For the children taking part we identified a series of outcomes which could be articulated either as learning (typically knowledge or skills which fell outside of the purview of their school education), experiential, critical or creative. Our aim was to create experiences which would engender new and meaningful relationships between the children and the foci of our workshops (environment, archives, technology) through creative means. This motivation will no doubt sound familiar to many teachers of creative arts and design, but the challenge we faced was to maintain a focus on the relevance of creative critical activities to the design of AR with relatively young children without (as far as we knew) formal design training. In the implementation section below we detail how we did this.

### Benefits for 7S

We have noted that our partners had identified a gap in their capacity to support innovative digital work and had aspirations to fill it. This desire was a strategic imperative identified at a policy level in 7S. From other projects we were aware that leadership imperatives are not always shared by staff ‘on the ground’, so we were conscious to include key members of 7S’ staff in co-planning sessions. This allowed us not only to benefit from their experience of working with children, but also to develop together a better understanding of what the workshops could offer their professional practice.

7S were particularly interested in how their archives could be used within their public programmes, as a prompt for creative activity rather than simply in handling session. Our project was well placed to respond to this interest.

### Benefits for designers/developers

The main benefit we identified for ourselves as the technical developers in the project was to gain inspiration for new interactions in AR. Our aim was to develop workshops which would adopt aspects of MR to produce insights into how this might spur reflection on place and memory. Additionally, we wished to explore whether it were reasonable to develop a process which could be replicated in part by design/development firms in the future to form part of the services they offer. This benefit was designed to contribute to the challenges for collaboration in the creative economy which we established at the outset in reference to the research council agendas.

### METHODOLOGY

Our project drew inspiration from other forms of design workshopping mentioned above in the review section. In common with other qualitative, ethnographically-oriented, creative work in design and HCI e.g. [5,13,20,24,25], we conducted focused sessions with between 5 and 20 participants aged between 7 and 14 and observed their participations while taking notes, photographs and audio recordings. Sessions lasted around two hours. Child participants were recruited by 7S using existing mailing lists and social media presences; some children attended with parents or guardians. Around three quarters of the participants were female. We did not collect data on ethnicity. Workshop 4 was conducted in a local school which was approached directly by 7S. We underwent a full process of ethical approval concerning our use of research data and participants (and their parents/guardians for the children) were guided through an informed consent process.

### PLANNING THE WORKSHOPS

The workshops were planned one-by-one over the 7-month period of the project. Initially we defined some areas of interest and gave the sessions working titles which were sometimes modified within the planning sessions. Below is a list of these titles with a brief synopsis of the session focus.

#### Workshop session overviews

##### *Workshop 1: Magical places*

We looked at ideas of co-existent or connected spaces by exploring a 19<sup>th</sup> century tunnel with a local guide. After some contextual work introducing examples of connection points

between real and fictional spaces in movies and literature children were asked to place glow sticks in a spot of their choosing within the tunnel (see Figure 2.) They were challenged to explain why this particular spot functioned as a connection between this world and another and to develop an account of some of the features of that other world. We asked them to propose social, religious, physical or scientific rules particular to that world and to develop short narratives around these constraints. These two points (regarding specific places and re-imagined rules) were intended to focus the session on how the experience of place links physical attributes to embodied and imaginary experiences.

#### *Workshop 2: Dreaming New Archives*

Planned with colleagues from the collections department at 7S, this session took reproductions of material from the David Almond archive and presented them in a fictional frame. We described a fictitious archival accession event wherein a stranger, oddly dressed and silent, arrived at 7S bearing a mossy, stained box leaving it with the confused staff. We described how we had come to the conclusion that the box contained remnants from an older civilization once present in the Ouseburn Valley which surrounds 7S (the Ouse is a tributary to the Tyne river in Newcastle.) Activities focused on identifying the use of the archival items within that civilization and in later stages of the workshop in taking the items outside and relating them to features of the current landscape. The choice to work with ideas of past civilization was inspired partly the emphasis on inter-generational time in some magical realist literature e.g. [35].

#### *Workshop 3: (Re)Making Memories*

Here we focused on the relationship between memory and place, attempting to establish whether ideas around material or place-based memories were accessible to children and in what form. We provided instant cameras to participants (see Figure 3) and asked them to explore the surrounding area, photographing objects that ‘remember’, e.g. brick work that bore staining from old fires. We also led a short sound walk around the area and asked people to recall what they had heard and talk about its relationship to the surroundings.

#### *Workshop 4: Space, Magic and Devices*

This session was conducted in a local state school with Year 7 pupils (aged 11-12.) We wanted to explore children’s ideas about how the fantastical and technological might co-exist, and designed a session to encourage imaginative story telling which connected the two. To this end we set the scene by playing a set of recordings of ‘numbers stations.’ These are radio transmissions believed to be secret messages to foreign intelligence officers. In our workshop we presented them without explanation to the children and asked them to speculate on their origin. The workshop’s main activity was building a ‘detector’ circuit using the popular Arduino platform. The circuit was a simple electro-magnetic field detector which caused a buzzer to sound and a light to flash. Again though, we refrained from explaining exactly what the artefact was and told the children only that it ‘detected’ *something*. The children used the detector to explore their

classroom environment and in the last part of the session asked them to produce short narrative accounts which populated the artefacts in the classroom (light switches, printers, projectors) with characters from their imaginations.

#### *Workshop 5: Children’s Magical Realism for New Spatial Interactions: A collaborative workshop*

This workshop included participation from some local AR/VR studios as well as a broad cross section of colleagues from the various departments of 7S including collections, exhibitions, marketing, events and the Creative Director. The session was built around comparisons of narrative development across the various professional disciplines and was intended to promote ideas exchange.

#### *Workshop 6: Magical Reality*

In this final session we introduced a late stage prototype of the project app, *Magical Reality*. Rather than using the opportunity to conduct usability testing, we wanted to explore possibilities for building fictional narratives around the AR objects and the relationships between them. To that end we borrowed ideas from workshops 2 and 3 and extended them by saying that we had continued to search for traces of the Ouseburn’s lost civilization and had developed the app as a detection mechanism to search the un-see-able for more clues. The AR objects were presented as semi-mythical archaeological findings and we asked participants to identify them by relating them to a series of cryptic verbal cues.

### **IMPLEMENTING THE WORKSHOPS: DISCUSSION**

It is not possible within the scope of this paper to offer a complete analysis of the findings of each individual workshop. Here we will restrict ourselves to speaking to the two parts of our contribution to DIS: First how the combinations of magical realism, design workshops and children supported the development of the app and second how this process functioned within the constraints of a collaboration with a cultural organisation.

#### **Practically implementing inspiration**

Our series of six workshops were designed to frame a set of initial propositions regarding possible relationships between magical realism and AR and make them a starting ground for personal and imaginative responses. Of the series of six, sessions 2 (*Dreaming New Archives*) and 4 (*Space, Magic and Devices*) were particularly successful in provoking unusual ideas with regards to place and AR and we concentrate on these below, grouping our observations around a set of areas into which they gave us insight.

#### *Insights: archival items*

We had committed to the use of archive images earlier in the project but had no preconceived ideas of how these might be used in the app and little understanding of how or if they would be interesting to children. Additionally, it was difficult for us to imagine how we might relate the materials to magical realism. The materials are mostly notes, doodles and small sketches (see Figure 1) and without context they are not readily distinguishable from any other preparatory



**Figure 3. A participant takes photographs of reproduced archive papers near Seven Stories.**

creative work. Our workshop, however, alerted us to a set of quite straightforward but nonetheless helpful observations. The first was that the children in our workshop tended to look for the concrete in the apparently abstract. When looking through the items we provided, a number of what we took to be abstract doodles were interpreted as bridges, rivers or maps. This observation along with the fact that the children often chose overtly figurative items, pictures of birds, boats and suchlike, suggested to us that these were good choices to include in the app and challenged us to think about how to render them visually interesting in 3D space e.g. in Figure 5. Much of the visual interest in Magical Reality is predicated on the success of developing 2D assets in to 3D ones. The thought process for this started in these observations.

During the session we also noted how children appeared compelled to make sense of items in relation to one another. The participants often made collections of what they perceived to be related papers due to common motifs or produced accounts for why X could be connected with Y. This was also instrumental in shaping our considerations of how to design the layout of our app so that one item led to another, what was visible from particular spots and how their appreciation as one large set or a series of small subsets might imply new meanings for audiences.

Our activity which asked the children to take the papers out of the building and account for their placement in the surrounds was a mixed success. Some of the associations made between features of the surrounding environment and the archival items were of a very literal character and it was difficult to imagine how they might usefully be drawn on. One participant, for instance, took a doodle prominently featuring the word ‘mud’ and placed it by a muddy area. Others, though, demonstrated that they were interested in the combined meanings created by adding layers of creative fiction to real places recalling the lessons learned by [34] in associating poetry and place.

#### *Insights: unseen fictions*

Our session with the school also sensitized us to features of experience, interesting to the children we worked with and to some degree exemplified by magical realism. Perhaps because of our introductory framing exercise with the numbers stations, or because of existing tropes in literature

and movies around magic and the unknown, a lot of the narrative ideas developed by the children were quite horrific. Many stories revolved around characters trapped by technology and pleading desperately for release. In one such narrative, responding to the fact that her detector was particularly reactive around a light switch, one participant described how the protagonist of her narrative had become trapped in the electrical system of the room during a workshop, very much like the one we were running, at school. In the story the girl became visible only when the switch was in the off position and was freed eventually when the switch was cycled rapidly. Other stories included characters haunting printers or becoming trapped in iPad games thanks to cross-contamination between game and real-life elements.

One of the features of magical realism is that the fantastical does not belong to a domain apart but instead is wound in with everyday reality and sometimes indistinguishable from it. Within David Almond’s canon this feature is sometimes a source of wonder, though never straightforwardly. In *Skellig* [2] for instance, a homeless man, found in the main character’s shed, slowly metamorphoses into an angel. This process is figuratively connected to the main character’s on-going mental state as he progresses from fear for his baby sister’s ailing health to eventual relief as she heals. The weaving of the two realities is both a source of horrific fascination and emancipatory joy. Almond’s later work, *Clay* [3] features a much darker form of the everyday fantastic as one character, a troubled boy with a mysterious past, is able to call life into the figures he sculpts in the eponymous medium. The sense of horror as the sculptures wriggle in to life in the book is palpable and derives partly from its everyday domestic context. The event is horrifying at least partly because it takes place within familiar environments. To reproduce this complex mix of atmospheres with an AR app is undoubtedly challenging and indeed AR more generally presents a difficult context for developing a sense of narrative atmosphere thanks to the very mixing of the virtual/game world and the dynamic and unpredictable nature of the real world outside it. Even if, as in our app, AR objects appear in the same spot, different times of day, different weather and season conditions, and different actors being present all contribute to making the same space be very different places. In the design of our app we were aware that addressing our target age group (around 8-12) meant being aware of the potential for distress in designing horrific AR experiences. We did, however, want to explore the potential of this area and note that horror is also conveyed effectively in many children’s books. This impulse led to a number of features of the app. In one interaction we chose to use a mixture of features of the local environment, references from David Almond’s books and the affordances of smartphone technology to create an atmosphere imbued with elements of horror. We identified a text extract cropped from a larger page of notes which read, ‘death, marry, hell, murder’ visible in the screen grab in Figure 4. This text was drawn from notes

from Almond's *A Song For Ella Grey* [4]. A modern retelling of the story of Orpheus and Eurydice the book relocates the entrance to Hades to a culvert within the Ouseburn Valley from which the river Ouse exits from beneath the city of Newcastle upon Tyne. The path along the river near the culvert is wooded and relatively isolated and we felt that this would add usefully into the atmosphere of horror. Finally, we designed the app to apply a black and white filter to the camera feed and linked this to the user's distance from the AR object. After a certain threshold distance is crossed the image becomes more and more desaturated over the final 20 meters approaching the text which is placed simply in space. The effect, we feel is successful in suggesting if not a literally horrific experience, then at least an unsettling one.

#### *Insights: dramatizing search*

The final insight from our workshops was also drawn principally from workshop four (Space, Magic and Devices.) That is that the search for AR items located in geographic space was itself a phenomenon which we could treat as a feature of interest and subject to a comparison with magical realism. During the workshop the children's search with the detecting circuits brought them into unusual forms of embodied interaction with their environments. The children gathered in spaces they normally would not; for instance, in groups underneath the projector or clustered around light fittings. They moved in unusual ways (for example, following walls searching for hidden wiring) and adopted unusual physical poses, such as stretching up to reach areas or crouching under tables. This activity caused a lot of laughter and interaction among the children, and after the workshop we discussed ways that we could add to the interest of searching for items. One aspect of this discussion was integrated with the discussion of horror-imbued interactions above and resulted in the black and white filter in Figure 4. We had a number of other similar ideas which were not implemented, mostly due to time constraints, including the idea that the screen might glitch irregularly or



Figure 4. Screen grab from *Magical Reality*.

its space distort or warp as you approached, perhaps including other imagery to emphasis the sense of two worlds co-existing simultaneously. The main feature of the app which built on these ideas was a compass interface which is visible at the bottom of the screen in Figure 5.

Early in the design process we had identified the need for some kind of mini-map or other discovery mechanism to guide users to the objects in the area. The compass used a metaphor of question mark symbols which gradually fade as the user approaches the object and which turn into an exclamation mark once the object has been found. Aligning the question mark with the centre line of the compass indicates the correct heading and there may be several question marks visible at a time in difference states of opacity. We concede of course that navigation interfaces of broadly this sort are a common feature in gaming. Research has explored how mini-maps can be included within video game diegesis [45] or explored the cultural significance of building maps as a player within game stories [32], but we have struggled to identify literature which discusses how such small interface facets can be developed to increase a sense of exploratory atmosphere. The compass in *Magical Reality* is intended to turn a walk (which might be suggested by a more conventional map interface element insert) into a search or perhaps hunt, where the position of the user, their orientation holding the device and the camera video on the screen combine to present a number of possible directions. It also shares a design language with the other interface elements including introductory screens, modal pop up windows and buttons which mimics the sketch style of Almond's archival notes. Each element was hand drawn by author Trujillo Pisanty and digitized for inclusion in the app.

#### **Seeing digital possibilities**

Having discussed some of the ways that the workshop series shaped the design of our app, we now consider the degree to which the process was beneficial for our partners in terms of increasing their agency in collaborations around creating new digital artefacts.

#### *Workshopping archives*

Our session with archivists and exhibitions staff from 7S was jointly planned and implemented. The initial idea for framing the archives in a fictional diegesis came from the research team, but other details, including the characterization of 'the stranger,' were arrived at through conversation. This is important because although the Collections Manager observed of the session that, '*it prompted new ways of looking at archives and was definitely valuable for us*' in considering the value of our approach for the future we need to consider whether it is within the skills of staff to plan and implement similar workshops independently or potentially with technical specialists without similar user-centred or otherwise ethnographically-oriented design backgrounds. Collections staff also commented positively on the nature of the engagement that the children had with the items observing that,

*'there were some fascinating observations going around the minutiae of the texts that you just don't get when you present the archives just as they are'*

We are certainly not the first to observe the creative potential of archive items in technology contexts [39,47] or their potential to form the basis of design workshops [6,40]. We suggest, though, that the dual character of our workshops as both being creative endeavours in themselves, which creatively disturbed archival epistemologies *and* as serving the purpose of providing a context through which to relate literary ideas to technology and thus generate new kinds of design inspiration does support our claim of a contribution. The archive session was attended to capacity (12 people), the attendees were strongly engaged throughout and many commented positively on their experience and attended later sessions.

In summary we identify the following points of success for the workshop as an example of collaborative development: The workshop trialed what was for our collaborators an entirely new approach to using archival materials in an engagement context and provoked a reappraisal of the potential of those materials for future engagement work. It proved that it was possible to co-plan a session successively in a way that was both useful for designers and novel but replicable for the archivists. Finally, we observe that the enjoyment of participants and the high attendance for the session underlined its potential to form an independent event offer that 7S could adapt and market in the future.

#### *Schools and technology*

Our session with the partner school was also successful in producing value both for the participants themselves and for their institution. During and after the session we were able to discuss the workshop with teaching staff. Prominent among their observations was that the session was out of the ordinary for the school because of its mixed focus on creativity and technology. Although the school offers some introductory programming classes as well as basic computer skills the pupils (and staff) had not previously been exposed to experimental activities for interaction design and the teachers were interested in the power of this combination to improve engagement with computer science teaching. Feedback from the Deputy Headteacher later informed us that some pupils had subsequently expressed an interest in pursuing related careers perhaps thanks to the novelty of encountering creative arts and technology together. Although the school were not included in our original round up of knowledge exchange providers/recipients we point out the benefits here because they underline our claim that the process we undertook is a sustainable one. 7S derive a portion of their income through conducting creative workshops with education providers. The ability to speak to the 'S' and 'T' as well as the 'A' of a STEAM (science, technology, engineering, arts and maths) agenda is an unusual offer. We also recall the original intention of the Research Council's call for arts and humanities contributions

into the development picture of immersive technologies and note its relevance also to educating developers of the future. Although we accept that our influence on school curriculum policy is very limited we also point to the value of 'one-off' workshops as exemplars which schools and educational bodies can leverage in gaining support for similar future initiatives that expand their scope.

#### **LIMITATIONS**

We have sought over the preceding paragraphs to identify a number of positive concrete ways in which our workshop series met our objectives and occasionally exceeded them. Before moving on to draw conclusions from our study however we wish to acknowledge a number of limitations and ambiguities to our findings not least in order to identify directions for future work.

#### **Magic or magical realism?**

It was helpful that within our project team we had a Professor of Children's Literature (author Reynolds) with a specialist interest in magical realism and that the design researchers were all well read in the canon before the outset of the project. This background knowledge helped shape some of the fundamental research questions behind our process, in particular our desire to know whether it were possible to bring magical realist influences into AR. Our planning sessions often contained lively discussion as to whether our planned activities were, in fact, magical realist enough or whether we were, for instance, enacting more generic literary ideas about magic and fantasy. Similarly, in the results we have outlined above, it could be argued that conclusions such as those about dramatizing search could have been reached without the framing of magical realism, or possibly even without the involvement of users. Such an objection must be a qualified one. No design process produces results exclusive to it and our intention is to demonstrate that ours produced good results, not unique ones.



**Figure 5. Screen grab from Magical Reality showing how a 2D archival item was developed into a 3D object.**

It is also the case that magical realist literature itself suffers from arguments regarding what can and cannot be regarded as within the orthodoxy. Even David Almond, whose works occupied such a central place in our project, is not considered by all critics to write completely within the idiom. Our workshops took a necessarily reductive view of the features of magical realism in order to operationalize them for planning for design. Merged realities and the de-stabilisation of place and time, two of the features we identified at the outset do not in and of themselves constitute a definition of magical realism. We referred principally to these because we felt them to offer both the clearest relationship to AR and the most pliable ideas for workshoping as well as being well represented within David Almond's writing. In performing this reduction though we accept that we may have inevitably detracted from the rich and multifaceted value brought to our project from magical realism.

### **Empowering digital participation?**

We established from the outset that our project aimed to contribute to a picture of collaboration in the cultural industries, and the GLAM sector in particular, which encouraged knowledge exchange, gave agency to individuals within cultural institutions and by doing so brought arts and humanities knowledge into a better dialogue with digital innovation in immersive technologies.

In the final weeks of our project we conducted a series of interviews with colleagues at our partner institution to establish what, if any, effects our project had had on 7S and the people who work there. A fuller analysis of this work is forthcoming, but it was clear that staff and management remained enthused by the project and its outcomes and felt that the collaboration had been both genuine and productive. What is less clear is the extent to which our collaboration escaped from the power dynamics peculiar to collaborations between technical and humanities partners identified by [19]. Although we and our partners collaborated on writing the original funding application, much of the shaping of the bid was conducted by the research team who in turn were responding to the research agendas expressed by the councils. The researchers were conscious that they brought the money and to a large degree set the agenda and that this was strongly influential of the character of participation possible [43].

The project was not calibrated to empower staff at 7S or child participants to exercise direct design decisions over the app. As such we have avoided formulating our work as participatory design. We reiterate our claim, however, that our engagement with both colleagues and children went beyond simply eliciting the children's knowledge, in a so-called '*child as informant*' relationship [29] because of our continuing efforts to contextualise our activities in conversations about art, technology and place with children and because of our responsiveness to the professional preoccupations of 7S colleagues, for instance in terms of finding new uses for the archive.

### **FUTURE WORK**

Above we have identified a number of, if not shortcomings, then areas of difficulty, ambiguity and complexity in untangling what does and does not count as magical realism, what its offer is to designing for AR, and what constitutes useful and appropriate participation for staff in cultural organisations.

In future work we would like to explore the first of these questions, perhaps by undertaking some comparative work using literary sources from different genres but remaining within the context of AR. Our initial decision to rely exclusively on magical realism was born of a series of identified congruencies between the genre and AR, a set of serendipitous contingencies on the ground and our own interest in the books. Doing comparable work with other genres with strong claims to offer knowledge about space and place in may be an interesting way to better assess the degree to which the work shaped the workshop activities and consequently the interpretation of those activities into outcomes by children. Forthcoming work will more fully detail the impact of our project on our partner institution and analyse this for its implications for future collaborative practice in this area. In the space available here we wish only to comment that we are sympathetic to the aims of participatory design, e.g. as expressed by [8,11], but share with [5] reservations from our perspectives as creators of artefacts regarding our own desire for agency in the making of creative cultural content. In future work we wish to work to better formulate our position with regard to this balance and test its viability more explicitly in collaboration.

### **CONCLUSIONS**

We have described the initial motivations for a seven-month research project seeking to develop influences from magical realist literature into the design of a smartphone application through a process of imaginative creative workshops. We have outlined a number of concrete relationships between the workshop process and features of our app, Magical Reality, which suggest that there is merit in exploring this relationship further, and that the method employed was successful in eliciting useful observations about place and technology from children. We have established that the process was both viable and useful for our cultural industries partners and suggested some ways future research might address outstanding questions related to the method used.

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