GIFTING PERSONALISED TRAJECTORIES IN MUSEUMS AND GALLERIES

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Abstract

The designers of digital technologies for museums and galleries are increasingly interested in facilitating rich interpretations of a collection's exhibits that can be personalised to meet the needs of a diverse range of individual visitors. However, it is commonplace to visit these settings in small groups, with friends or family. This sociality of a visit can significantly affect how visitors experience museums and their objects, but current guides can inhibit group interaction, especially when the focus is on personalisation towards individuals.

This thesis develops an approach to tackling the combined challenge of fostering rich interpretation, delivering personalised content and supporting a social visit. Three studies were undertaken in three different museum and gallery settings. A visiting experience was developed for pairs of visitors to a sculpture garden, drawing upon concepts from the trajectories framework (Benford et al., 2009). Next, a study at a contemporary art gallery investigated how gift-giving could be used as a mechanism for personalisation between visitors who know each other well. Finally, the third study, at an arts and history museum, explored how gift-giving could be applied to small groups of friends and family.

The thesis reports on how the approach enabled visitors to design highly personal experiences for one another and analyses how groups of visitors negotiated these experiences together in the museum visit, to reveal how this type of self-design framework for engaging audiences in a socially coherent way leads to rich, stimulating visits for the whole group and each individual member. The thesis concludes by recommending the design and gifting of museum and gallery interpretation experiences as a method for providing deeply personalised experiences, increasing visitor participation, and delivering meaningful group experiences.

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Chapter One: Introduction

Digital technologies provide many opportunities for novel and engaging experiences with cultural heritage in museums and galleries. The designers of these technologies face a combination of challenges unique to museum and gallery visiting. Firstly, the material that museums provide to support interpretation should be rich and allow visitors to engage deeply with the artefacts on display. Secondly, the capabilities of digital technologies to provide access to vast amounts of information should be balanced with the need to avoid overwhelming visitors with too much information than they can comfortably deal with, calling for increased personalisation of experiences. Thirdly, many visits take place in groups, and the social experience should be supported.

This thesis addresses the challenge of supporting interpretation, personalisation and socialisation in a museum visit. The research involves a series of designs that tackle these problems in turn, iteratively building on one another to deliver an experience that is at once personal and social.

1.1 Context and Motivation

The market for leisure and cultural visiting is changing. Over the past few years, when people visit places of interest, they are increasingly being offered *experiences* around them. In cities such as London and New York, immersive film screenings and music performances are major events for customers who want an increasingly participatory experience with cultural content, and to weave these experiences into their social activities, attending with groups of friends and posting about it on social media (Atkinson and Kennedy, 2015). Museums and galleries are also part of this trend. Late night openings offer a more relaxed and social visit, with some museums offer additional events such as speed dating (Science Museum, 2015), and participatory events being on the agenda for museums' marketing departments and curators alike (Reed Rozan, 2014).

This move towards providing social experiences has also been seen in the design of digital technologies for museums and galleries, where there has been a shift from technology for personal use, such as traditional audio guides, to those that support collaborative interaction between visitors. Social interaction is, however, just one part of a successful museum visit, and designers of digital technologies need to be careful to balance the increasingly popular social functions with the less on-trend features that visitors derive value from.

A 'holy grail' for museums and galleries is to create a deep and personal engagement with exhibits, giving visitors the opportunity to consider exhibits with the support of interpretation material, such as information panels, guide books and audio guides. This material can support the *process* of interpretation, a key concept to this thesis, which is defined broadly as the forming of an understanding or meaning of an object or artwork by a visitor. This might be the result of intellectual scrutiny of the object and the supporting materials, or might simply be formed upon viewing an object, without any intentional analysis. It might come about through discussion with others, or by the visitor alone. The content of interpretation is not limited to a particular focus. An interpretation might be about what the viewer understands a painting as depicting, or what a historical object was used for. It might be about a concept or political stance that the artist intended to convey. Put simply, interpretation refers to the thoughts that a visitor has when visually and intellectually engaging with an object in the world, and, consequently, what meaning they assign to the object.

Whereas the traditional role of the gallery or museum was to provide an official interpretation, the contemporary institution is typically more concerned with supporting visitors in engaging with multiple interpretations and perspectives, or in making their own interpretations (Whitehead, 2012). A consequence of delivering multiple interpretations is that visitors may be confronted with increasingly large volumes of information. The capability of digital technologies to provide access to huge volumes of online information only serves to compound this problem, threatening to distract attention away from the artefacts themselves or even overwhelm the visitor. At the same time, the vast and diverse range of people who visit museums makes it difficult to design content for an 'average' visitor. This has stimulated an interest in personalisation, typically by automatically recognising visitor types or visiting styles and filtering or adapting information accordingly (Ardissono et al., 2012).

Returning to the idea of a social visit, it is well documented that when most people visit museums, they do so as part of a group of friends, family or loved ones, and the social experience can be a key motivation for visiting in the first place (Falk and Dierking, 1992). This raises a number of challenges, from the problems of sharing audio guides (Aoki et al., 2002) to the difficulties that arise from splitting attention between artefacts and information on the one hand and the needs of fellow visitors on the other (Tolmie et al., 2014).

Addressing any one of these issues – delivering rich and engaging interpretation, personalising content to the visitors' needs or interests, and delivering these in a way that supports a social visit – is difficult enough, but the successful museum visit needs to accommodate all three simultaneously, enabling visitors to make rich interpretations from potentially large pools of information while also paying due attention to fellow visitors. It is this combined challenge that is addressed in this thesis and that can be summarised in the following research questions.

1.2 Research Questions

This thesis is centred around the research question:

> *How might digital technologies for museum and gallery visiting be designed to support interpretation, personalisation and social visiting?*

The term "digital technologies for museum and gallery visiting" covers a range of

approaches and platforms for augmenting the visiting experience, which will be explored in more detail in Chapter 2's literature review and briefly summarised here. There is a wide variety of ways that digital technologies can be integrated into the museum visiting experience, for example, a museum's website might allow visitor to plan their visit ahead of visiting in person, while other technologies might support the visit as it happens. During the visit itself, technological interventions might take the form of mobile, portable platforms that can be carried by the visitor, or standalone, installations and reactive exhibition spaces. Technologies might support the visit of individual visitors, for example, a personal mobile audioguide, or multiple visitors, for example, an interactive tabletop interface. This thesis focuses on digital technologies that support the museum visit in the moment, and take the form of mobile, portable visiting experiences that support individuals and small groups.

The research question is investigated through a series of iterative user-centred design and evaluation studies. The studies address, in turn, the following sub-questions:

1. *How can interpretation be supported in digital technologies for museum and gallery visiting?*
2. *How can personalisation be delivered by digital technologies for museum and gallery visiting?*
3. *How can social visiting be supported by digital technologies for museum and gallery visiting?*

1.3 Methodology and Approach

This section will briefly present and discuss the methodology employed in the thesis and the approach taken.

1.3.1 Research "in the Wild"

It makes little sense to study museum and gallery visiting technologies outside of their context of use. That context includes the physical structure of the museum or gallery, the layout of the interior, the exhibits on display, the supporting interpretation, the presence of staff and other visitors, and so on. This context is so integral to the design and study of a visiting experience that it would be almost impossible to carry out this type of research anywhere other than within that context. This naturalistic, "in the wild" approach responds to how technology has become embedded in our everyday lives (Crabtree et al., 2013).

There are benefits and drawbacks to this approach. The most tangible benefit is of being able to engage with the context described above and the objects on display, the expertly-curated exhibitions and the real-world constraints, such as, perhaps, crowding by other visitors blocking access to the exhibits on display. On the other hand, designing and studying visiting technologies in situ is not without its challenges. Many exhibitions that technologies are trialled in haven't been designed for visitors to explore with technologies, so integrating technologies into the environment isn't possible. Instead, the technology is 'dropped in' and expected to fit with the carefully designed layout, display and interpretation media that already populate the space. Additionally, setting up research in the wild, especially if participants will also be recruited in the context of use means it can be difficult to understand the whole picture of the visit outside of the museum/gallery walls, such as how the visit experience fit with the rest of the visitor's day, and how they might come to think about the experience in the future.

The approach differs from user-centred and ethnographic methodologies, which typically involve observing and studying populations to understand existing practices before suggesting design implications – instead it focuses on creating and evaluating experiences in the context of use (Rogers, 2012). The reasoning behind this part of the approach was that there is already a large body of existing ethnographic work in museum and gallery visiting, and of particular relevance was a group of studies being carried out for the multi-partner, EU-funded CHESS project by colleagues in the Mixed Reality Lab including the ethnographer Peter Tolmie[1]. Tolmie carried out a series of in depth ethnographies at two museums in Europe – the Cite de l'Espace space museum in Toulous, and the Acropolis museum in Athens and published highlights from the results (Tolmie et al., 2014).

Moreover, the "in the wild" approach is not necessarily concerned with fitting neatly in to existing practices. It is more common for in the wild researchers to develop experimental technologies that augment environments and practices that might change or disrupt behaviour. By studying how interventions are experienced by users, and how they behave in response, it is possible to investigate how they might be integrated into the "wild" context. That is not to say researchers completely disregard

[1] http://www.chessexperience.eu/

normal practices, indeed the research presented in this thesis takes a series of concepts from HCI theory, situates them within literature on visiting practices, and applies them to the design of a visiting experience.

The studies presented in this thesis were situated in three different real world settings – an outdoor sculpture garden, a contemporary art gallery and an arts and local history museum. They were set up with a degree of collaboration with the curators and managers of the institutions who provided access to the collection and the background interpretation on the exhibitions and helped organise the practicalities of the studies. The approach is iterative, in the style of user-centred design (Macguire, 2001). Each intervention is studied in situ with visitors and the results used to validate or inform aspects of the design.

The initial choice of an outdoor sculpture garden was motivated by an early design opportunity that would utilise GPS location positioning and deliver content to visitors automatically based on where they were in the heritage setting. Upon early pilot testing, it became clear that the positioning was not accurate enough to support the experience as intended. It was therefore decided to replace the GPS positioning with a more user-driven approach that relied on the visitor to select the content based on where they were in the garden. Having gained an understanding of how the approach worked in the outdoor sculpture garden, it was decided that, for the second iteration, it would be of interest to move the experience to an indoor setting that would allow the approach to be studied in a more mainstream environment. Finally, carrying out the third study in another indoor venue, with a different layout, range of content, and interpretation strategy, enabled the research to continue exploring the approach in a range of contrasting heritage settings. While differences were observed between the settings before the interventions were added, for example, visitors spending more time engaging with exhibits in indoor settings, there were also similarities, such as the exhibits being laid out along a clear path in the sculpture garden that mirrored how many indoor exhibitions are designed. Studying the experience in three settings enabled the research to explore the design opportunities and constraints associated with each exhibition space and allow the experience to develop accordingly.

1.3.2 Design Approach

The approach taken by this thesis was to apply concepts from theory to the design of museum and gallery experiences.

1.3.2.1 Trajectories

The first challenge for this research was to design a visiting experience that delivered interpretation in a way that supports a deep engagement with exhibits that leads visitors into making interpretations. It was noted that visitors may find it difficult to instantaneously switch into a mode of deep engagement with an exhibit, and when visitors do engage, numerous distractions may interfere, notably the presence of other visitors and the demands of group members. As a result, it is notoriously difficult to create a deep engagement between visitors and exhibits.

The thesis begins by exploring whether a recent idea to emerge from HCI – that of 'trajectories' – might offer a solution. The notion of 'interactive trajectories' emerged from studies of collaborative behaviour in galleries and museums in which visitors' interactions were seen to shape those of subsequent visitors. These studies inspired a series of trajectory-related concepts including principles for the design of spectator interfaces (Reeves, 2011), chaining public displays (Koppel et al., 2012), and a general framework for designing extended cultural experiences in terms of canonical, participant and historic trajectories (Benford et al., 2009; Benford & Giannachi, 2011). These concepts have been used to compare existing experiences and to analyse data from studies (Flintham et al., 2011), with a focus on interactive performances (Benford et al., 2011). They had not, at the time the study was carried out, been proactively applied to the design of new experiences, reflecting a wider challenge for HCI of putting theory into practice (Rogers, 2012).

At the same time as designing the content of the experience (which will be introduced in Chapter 3), the trajectories framework was employed to structure the delivery of this content in a visiting experience. The framework was used from the very outset, with the concepts set out by Benford et al. (2009) and Benford and Giannachi (2011) informing the experience design. The framework asserts that cultural user experiences may extend over multiple and hybrid spaces, timescales, roles and interfaces. These can be expressed by using the concept of a trajectory: the user's journey through the user experience over space, time, roles and interfaces. Benford and Giannachi propose three types of trajectory:

- The *canonical trajectory*: the designer's plan for how a user will engage with the experience
- *Participant trajectories*: what each participant actually does when they engage

with the experience

- *Historic trajectories*: opportunities within the experience for participants to reflect on and recount experiences.

Central to the trajectories framework is the concept of *transitions*, which are the key points along the trajectory at which users may switch between hybrid structures. Transitions include *beginnings, endings, role and interface transitions, access to physical resources, episodes*, and *seams* in the underlying infrastructure. The framework encourages careful design and management around transitions to ensure continuity is sustained.

It is important for designers to consider how participant trajectories might *diverge* and *reconverge* with canonical trajectories, and also how different participant trajectories might *interleave* through *encounters*. This might involve considering moments of *isolation* and *pacing* to best structure multiple participant trajectories.

The ways in which these various concepts informed the design of the visiting experience are presented in Chapter 3.

1.3.2.2 Gift-giving

Another set of concepts that informed the ongoing design of the museum visiting experience comes from the anthropological and sociological literature on gift-giving, which will be discussed later in the thesis. To briefly introduce it as a concept, a gift is something given from one person to another without the expectation of imbursement. While gifts are often thought of as material objects such as presents, gifts can also be non-material, including invitations to meals or accommodation, and care or help (Komte and Vollebergh, 1997). The sociological literature tells us that gift giving is an important and complex social activity involving a gift giver, a gift recipient and possibly others too. Especially important aspects of gift giving are that: gift exchanges are social occasions; gifting involves social obligation and reciprocity; and gift assessment can be a tricky social moment involving saving face.

As stated above, the aims of the thesis are to support interpretation, personalisation and socialisation through applying key concepts from trajectories and, later, gift-giving to the design of a visiting experience. The design and study will be presented through chapters 3, where interpretation is the key focus, 4, where the focus will be on how to personalise the experience designed in chapter 3, and 5, where it is considered

how the experience can be socialised.

1.3.3 Research Methods

Alongside the general approach detailed in 1.3.1, the research employs the following methods:

- Naturalistic, ethnographic observation of participants, including video recording and analysis
- Semi-structured interviews
- Design workshops

These methods will be described in more detail in each of the Chapters 3, 4 and 5, where each of the study approaches are presented.

1.4 Contributions

This multidisciplinary thesis has made significant contributions to the following academic fields.

1.4.1 Human Computer Interaction

The thesis contributes an understanding of how trajectories can be applied to the design of novel user experiences in the domain of museum and gallery visiting. This resulted in a full paper at the 2013 CHI conference on Human Factors in Computing Systems:

> Fosh, L., Benford, S., Reeves, S., Koleva, B., Brundell, P. (2013) `See Me, Feel Me, Touch Me, Hear Me': Trajectories and interpretation in a sculpture garden. In *Proceedings of SIGCHI Conference on Human Factors in Computing Systems (CHI 2013).* ACM Press.

The thesis also contributes the documentation and analysis of how gift-giving can be applied to the design of personalised museum and gallery visiting experiences. The research resulted in a full paper at the 2014 CHI conference on human factors in computing systems:

> Fosh, L., Benford, S., Reeves, S., Koleva, B. (2014) Gifting Personal Interpretations in Galleries. In *Proceedings of SIGCHI Conference on Human Factors in Computing Systems (CHI 2014).* ACM Press.

1.4.2 Museum studies

The research has also contributed to the field of museum studies where it is applicable

to museum professionals and technology designers alike. The contribution is a novel method for personalising social visits, generating gift experiences that can be relatively easily implemented into museum visits without the need for additional infrastructure. The research was disseminated as a full paper at the 2015 Museums and the Web conference:

> Fosh, L., Lorenz, K., Benford, S., Koleva, B. (2015) Personal and Social? Designing personalised experiences for groups in museums. In *Proceedings of the 19th Annual Museums and the Web Conference (MW 2015).*

1.4.3 User Modelling and Personalisation

The research contributes a novel method for personalisation that takes the interpersonal relationships between those who know each other well as a basis for personalising museum and gallery visiting experiences. The research was published as a full paper at the 2015 User Modelling, Adaptation and Personalisation conference:

> Fosh, L., Benford, S., Koleva, B., Lorenz, K. (2015) Gifting as a novel mechanism for personalised museum and gallery interpretation. In *User Modelling, Adaptation and Personalisation.* Springer International Publishing.

1.4.4 Social Computing

The contribution to social computing is the reconfiguration of the social dynamic of group museum visiting by extending gift-giving. Through studying this, an understanding of how groups managed and configured themselves was established. Moreover, the research re-framed the notion of social coherence as an esoteric property that extended beyond proximity, and set up future work on how to support and detect this kind of coherence in groups. This was reported on in a full paper at the 2016 Computer-Supported Cooperative Work and Social Computing conference:

> Fosh, L., Benford, S., & Koleva, B. (2016). Supporting group coherence in a museum visit. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*. ACM Press.

1.5 Thesis Outline

Following on from this introduction, this thesis presents a review of the literature, the three studies of the design and study of the visiting experiences, and a discussion of the implications of the research on the thesis themes.

Chapter Two presents a review of the current state of the literature around the three broad areas that contribute to defining the research question: museum interpretation, personalisation and social visiting. The overlaps between the areas are explored to focus on how they have been considered in conjunction, and the ways in which the research question has been approached before.

Chapter Three presents the first study of the thesis that sought to address the first research sub-question: how to support interpretation. The chapter describes the design approach, drawing on concepts from the trajectories theoretical framework, and how the design was implemented and studied at a sculpture garden.

Chapter Four continues the presentation of the thesis' empirical work with the second study, building on the study in Chapter 3 and responding to the second research sub-question around personalisation. An approach developed from the concepts of gift-giving is developed and applied to the personalisation of a gallery visiting experience. The designs and resulting visits are documented.

Chapter Five presents the final empirical study of small groups of friends and family at a museum. The study addresses the third research sub-question of how to support social visiting. It builds upon the work of Chapters 3 and 4 to extend the gifting experience beyond pairs to small groups. The design and study of the group visits are presented.

Chapter Six provides a thematic discussion of the results of the three studies. The chapter begins with a reflection on designing with trajectories, before presenting the three themes that arose from the thesis work: interpretation, personalisation and socialisation. These are discussed with reference to the three studies and surrounding literature.

Chapter Seven concludes the thesis by answering the research questions, summarising the contributions of the thesis, highlighting the limitations and caveats of the research, and pointing to future work to be carried out.

Chapter Two: Literature Review

This thesis begins with a literature review that will ground the work within the existing ideas, practice and theory upon which the research builds, and identify the gap in the literature that the research questions are intended to fill.

As introduced in Chapter One, the research is centred around three themes: interpretation, personalisation and socialisation within the museum visit. This review will continue with this thematic categorization, first looking at interpretation in museums and galleries, before examining the themes of personalisation and socialisation and their roles within museum and gallery visiting.

In this chapter, each theme will be introduced with a broad introduction to the discipline that informs it, before digging deeper to examine the theme and how it relates to the thesis question. Museum and visitor studies will inform the theme of interpretation; user modelling and personalisation (within computer science) will inform the theme of personalisation, while CSCW and social computing will inform the theme of socialisation. Finally, the three will be drawn together to review the research that investigates personalisation towards groups in museum visiting.

2.1 Introducing the Literature Review

The literature reviewed here is split across three broad areas: museum interpretation, personalisation and social computing. The first section (2.2) introduces interpretation as a practice within museum studies and documents the ways that this has been supported through digital technologies over the past decades. Next, section 2.3 will broadly introduce personalisation within computer science before section 2.4 examines how personalisation has been applied to digital technologies in museums and galleries, building upon the introduction to museum interpretation technologies presented in 2.2. Section 2.5 will introduce CSCW and social computing, before 2.6 drills down to social experiences for museums and galleries. Finally, 2.7 pulls together the three strands, first by introducing the general relationship between personalisation and social computing, before exploring research into how the two have been combined in previous museum and gallery visiting technologies.

2.2 Interpretation

The first set of literature to be covered here provides a background to how visitors are supported in making interpretations when visiting museums and galleries. This section of the review provides a summary of the theoretical background in support of how visitors engage with museum material alongside the artefacts themselves, and examines the relationship between object, interpretation and visitor. Next, a brief history of the key trends in delivering interpretation material is presented, including recent advances in digital interpretation systems. This section is intended to introduce the area and provide a background to a more detailed review of personalisation of digital museum interpretation (2.4) and interpretation for groups (2.7).

For many centuries, museums have collected and displayed objects of high historical, cultural, scientific or artistic interest or significance. Originally established to house collections for wealthy individuals or private institutions, they are now more commonly open to the public, offering access to artefacts for public viewing. The role of museums has also changed to encompass goals such as education, entertainment and interpretation. Curation and display of artefacts are highly specialised areas of expertise and are roles undertaken by highly qualified individuals. The display of artefacts can be organised in various ways to create engaging experiences for visitors by creating narratives, grouping objects together to draw similarities or comparisons, or considering the spatial layout to determine the order in which objects are viewed.

In addition to the spatial display of artefacts, interpretation resources such as text labels and information panels are placed among collections to provide a more direct educational function. Interpretation resources can take a number of approaches, from simply giving factual information to inviting visitors to construct their own interpretations.

The rise in the computing power and ubiquity of handheld and personal digital technologies has provided exhibition designers with new opportunities for the presentation of interpretation content. Audio guides were introduced to museums as early as the 1950s, presenting visitors with a taped, ordered commentary of the exhibition's content (Tallon, 2008). This format of vocally recorded interpretation has remained popular with many museums and galleries offering visitors the opportunity to borrow a handheld device at an additional cost. More recently, museums have begun to offer freely available apps for visitors to download on their own smartphones and tablets (Economou and Meintani, 2011). These typically add additional information to that which can be displayed physically in the museum space, via text, audio, video, or a combination, or an interactive element such as gameplay or playful information seeking. Digital museum guides have made use of such advances in technology as location awareness - typically difficult within the confines of an indoor space - as an alternative to user-driven interaction or timing, to deliver content appropriate to the user's position and context within the museum (Hinze and Voisard, 2003; Satoh, 2008). Other popular technologies to be adopted by those designing museum interpretation content include tabletop interfaces, that allow multiple visitors to interact with content on a static display (Horn et al., 2012) and augmented reality, that can offer users heightened, unique and immersive experiences around the museum content, but that could threaten to distract attention away from the items on display (Miyashita et al., 2008; Terrenghi & Zimmermann, 2004).

2.3 Personalisation

In recent years, personalisation has become an increasingly widespread feature over a range of digital services. Customers buying products and services are increasingly tracked by retailers who use the data collected to recommend purchasing options or target the customer with personalised advertisements, in order to maximise the chance of them finding a suitable product and making a purchase (Goy et al., 2007). Search engine giants have had a keen interest in personalisation as a way to effectively tailor

search results to the user's background and context, increasing the efficiency of the search service (Sieg et al., 2007). Entertainment services, such as online television and music streaming, also employ personalisation techniques to recommend content to users, and have been a topic for personalisation research (Ali and Van Stam, 2004; Hansen and Golbeck, 2009). Alongside entertainment and commerce, approaches to personalisation have also been applied to healthcare services in order to increase the user's physical activity (Lee et al., 2015) and a range of ubiquitous computing technologies tailor environments to users' preferences (Gallacher et al., 2013).

Personalisation typically involves gathering information about a user, then using this as a basis for delivering a service or content that best fits the needs or preferences of the user. The first stage of this process is known as user modelling – building up a representation of the user that might contain information about their interests, skills, knowledge, and data collected about their behaviour (see Fischer, 2001). Data about the user can be gathered explicitly, for example by collecting ratings or personal details the user voluntarily gives to the service (Hu and Pu, 2010), or implicitly, for example by tracking a user's previous purchases or behaviour (Schein et al., 2002). In recent years, the implicit collection of user data has become widespread as a method for building user models, and enabling those models to be updated as user preferences and behaviours change.

Having built up a model of characteristics of the user that relate to the personalisation task at hand, recommender systems use this model to filter content to the user's inferred preferences or needs. There are two main types of approach to filtering content which are now summarised. Collaborative filtering approaches recommend items based on the assumption that people with similar tastes and preferences will agree on other, new recommendations. The approach involves comparing the user model with data collected from many other users to determine a set of recommended content that is expected to be suitable for the user (Sarwar et al., 2001). Content-based approaches, on the other hand, use properties of the items involved, matching characteristics of the items to the model of the user's preferences (Van Meteren & Someren, 2000). It is increasingly commonplace to blend the two approaches in modern recommender systems (see Ducheneaut et al., 2009).

Despite the ongoing optimisation and refinement of user modelling, recommender systems and the algorithms behind them, researchers have noted the limitations of

automated personalisation. Adomavicius et al. have explored how users' preferences can actually be influenced by the predictions generated from recommender systems (Adomavicius et al., 2011), leading to efforts to remove bias (Adomavicius et al., 2014). Additionally, studies have shown that users harbour reservations about the amount of data that must be given up in order to receive a personalised service, reflecting growing concerns about the privacy implications of automated, data-based personalisation methods (Panjwani et al., 2003).

An alternative approach to automated personalisation offers users the opportunity to customise a service themselves (Blom and Monk, 2003; Saari and Turpeinen, 2004), however some research suggests that giving users too much choice can be overwhelming and decrease satisfaction (Iyengar and Lepper, 2000). Recently, research has revisited the idea of helping users to personalise services for themselves through reflection on their own goals and motivations around physical activity (Lee et al., 2015). This move away from automated, data-driven personalisation is particularly relevant to museum visiting, an activity that is infrequent and relatively short-lived, making it difficult for systems to capture data and build up a user model. Approaches to personalisation in museum visiting are now discussed in the following section of the literature review.

2.4 Personalising Museum Visiting Experiences

There is already an extensive body of literature related to personalisation in museums spanning the building of user models, matching content to users, and even supporting groups of visitors (Ardissono et al., 2012 provides a thorough review). The following section reviews the techniques to model users in this domain, ranging from questionnaires to location monitoring, before turning to look at the content itself and how it is tailored to the visitor types or behaviours that they differentiate between.

2.4.1 Modelling Visitors

Visits to individual museums are typically one-off and relatively short-term activities, making it difficult for systems to build up knowledge about a visitor. One common method of initially gathering knowledge is to request it directly from the visitor. Some cultural heritage and tourist guides have required visitors to configure their own user models by filling out a form of questionnaire with details of their interests and backgrounds (Cheverst et al., 2002; Vayanou et al., 2014). It has been noted, however,

that the effort involved in filling questionnaires does not correlate with visitors' expectations for the start of a visit to a museum (Fantoni, 2003). Other, less time consuming, ways to gather information from users about themselves have included asking visitors to assign themselves an avatar (Stock et al., 2007) or category (Fantoni, 2003), effectively assigning them to a particular segmentation of the museum's audience based on their motivations and level of expertise. By broadly categorising visitors into relatively few categories, this approach to personalisation lacks the ability to tailor experiences to visitors' personal qualities or interests, and relies somewhat on stereotypes of what the different categories of visitors are *likely* to want to learn or see.

2.4.2 Tracking Visitors' Behaviour

The initial modelling of the visitor, summarised above, is often supplemented with information gathered by tracking the visitor's behaviour during the visit, and updating the user model accordingly. This can involve recognising the places or objects the user has visited in the museum by tracking their location, or the content they have accessed within the visiting experience, and recommending artefacts or content similar to what they have shown an interest in (Opperman and Specht, 1999).

Tracking visitors commonly involves the use of location monitoring technologies. For outdoor venues, such as sculpture gardens and parks, GPS technologies can be used relatively easily to track visitors using satellite positioning. Most smartphones and tablets come with inbuilt GPS capability, and GPS cards can be easily added to devices that do not. GPS cannot be employed in indoor settings, however, since it relies on line-of-sight transmission between the device and satellites. Tracking location in indoor museums and galleries therefore requires less straightforward and 'off the shelf' positioning systems. Two main types of technology have been widely used to overcome this – infrared and radio frequency. Infrared systems involve emitters releasing a signal that is received by one or more receiver, but require a clear line-of-sight between the two, which can be interrupted by obstacles (such as people and exhibits) in busy museums, and need to be well spaced (Kuflik et al., 2011). Radio frequency based systems involve the transmission of signals over networks such as wi-fi, however these can also require a clear line-of-sight between modules or do not alone offer high levels of accuracy (Gu et al., 2009). Museums are a challenging setting for each of the different methods of indoor positioning due to

physical constraints, such as layout and density of objects and people, and the more fine grained challenge of determining visitors' points of interest, which is often not achieved by position alone and requires additional information about orientation and line of sight. As a result, accurate indoor positioning systems for museums can require multi-layered and specialist infrastructure that can be expensive to install (Kuflik et al., 2011).

Tracking visitors' locations can allow systems to gather information on what objects visitors have paid attention to, and how long they have spent engaging with them, allowing them to infer what the visitor has shown an interest in and deliver recommendations based on this (e.g. Petrelli and Not, 2005). Tracking visitors' movements can also allow additional tailoring of the visiting experience, such as matching movement patterns to known classifications of visiting style (Opperman and Specht, 2000). One such classification consisted of four styles of visiting: ant, fish, butterfly and grasshopper (Veron and Levasseur, 1983). The styles were characterised by the amount of time visitors spent examining objects, the order in which they visited objects, and the frequency with which they visited objects, for example, the grasshopper was characterised by having particular preferences, moving through the space to stop only at objects of particular interest and spending a considerable amount of the time at these. One system tracked visitors' movements in the space and matched them to this classification, tailoring the length and depth of information presentation according to the perceived visiting style (Gabrielli et al., 1999).

2.4.3 Recommending Content

Having gathered information about the visitor in one or more of the ways considered above, the next task for a personalised visiting experience is to deliver content that best matches the visitor model. Early tourist systems used features of the visitor, such as areas of interest, existing knowledge of the featured domain and technical competence, as a basis for adapting content and style of presentation via a simple mapping (Fink et al., 1998).

As more sophisticated systems are able to gather more information about the user, recommendations can be less easy to map to user models, and the scope for recommending content can be wider. Indeed, a common goal of modern personalised experiences is to allow visitors to engage with the vast and diverse range of content held by the museum, rather than channelling visitors into one of only a set number of

pre-defined experiences. The user model has been used to initially rank content based on how well it matches with visitors' interests and preferences to offer suggestions for places or objects of interest (Ardisonno et al., 2003).

In museums, it is often the case that visitors are interested in discovering new interests, rather than simply visiting objects relating to their existing knowledge. Personalised experiences have therefore integrated recommendations for artefacts that are semantically related to those the visitor has expressed interest in, rather than just those that directly match the visitor's interests (Wang et al., 2009).

Collaborative filtering techniques have been used by systems to recommend content by comparing visitors' behaviours with those of other visitors, and suggesting content that those with similar behaviour have gone on to enjoy. The rationale behind these approaches is the assumption that visitors with similar past behaviours will be likely to continue to enjoy similar visits. This technique was employed by Bohnert et al. in their museum guide that gauged a visitor's interest in an object by monitoring time spent with it and compared this to other visitors' interest in the same object. It then predicted the object likely to be visited next based on the objects visitors with similar interest had proceeded to visit (Bohnert et al., 2008).

Content-based filtering has also been trialled in museum guides offering personalised recommendations. De Gemmis et al.'s approach involved users rating artworks and tagging them with descriptors, allowing the system to recommend content whose curatorial descriptions were aligned with those the visitor rated highly (de Gemmis et al., 2008). The approach relies on visitors rating and tagging content before the recommendations can be generated, something which may not be welcome during a natural visit.

This overview of the common methods of generating personalised recommendations reveals the overwhelming use of computational methods to designate content to a visitor based on information they have offered or that has been gathered through automatic detection of behaviour.

2.4.4 Extending Personalisation Beyond the Visit

One key challenge for personalising museum experiences is that visits are typically relatively short, taking anywhere between an hour up to a whole day, and although repeat visits are common, it is difficult to connect multiple visits to one individual

user to build up a model of them, over time. As a result, even if a visitor returns to a museum or gallery multiple times, and connects with a personalised experience, they will be treated as a new user every time. The challenge was taken up by Floch et al. who devised a set of scenarios for 'lifelong cultural experiences' that would engage visitors in cultural visiting experiences across multiple visits to multiple sites (Floch et al., 2014). The paper points to the differences between cultural heritage sites with different subject matters and in different cultures and countries, and the challenges arising from this in delivering a personalised experience across sites. The authors pointed to future use of linked data, semantic web and cloud technologies to actualize the lifelong personalisation scenarios, a development that has previously been leveraged for other purposes such as internal, context-aware personalisation (Chou et al., 2005).

A more modest approach to extending the experience beyond the visit was proposed by Kuflik et al. (2014), whose framework to extend the visit by connecting the pre, during and post visit phases was applied to a mobile visiting guide for a small museum. Information was provided to visitors prior to their visit to assist them with planning to visit exhibits that are of personal interest to them. During the visit, relevant information was provided to them based on their visitor and visit models, and after the visit their experience was extended by supporting memories and reflections in the following weeks.

Evidence suggests that pre-visit planning can be a useful way for visitors to extend their visits. A systematic analysis of the motivations of visitors to London's Tate museum's website found that the highest proportion of visitors, 27%, were using the website to plan repeat visits - finding out about current and upcoming exhibitions (Villaespesa and Stack, 2015). 14% of visitors were planning a first time visit - seeking and finding information about what exhibitions are on, what is in the permanent collection, as well as practical information about opening times and ticket prices.

Consideration has also been given to how to support visitors in extending the experience after the physical visit. The Rememberer was designed to support visitors at San Francisco's Exploratorium in capturing their personal experiences for later reflection (Fleck et al., 2002). The tool allowed visitors to 'bookmark' the webpages of the exhibits they visited, adding photographs and notes. Most (10 of 17

participants) visited the webpages in the weeks following the visit, and some even shared the webpage with relatives. A similar approach was taken at Bletchley Park museum, where visitors could send text messages containing a description of their interests, around which a personalised website was created for them to use at home to follow up their visit (Mulholland et al., 2005). A similar proportion of the participants (20 of 35 secondary school pupils) was reported to follow up by visiting the webpage in a preliminary evaluation.

A final approach that researchers and practitioners have taken to personalise experiences beyond simply what happens in the museum is to draw connections between museum content and visitors' lives. An experience designed for a living history museum used a number of techniques to do this (Ciolfi and McLoughlin, 2012). For example, the experience included recorded 'memories' from characters at the site that would draw visitors' attention to aspects of the environment that has personal significance for the characters, allowing them to notice and attach personal meaning to the site. Characters' memories, often very personal and evocative in nature, prompted visitors to relate the content to their own lives and draw comparisons, deriving a deep meaning about the lives lived at the history museum.

2.5 Social Computing

The third broad set of literature concerns interactions with technology when multiple users are located in the same space. Over the last five decades, computing systems have become increasingly prevalent in workplaces, homes, public spaces and leisure spaces, and have increasingly been used to support collaborative tasks. Computer Supported Cooperative Work (CSCW) is an academic field that deals with understanding how groups of individuals use technology to perform tasks and how technology can be designed to support collaborative and cooperative work. Groups of people can work cooperatively on tasks synchronously or asynchronously, and can be collocated or remote, and CSCW can therefore be carried out with its participants working in four configurations of time and space (Baecker, 1995):

- same time/same place (for example, workers in a meeting room sharing an electronic whiteboard);
- same time/different place (for example, employees of the same company in different countries communicating via video-conferencing software);

- different time/same place (for example, workers on different shift patterns using project management software to share information on their task progress); and
- different time/different place (for example, employees of a multinational company who work in different places in different timezones.

Groups are supported in a range of work and leisure activities across these four configurations. In recent years, however, mobile devices have become almost ubiquitous among western societies, and uptake in developing countries is also happening at a higher rate than personal computing. Modern smartphones give their users the ability to communicate with others and access information on the Internet in almost any setting, including many social settings and activities involving others.

Prior work within HCI and CSCW has established the roles that mobile technologies, such as smartphones, have played in supporting distributed interactions, connecting remotely located individuals (Humphreys, 2010). As mobile technologies have become more embedded in everyday life and activities, research has turned to how to support face to face interactions around shared or individual devices. The research into collocated interactions is concerned, however, with both activities in which interaction with devices is central to the task being carried out, and how interaction with technology, outside of the primary activity, may interrupt or interweave with the primary social activity. This review will discuss each of these in turn.

CSCW literature has examined collaborative activities around technological devices and how best to support the types of interactions that occur. Ethnographic studies of cooperative work have been used to inform systems design that support collaboration and communication between those working together in air traffic control (Bentley et al., 1992). Findings have generally focussed on awareness as a key resource for successful collaborative experiences (Gross et al., 2005) as well as practices for coordination and control (Heath and Luff, 1992). More recently, research has turned away from the workplace to social and leisure activities such as visiting theme parks, where groups of users can collaboratively build souvenirs (Durrant et al., 2011), watching videos (O'Hara et al., 2007) and searching (Church et al., 2012). There has also been a greater amount of interest in mobile experiences such as in delivering notifications within groups (Fischer et al., 2013) and photo-sharing (Lucero et al., 2011).

Recent work has also examined how individuals manage, on the one hand, their device use, and on the other, their interaction with other people physically present. There is a persistent view of this kind of mobile phone usage as being detrimental to face-to-face social interactions (Turkle, 2011), with some research pointing to examples of behaviour that might be classed as "rude" (for example, Ames, 2013; Humphreys et al., 2013). Potential disruptions to social interaction such as these have prompted an interest in investigating the nature of individuals' interactions with mobiles in public and social spaces, and how best to deliver notifications that may interrupt social activities (Fischer et al., 2013). Porcheron et al. examined how individuals managed their interactions with mobile devices alongside their social activity of eating and drinking together, uncovering the methods and mechanisms by which interactions are embedded into the flow of social engagement, ultimately arguing that individuals are capable of working mobile interactions into their social engagement while suggesting ways in which technology could better support this (Porcheron et al., 2016).

In addition to the interactions discussed above, studies have explored how collocated people engage with and use systems (e.g. Luff and Jirotka, 1998), pointing to the need to consider how to interweave users' technology activities with the interactional resources they use in their social interactions, including gesture, gaze and orientation.

This review will delve deeper into the key aspects of social computing for this thesis in sections 2.6 (visiting museums in collocated groups) and 2.7 (personalisation for collocated groups).

2.6 Group visiting

2.6.1 Group Visiting Practices

In their pioneering work on deconstructing the museum visiting experience, Falk and Dierking define the experience of visiting to consist of a set of three intersecting spheres: the *physical context*, that is, the structures, exhibits and resources that make up the museum's buildings and content; the *personal context*, meaning the way in which an individual visitor views and experiences the content through their own personal lens; and the *social context*, which covers the ways in which the experience is shared with other visitors (Falk & Dierking, 1992). The social context describes firstly the groups of visitors and their makeup: the group members and the

relationships between them - such as parents with young children vs. groups consisting only of adults. Social context also covers the interplay of each group member's personal context, the perceived crowding of the museum and interactions with strangers and museum staff. Finally, the social agenda of the visit refers to the motivation for the group visit - to spend time together, to entertain children or to learn together or share knowledge about particular topics. The authors see these components of the social context as influencing the entire museum visiting experience, and vice versa. The implication is that to design for a coherent visiting experience one must take into account the personal, physical and social contexts simultaneously.

Heath et al. break down the social ordering of museum visiting in groups and pairs, finding that pairs of visitors use each other as resources when navigating museums (Heath et al., 2001). Visitors were found to approach and move away from exhibits together by organising their movements through vocal, visual and tactile interaction with each other. Galani and Chalmers distinguished three types of joint navigation (2002). Tightly connected groups examined objects together, shared a common pace and made decisions together. Loosely connected groups shared examination of only some objects, but maintained an awareness of each other. The third style, independent navigation, involved each visitor having their own pace and agenda. The authors found most visitors fell into the first category when exhibit information was not easily accessible, therefore stayed together to help each other interpret the exhibits. One of the key resources of co-visiting, they found, was mutual visibility, the extent to which individuals are able to see each other's location and interactions.

Building upon Heath and Hindmarsh's extensive ethnographic studies of workplaces, in which they found that objects were "momentarily and reflexively constituted within social interaction" (Heath and Hindmarsh, 2000), vom Lehn extended the ethnographic approach to understand not just how visitors move through physical space together, but also collaboratively engage in the work of interpreting objects (vom Lehn, 2006). He found that when pairs of visitors encounter objects together, one member of the pair would first characterise the object by providing the other with the resources to see it in a certain way. This was done by vocal utterances, bodily orientation and gesture. This suggests that the interaction between pairs visiting together influences how exhibits are interpreted by the individuals, reflecting a

finding from Heath and Hindmarsh's earlier work - that when an object is encountered within a small group, the object gains a significance that is unique to the specific context and series of interactions between the individuals involved (Heath and Hindmarsh, 2000).

The content of conversation between visitors has been examined in research by Bruder and Ucok that studied how individual visitors engaged in conversation with a researcher during a museum visit (Bruder and Ucok, 2000). Their overall finding was that talking about a painting made the images more meaningful for visitors, and the authors suggest the reason being that meanings of artworks can be interactively manufactured through discussion. As visitors verbalise their own opinions and listen to another's, they build upon utterances to construct further meaning. Additionally, visitors bring personal insights, experiences and opinions into their interpretation by using (often personal) narratives, such as anecdotes, to relate unfamiliar elements of the paintings to common reference points that are personal to their lives.

The research summarised above suggests that both conversation and physical interaction between visitors in pairs and small groups influences the nature of the visit in a number of ways: how visitors move around the space and what objects they attend to, and how they go on to engage with and interpret these objects. At the same time, as Falk and Dierking previously suggested (1992), social interaction is influenced by the interplay between the museum content (physical context) and the individuals' opinions and experiences (personal context).

2.6.2 Group Visiting Experiences

It is becoming increasingly common for museum visiting technologies to incorporate social functions that support groups rather than individual visitors.

As highlighted in Section 2.6.1, research into museum visiting over the last 25 years has revealed how museum visiting is often an inherently social practice and that interaction between group members can be a key resource in enjoying and learning from museum exhibits. In response, researchers have investigated how to develop visiting experiences that explicitly support interaction within groups of visitors to access content.

This section of the literature review will now examine technological interventions in museums that have been specifically designed for groups of visitors rather than

individuals. Following on from Section 2.3, the focus is on experiences for groups of visitors visiting the *same place* at the *same time*. The experiences discussed in this section can be broadly grouped into those that primarily support group awareness of each visitor's activities, those that primarily support communication between group members, and those that primarily support collaboration between group members. These will be explored in turn.

2.6.2.1 Awareness

Many visiting experiences, even those designed with groups in mind, are delivered on personal devices, such that even when visitors are in groups, each group member has their own device on which to receive content, and devices may be linked via a local network or not at all. In addition, the most common method of delivering information to visitors, without requiring them to shift their gaze away from exhibits to read text, is through audio recordings. As museums are traditionally quiet places of contemplation, and visitors access information at different paces, the use of individual headphones to deliver audio is widespread. This, however, can cause visitors to feel isolated from their companions, since they cannot share the resource and use it as a base for comparison or awareness of each other's activities, while also preventing them from easily entering into conversation. Aoki et al.'s *Sotto Voce* audio guide came with an innovative feature that allowed visitors to circumvent this problem (Aoki et al., 2002). Visitors in pairs were each given a mobile guidebook and accompanying headset on which to listen to an audio commentary of the museum exhibition. So far so normal. The twist was that visitors could 'tune in' to their partner's audio stream to 'eavesdrop' on what they were listening to. This access to each other's stream provided the pairs of visitors with an awareness of each other's current activity and a shared resource for conversation (should they wish to communicate). Use of the Sotto Voce system was compared with similar, pairwise use of an 'open-air' audio guide - a guide also used by pairs but which played audio through speakers rather than headphones, so that audio could be shared. Pairs of visitors using the Sotto Voce system were found to display more continuous engagement with each other and a naturalistic visiting style, as they integrated the information they received into their conversations. The eavesdropping feature was also found to result in visitors making comments about exhibits with a greater level of detail and depth. The results of the study suggested that eavesdropping was a way to

naturalistically integrate museum content into visitors' conversations and interactions, standing in contrast to typical audio guides or open air audio systems that cause visitors to struggle to build the interactional ties that support awareness and interaction.

The City project took awareness beyond the physical, co-present museum visit to support mixed-reality co-visiting (Brown et al., 2003). The system provided technological support for three types of visit: the physical, in-person visit, the virtual reality visit via a 3D environment, and the online, web-based visit. The integrated system provided methods for communication between the visit types, specifically the use of hybrid resources, represented online as well as in the real world; an audio channel for voice communication; location and orientation information for the visitors; and mutual visibility. These resources were found to be key to facilitating a co-visit between remote visitors.

2.6.2.2 Communication

Awareness alone may not be sufficient to support groups larger than two who are visiting in person at the same place. Visitors in groups of three or more may find it difficult to manage eavesdropping multiple companions' audio streams, and as noted above (2.6.1), groups of visitors are likely to separate from one another for at least part of the visit. In response, systems that allow visitors to communicate via the technology have been a popular way to support group visiting. Systems such as Hippie (Opperman and Specht, 1999) and Guide (Davies et al., 2001) allowed group members to send and receive messages during the visit. PIL combined message sending with context-awareness to enable users to share recommendations and request that a companion might "Come here." (Kuflik et al., 2007).

Laaksolahti et al.'s *Lega* supported the communication of expressive reactions to exhibits between group members (Laaksohlahti et al., 2011). The handheld tool allowed visitors to leave physical traces in response to artworks they had encountered, which could be picked up and experienced by other members of their group using their own *Lega* device. The *Lega* records signals from touch sensors and accelerometers and transmits these to other *Lega* devices. When a visitor receives a 'trace', they can feel them as vibration patterns that are designed to capture the movement of the original recorder. The *Lega* is an interesting system as the responses recorded and received were designed to be ambiguous and open to interpretation,

rather than to deliver specific messages, as was the case in the previously mentioned systems, nor were they delivered to a specific person. The authors propose that this allows visitors to make sense of the traces by reflecting on their knowledge of the person who sent it.

A final example of a system that supports communication between visitors is ArtLinks, which expands the audience for communication beyond those visiting together (Cosley et al., 2008). The system was designed to support connection between visitors, to create more meaningful and memorable experiences with objects. Visitors can leave responses to an artwork, read responses other visitors have had, and see a visualization that highlights the connections between their own responses and other visitors' responses, as well as connections based on demographic information such as age, gender, and hometown. The interface design gave precedence to connections to other visitors, a decision intended to promote further engagement and reflection in visitors - about the exhibit, their response to the exhibit, and their connections with other visitors. The results of a user study suggested that enabling visitors to reflect on their connections with other visitors was successful in raising visitors' awareness of connections with others, and thus made for a more meaningful experience, possibly by building or reflecting upon other visitors' responses.

2.6.2.3 Collaboration

The group experiences discussed so far have been generally supportive of existing group visiting behaviours, such that visitors can choose to engage with them to access extra support for their group visit, without having to change existing practices. Other experiences put group interaction at the heart of the visit in a way that may demand changes in visitors' behaviours in order to use the experience. The primary mode for this type of experience requires explicit collaboration between visitors in groups.

One such experience involved visitors playing games on mobile devices that contributed to a shared game on a public display (Dini et al., 2007). As visitors completed their own individual games, parts of a shared puzzle would be revealed on the public display. Visitors were therefore required to collaborate both by completing their own games to contribute to unlocking parts of the group puzzle, before having to collaborate once more to solve the puzzle on the shared screen. The collaborative nature of the games was intended to increase interactivity and enjoyment, with the ultimate aim of facilitating effective learning.

Another approach was to deliver an experience to groups of visitors in a way that necessitated communication in order to progress a narrative (Callaway et al., 2011). The design made use of a model of narrative tension and release that can stimulate engagement in dramatic productions. To achieve this, each group member was delivered a part of a story on a mobile device but key parts of the narrative would be left out. Other parts of the story were delivered to other group members, such that each visitor had enough of the narrative to capture their interest and build tension, but that required communication with other group members to find out what happened next. When the narrative tension technique was used in a study, the amount of conversation between group members increased, compared with another condition in which all group members were given the same content. The increase in interaction between visitors is positive, however the experience imposes a way of visiting that might not correspond with all groups' visiting styles and potentially overlooks the roles that group members might display.

One technology particularly suitable for collaboration in museums is the tabletop interface which will now be briefly discussed. These large horizontal displays support use by multiple people and sometimes multiple groups. They support friendly and collaborative activity due to their physical affordances - they can be approached by any angle and are often optimized to support concurrent use - and encourage face-to-face interaction around the device that can call to mind similar social 'around the table' activities such as working or dining (Geller, 2006). Tabletops can encourage cooperation by revealing additional features when visitors collaborate with each other (Taxen et al., 2004). Others support individual work in a cooperative environment, by giving visitors their own personal 'territories' on the tabletop interface, allowing parallel activities on equal terms (Klinkhammer et al., 2011). Tabletops can provide resources to foster conversation between visiting groups during (Correia et al., 2010) and after (Rocchi et al., 2008) the museum visit, and to assist social learning through collaborative games (Horn et al., 2012). Use of tabletops is generally public, and the study of an information browsing tabletop device revealed that visitors were more likely to stop and use the device when they could see others already doing so (Hornecker, 2008).

2.7 Personalising for Groups in Museums and Galleries

This literature review began by examining the traditions of interpretation in the

museum setting, how interpretation happens when visitors visit museums and how digital technology has influenced visiting activities and interpretation over the past decades. It has also looked at popular methods of personalisation and how they have previously been applied to museum visiting, as well as social computing and how it this has also been applied to museum visiting. The next step is to bring these together to look at how personalisation can be achieved for groups of visitors to museums and galleries. This section will first look broadly at the crossover between personalisation and social computing, before moving to look specifically at what the literature says about personalising for the group museum or gallery visit.

2.7.1 Personalisation, CSCW and Social Computing

Since the early days of CSCW research, it has been noted that, like all user-facing systems, it is not easy to design systems for collaborative use that the label 'one size fits all' can be applied to. Different group members, as well as groups as a whole, differ in their roles, skills, needs and objectives and so will have different requirements and preferences for the systems they use, therefore tools and user interfaces in CSCW systems should be adaptable to different group members (Greenberg, 1991). In groupware systems, this has generally been achieved by enabling the user to adapt the system's interface and functionality to meet their needs, rather than automated personalisation (e.g. Wolfe et al., 2009).

The personalisation community draws upon collaboration and social computing to develop algorithms for user modeling and recommender systems. As described above (Section 2.3), social recommender systems use collaborative filtering to make predictions about a given user by comparing it to data collected by many other users who might share similar preferences to the user being targeted (Sarwal et al., 2001). This involves comparing a user model with a large collection of social data and making assumptions about individuals based on other users with similar characteristics or behaviours.

These two communities - CSCW and personalisation - have begun to cross over to a greater extent in social media and personalised online services. Social networks such as Facebook and LinkedIn are built upon the connections between users, and interactions between users are modelled to deliver the most relevant content based on the user's previous social interactions (Lapides et al., 2015).

It is not surprising that the intersection of personalisation and social computing is fairly limited. Personalisation focuses on tailoring services to individual users while CSCW and social computing are concerned with collaboration and connections between users. Many CSCW systems that support both personal and collaborative work achieve this by separating the two and having a function to intertwine them (e.g., Prinz et al., 1998; Stahl and Hermann, 1999). One area where there is a more significant crossover is in Computer Supported Cooperative Learning (CSCL), which looks at social online environments for learning and education. It is common for learning environments to need to adapt pedagogies, activities, approaches and content to individual learners. Miao and Hope took a different approach, using characteristics of the group as a whole as a basis for adapting activities and teaching elements (Miao and Hoppe, 2005). They used characteristics of each group member to build models and formalise a representation that could be used in an existing personalised tutoring system. A 'proof of concept' prototype was developed but it is not documented whether the approach was actualized and tested with users.

2.7.2 Personalisation for Groups in Museums and Galleries

Within the domain of museum visiting, it is generally the case that digital technologies support personalisation *or* group support, and not both. There is, however, a small body of work that has begun to explore how to combine the two.

Luyten et al. describe a museum guide that includes both personalisation and social visiting support. Personalisation is achieved by building an adaptive user profile that can evolve as the user gives interactional 'clues' about their preferences - stopping a piece of interpretation media early, showing lack of interest, or bookmarking a piece of content, showing interest (Luyten et al., 2006). The way the content is presented can also be tailored to the visitor, for example a video piece could be presented as an animation or in documentary format. The group support aspect of the guide is a communication system that allows visitors to talk to each other in real-time over an audio channel, and send messages and media to each other's devices. The project's objective was to "discover the opportunities and benefits of a personalised approach while exploiting the social relationships of the visitors". Later work by the same group included a collaborative game alongside communication features, with a focus on learning through social interaction (Schroyen et al., 2007). In a similar way to the collaborative experiences in Section 2.6.2.3, the experience required visitors to

collaborate in a particular way to progress with the game and unlock content. A localization service determines when all team members are in the vicinity of the museum artefact that the game relates to, to suggest beginning the game at an appropriate time. The personalisation aspect of the game, however, is limited to the selection of a game avatar that can be styled to look a certain way - the intention being that visitors will make an avatar that looks like themselves.

Kuflik and Dim (2013) developed a categorization of the behaviour of pairs of visitors as they entered a museum. The six types of pair-behaviour represented the levels of synchronization between pairs, which could vary throughout the visit, and were labelled in a manner that followed Veron and Levaussaur's earlier categorization of individual visitors (1983) by giving them animal nicknames. Kuflik and Dim's choices were penguins, geese, meerkats, parrots, doves, and lone-wolves and were chosen following a video study of pairs of museum visitors. To give a flavour of what each category represented, penguins were those pairs of visitors who walked side by side, paying little attention to the exhibits either side of them, while geese represented pairs in which one visitor took the lead while the other followed behind. In a study, visitors wore radio frequency identification (RFID) tags that could be picked up by stationary beacons so that each visitor's approximate location could be relayed to a central system. The system was able to detect when pairs of visitors displayed the various pair-behaviour types, determining the dominant style for pairs of visitors, while recognizing that many pairs would show different behaviours throughout the visit. Being able to detect groups' visiting styles shows a great deal of promise for systems that can deliver content in a way that matches the styles of pairs of visitors. The same authors' earlier work considered how the physical 'togetherness' of a group might be used as a resource for determining when to suggest social activities in the visit, and when to recommend personal suggestions to an individual (i.e., when they are not in deep conversation with other visitors) (Dim and Kuflik, 2009).

Petrelli et al. present a design approach for a visiting guide at a World War I site that combined personal elements in an experience that was designed for pairs and small groups (Petrelli et al., 2016). Social visiting was supported by the use of soundscapes – speakers were used to play commentary and sound effects over air rather than through headphones. A personal visit was supported by allowing visitors to choose their own paths and content, which allowed them to interpret the heritage in their own,

personal ways.

Finally, a brief turn to the related tourism domain concludes this section of the literature review. INTRIGUE is a tourist information guide for groups visiting the city of Torino that tailors recommendations to groups rather than individuals (Ardissono et al., 2003). The system combines references from multiple group members to recommend city attractions for the whole group to visit. The recommendations are based on the group members' general interest and practical requirements (such as an elderly group member not being able to climb many flights of stairs). The system achieves this tasks, however it did not need to address the additional complexity involved in delivering tailored interpretations, as would be required in museums and galleries, alongside the attractions, nor did it proactively address the interactions between group members during the visit. Another recommender system designed for eliciting preferences from a group and suggesting travel destinations (Plua and Jameson, 2002). The system provided a means of collaboration such that group members could help others with preference specification, for example if one group member was unable to access the system, they could have another group member specify their preferences for them. However, this approach was most applicable to distributed groups to solve problems of accessibility.

2.8 Conclusion

This review has provided a background to each of the themes of the thesis and drawn out the key literature that provides a background to the research question. The literature reveals the benefits to museum visiting that providing interpretation, personalisation and support for group visiting can have for a museum visit.

The most significant literature for the thesis is situated in the spaces between the themes: how museum interpretation has been personalised, how museum interpretation has been socialised and, to a lesser extent, how personalisation and socialisation intersect. Key literature on the personalisation of museum interpretation has been around using the semantic relations between content to recommend artefacts and material that may not be directly related to the visitor as it would be in a traditional recommender system (Wang et al., 2009), and the shift away from thinking about the museum visit as a single, one off event, by connecting museum content and interpretation to aspects of the visitors' lives through extending the visit (Floch et al. ,

2014) and making connections to personal events and memories (Ciolfi and McLoughlin, 2012).

Within the area of socialising museum experiences, key literature relates to how to support awareness and communication in a way that supports both existing social behaviours and individual interpretation. Sotto Voce (Aoki et al., 2002) is a key example of supporting group awareness without interrupting the individual experience, while The Lega (Laaksolahti et al., 2012) and ArtLinks (Cosley et al., 2014) support visitors in socially sharing their interpretations.

Each discipline - museum studies, social computing and personalisation - has informed the mainly HCI literature that has been highlighted in the crossover areas, yet there is little work to be found that tackles the combined challenge of supporting interpretation, personalisation and socialisation. Luyten et al.'s work on a guide that supports personalisation and socialisation treat the two as separate features of a system, rather than integrating them into a holistic visit. Kuflik and Dim's work on detecting and tailoring content to groups is promising but does not directly address interpretation within those groups, instead focusing on suggesting activities. The recurring idea of collaboration as a way to engage groups - through games or narratives - does not address the need for supporting engagement and interpretation between visitors and the museum content. Finally, recommender systems that combine preferences from group members fall short of supporting the range of behaviours and interactions that make up group visiting.

This lack of integration, despite the large bodies of work relating to personalisation and supporting social visiting, suggests that combining the two in a coherent group visit is a challenge not to be taken lightly. This reinforces the decision to progress through the research sub-questions one-by-one, starting with the question of how to support interpretation, before addressing personalisation and later social visiting.

Chapter Three: Designing a Visiting Experience for Pairs

Museums and galleries are places that display objects of artistic, cultural, historical or educational interest. Visitors can engage with these objects on a number of levels, often supported by interpretation material provided by curators and exhibition designers. Exhibitions can support visitors in engaging deeply with objects, perhaps giving them space to explore the interpretations provided as well as their own ideas, which can lead to more meaningful visits. Achieving this, however, can be challenging.

This chapter documents the first step to applying trajectories to the design of an extended visiting experience in a particular setting that supports interpretation, personalisation and socialisation. The visiting experience described here, for a sculpture garden, was designed to weave together a set of interpretations from artists and designers and intended to give pairs of visitors the opportunity to engage deeply with sculptures in an unusual and enjoyable visit. The trajectories framework is applied to structure the experience in a first step to achieving the thesis aims.

This chapter first describes in detail the design of the experience content and structure, before reporting on a study of visitors at the sculpture garden as they engaged with the experience. The findings are discussed with relation to the key thesis themes of interpretation, personalisation and social visiting.

3.1 Approach and Objectives

As presented in Chapter 2, making interpretations in museums and galleries can be challenging for a number of possible reasons. Visitors might lack interpretation skills or prior knowledge, they might find it difficult to switch into a mode of engagement, and if they do engage, they might struggle to stay engaged when distractions arise. The study presented in this chapter explores whether a recent idea to emerge from HCI – that of 'trajectories' – might offer a solution. The notion of 'interactive trajectories' emerged from studies of collaborative behaviour in galleries and museums in which visitors' interactions were seen to shape those of subsequent visitors. These studies inspired a series of trajectory-related concepts including principles for the design of spectator interfaces (Reeves, 2011), chaining public displays (Koppel et al., 2012), and a general framework for designing extended cultural experiences in terms of canonical, participant and historic trajectories (Benford et al., 2009; Benford & Giannachi, 2011). These concepts have been used to compare existing experiences and to analyse data from studies (Flintham et al., 2011), with a focus on interactive performances (Benford et al., 2011). They had not, at the time the study was carried out, been proactively applied to the design of new experiences, reflecting a wider challenge for HCI of putting theory into practice (Rogers, 2012).

The overall approach was to directly apply Benford et al.'s collection of trajectories concepts to the design of a visiting experience at a sculpture garden. The trajectories framework was employed to design both a global trajectory through the garden as well as detailed local interactional trajectories through each sculpture, weaving together instructions, music and interpretation in an attempt to frame moments of deep personal engagement. The experience was deployed at a public sculpture garden for participants to trial 'in the wild' (Crabtree et al., 2013). The study followed an ethnographic style, using observation as participants used the experience and semi-structured interviews afterwards.

The study's objectives can be summarised by the following statements:

- To use the trajectories framework to design a visiting experience.
- To understand whether visitors followed the trajectory.
- To understand how visitors engaged with sculptures.

- To understand how visitors interpreted sculptures.
- To establish the ways in which the design extended the trajectories framework.

This chapter will now present how the study went about achieving these objectives, beginning with a detailed look at the design of the experience, before presenting the study approach and results, and the implications for the wider thesis questions.

3.3 Design of the Sculpture Garden Experience

This section describes the experience that was designed, including the setting, the content, the content delivery and the structure of the experience.

3.3.1 Setting

The setting for the experience was Rufford Abbey, a historic country house whose extensive grounds include the sculpture garden that is the focus of the design.

Figure 1: Rufford Abbey Country Park

Rufford Abbey Country Park lies in North Nottinghamshire in an area known as the Dukeries. Alongside a historic abbey (Fig. 1) and 150 acres of woodland sits a modern sculpture trail featuring 25 works collected and commissioned by Rufford over a 30-year period. The featured artists are mostly British and some are local to the Rufford area. The sculptures are positioned along a path such that there is a natural route they are to be encountered in. This raises similarities with indoor galleries and museums in which the arrangement of artefacts are carefully curated to create an ordered experience for visitors. The sculptures range in materials, with some carved

from different types of locally quarried stone and others made from metal, glass, wood or ceramic. The sculptures vary in form, but a number have a natural or organic theme, for example one piece, Pine Cube, features limb-like vines captured in bronze (see Fig. 2).

Figure 2: The sculpture 'Pine Cube '

Another sculpture entitled Here Today, Gone Tomorrow, commissioned specially for the garden, clearly links itself to the landscape around it. The sculpture takes the form of a road sign depicting how the landscape once looked, juxtaposed to the way it looks now, and inviting the viewer to compare the two (see Fig. 3). The sculptures are strongly linked to the environment around them, the acres of woodland and historic setting. The collection is therefore unique to its setting and could not be replicated elsewhere. There are strong themes of nature, change and organic structures running

through the sculpture trail.

Figure 3: The sculpture: 'Here Today, Gone Tomorrow'

The sculpture garden attracts a wide population of visitors, from elderly couples to family and school groups, and from those interested in art to those who have come to enjoy the countryside. Rufford has strong ties to the local community and makes its facilities accessible for education. The park welcomes families and school groups alike to visit its craft centre[2] and has materials available on its website for teachers for leading educational visits[3]. The website has additional resource sheets for particular sculptures that give information about the sculpture and a set of 'ideas to explore' – the tone of which suggests these are primarily for children[4].

The sculptures are arranged along a path that leads visitors through the garden with sculptures positioned along it. The sculptures are displayed with relatively little additional interpretation; three are accompanied by a plaque giving the name of the sculpture, the artist, and a description (see Fig. 4), while the remainder are free from

[2]http://cms.nottinghamshire.gov.uk/home/leisure/arts/ruffordcraftcentre/ruffordeducation.htm
[3]http://cms.nottinghamshire.gov.uk/ruffordsculpturetrailteachersresource.pdf
[4]For example, http://cms.nottinghamshire.gov.uk/ruffordsculpturetrailsheet5.pdf

any interpretation or labels. This meant there was a mostly ‘blank canvas’ against which to explore how to enhance engagement and interpretation.

Figure 4: The sculpture 'The Hand' and its interpretation panel

Upon initially visiting the sculpture garden, it was observed that visitors tended to walk around in groups, sometimes stopping to look at sculptures, but did not on the whole engage very deeply or for very long, nor did they touch sculptures or otherwise physically engage with them.

3.3.2 Designing the experience content

It was first decided that rather than deliver enhanced content for each of the 25 sculptures, a subset of those that were thought to offer an interesting experience would be selected. Nine sculptures were therefore chosen that were large and detailed enough to support visitors spending a couple of minutes looking at them and had space around them to explore them from a range of perspectives. The nine were positioned along the path that visitors are generally led to follow as they visit the sculpture trail.

It was decided early in the design process that three different pieces of content would be delivered alongside each of the sculptures in the visiting experience: a piece of music, an instruction for how to engage with the sculpture, and a portion of text. The

music was intended to set a mood for engagement and to temporarily remove external distractions, including that of other visitors, creating a kind of social isolation. Instructions were given to guide people into a particular form of engagement with the sculpture, one that may be slightly unusual or even gently provocative in asking visitors to do something they wouldn't normally do when engaging with a sculpture. Finally, information was chosen because this is what people would typically expect to get in an interpretation and was intended to satisfy visitors in learning about the sculptures rather than just experimenting with the music and instructions for engagement. The overall rationale was to create an unusual visiting experience that went beyond simply presenting information about the exhibits and offered opportunities to explore visitors' engagement with the sculpture garden in unique ways.

A sound designer and a performance poet were commissioned to help compose the extended visiting experience. The design process took place over a series of design meetings between the author, the sound designer and the performance artist. The basic content structure of a piece of music, a physical action and a portion of text were presented to the two artists. The sound designer chose a specific piece of music for each of the nine sculptures that had been selected from the garden. The performance artist then designed a series of performative interactions to match each sculpture and music track, encouraging visitors to engage by standing or moving in certain ways, adopting unusual viewpoints, or touching the sculptures. Finally, a portion of text was composed, drawing upon information published by Rufford on their website, detailing the background, themes or construction of the sculptures.

The net result was an unusual experience in which visitors were invited to engage with a series of sculptures alongside other artists' responses to – or interpretations of – them. The design of the three types of content – music, instructions and text – are now considered in turn.

3.3.2.1 Music

The selection of music was designed to reinforce the themes and materials that the author and sound artist associated with the sculptures. The sound artist worked with the author to list keywords for each sculpture based on their materials, their forms and the information written about them on Rufford's website. They drew up a shortlist of

songs, and then listened to these while viewing the sculpture in situ. Tracks that worked especially well were those that evoked a strong mood or mirrored the visual form of the sculpture. The final selection ranged across genres, mixing pop and classical. Almost all tracks were instrumental, and the few vocals that were present were very much in the background, as it was felt that lyrics would distract the visitor from the sculpture. By way of example, the stone sculpture Golden Delicious was assessed by studying the sculpture and reading background information, prompting the themes of happiness, health and vitality. *Noah's Ark* by CocoRosie was chosen because its low-key folk sound, interesting structure and positive lyrics and melody were deemed to fit the sculpture's form and themes.

3.3.2.2 Instructions

A range of actions was designed so as to sustain novelty and surprise at each new episode of interaction. It was important that each action was meaningful in the context of its particular sculpture, encouraging an unusual but relevant form of engagement. For example, the sculpture *Pine Cube* is surrounded by benches, so it seemed natural to ask people to sit here, while *Two Vessels* had an interesting texture that begged to be touched. Some sculptures did not suggest such obvious physical interactions, leading to more figurative instructions that stimulated the imagination. Thus, instructions might ask visitors to look closely at particular parts of a sculpture, answer questions, imagine stories, or undertake physical actions such as sitting, standing or climbing, marching or touching.

In a 2011 study, a mixed reality art experience instructed members of the public to adopt the role of a terrorist through a series of instructions delivered by phone calls (Tolmie et al., 2011). In this paper, it is suggested that compliance through instruction can take the form of four layers: locational compliance, sequential compliance, comportmental compliance and relational compliance. The instruction design drew upon Tolmie et al.'s notion of comportmental compliance: the way that instructions specify how individuals behave. As the experience requires users to carry out certain actions in order to engage with the sculptures in a particular way. In order for visitors to engage in the way intended they must understand clearly what they are being asked to do. Also relevant to the instruction design is the notion of relational compliance, which concerns how users relate to the experience as a whole or understand the

'underlying sense' of the set of instructions they are given. To achieve this, visitors must be made aware of the type of experience they should expect to have, in this case that their visit to the sculpture park goes above and beyond what is expected in an ordinary visit to a museum or sculpture garden. The experience therefore opened with a recorded message stating: *"Hello, my name is Francesca Beard. I'm a poet, and I'll be your guide on this tour of the sculpture garden …"* While not giving too much away about the rest of the experience, this was intended to set the tone for the rest of the visit.

The instruction design also drew heavily on the performance poet's experience of leading improvisation workshops. It was decided that the wording of the instructions should be gently persuasive rather than prescriptive, using opening phrases such as *"Why don't you..."* rather than simply telling the visitor what to do. The basic instructions were expanded on to set the mood for the engagement and to encourage the visitor to reflect. For example, at *The Hand*, the instruction reads, *"There are words written on this sculpture. How many will you read today? What story do they tell you?"* The frequent use of 'you' was intended to personally engage the visitor.

3.3.2.3 Text

Key material about each sculpture was extracted from the official visitor centre website and combined those with information about the musical accompaniment (including why it has been selected) to produce a single screen of official interpretation.

3.3.3 The Design Process

The design process began with a meeting with the sound designer, Rebecca Lee. The first meeting involved viewing images of the sculptures remotely from their natural setting and brainstorming words about the themes and ideas that the images evoked. The next meeting involved listening to a selection of music pieces that had been highlighted as potentially fitting the sculptures. The music tracks were listened to and their suitability was assessed by discussing how well they met with the set of themes as well as their mood, emotional tone and general fit. The final step was to listen to the music in situ, at the sculpture garden, to assess how it sounded in the presence of the sculpture.

Concurrently, the design process involved the commission of Francesca Beard, a performance poet and artist who also runs projects engaging members of the public with performance and literature, to design a set of instructions for how to physically engage with the sculptures in the experience. This involved working on two levels – first, designing the action to be carried out, then designing the spoken instruction for encouraging the visitor to carry out the action (recorded vocally by Francesca and mixed in to the music tracks). The instructions were brainstormed in a similar way to the music, by picking key words and themes, but with more of a focus on the physical form and space around the sculpture.

Francesca's experience with conducting performance workshops with members of the public influenced the phrasing of the instructions. She found that asking questions to put the emphasis on the individual who can then choose to perform, rather than simply instructing or demanding a response, would help people feel confident in performing gestures and actions. Her experience running storytelling workshops also influenced her instruction design, which prompted visitors to relate what they did and saw to themselves and use their imaginations to find meaning.

Finally, the information displayed about the sculptures was picked from information pages on the sculpture garden's website. The text was designed to be easily readable for those visiting the sculpture garden, therefore the portions of text were short and concise. They gave contextual information that summed up the themes and background to the sculptures.

3.3.4 The Content that was made

Table 1 shows the full content design for each of the sculptures in the experience. The content design for the first sculpture will be expanded on below by way of an example.

Table 1: The content of the sculpture garden expereince

Sculpture	Music	Instruction	Text
The Hand Roger Lee (1)	Penguin Cafe Orchestra – Music for a Found Harmonium	There are words written on this sculpture. How many will you read today? What story do they tell you?	The Hand's 'thumbs up' shape is based on the Makaton symbol meaning 'good'. Makaton is a modern picture language based on sign, symbols and gestures to support communication. The artist worked with children, young people and their carers who use

			Makaton to help design the sculpture. The sculpture's ideas came from their experiences and challenges in accessing parks and leisure spaces.
Highs and Lows David Parker (2)	Benjamin Britten – Three Divertimenti Waltz (Maggini Quartet)	Rest your eyes on the bottom of this metallic structure. Now let your mind weave in and out of the passages, along and in between the branches. Where do you end up?	David Parker made Highs and Lows during his artist's residency at Rufford in 2002. He was inspired by the architecture of the vaulted ceilings in the Abbey's ruins and the large trees standing nearby. The artist describes his sculpture as "structural and organic".
Golden Delicious Michael Disley (3)	CocoRosie – Noah's Ark	This man has brought you an apple. Why don't you take it and put it in your pocket? Or maybe you would like to eat it?	Michael Disley (b 1962) is a sculptor in stone. He studied at Sunderland Polytechnic and Trent Polytechnic from 1981 – 86. He has worked in Britain and Japan, but most of his major commissions and residencies have been in Northern England. Golden Delicious was commissioned by Rufford in 2003. The sculpture is carved from one piece of sandstone. Disley carved the sculpture outside in the Yorkshire quarry where the stone was sourced.
T*wo Vessels* Robin Welch and Rachel Wood (4)	John Cage – Sonata 5	Take your hands and move them down the pillar to feel the texture. How did it get like that?	Based on the Australian BoabTree, Two Vessels was made using a coiling clay technique. The surface texture was created by throwing wet clay scraps onto the surface to suggest the feel and look of tree bark. A slip and copper wash was then applied to the sculpture to colour and darken the clay, helping to emphasise the character of the surface.
Young Girl John R Meikle (5)	PJ Harvey – Girl	Why don't you have a closer look at this girl? Who is she? What does she look like?	The sculpture is modelled on the artist's daughter. He took a plaster cast of the girl which he then remodelled and carved before casting the final sculpture in aluminium.
Chimney Stacks and Iron Bridge Archway Robert Harrison (6)	Handel – Water Music Suite 2	Is anyone around? Why don't you hold your head high and march through the arches. There are many different paths, but which one will you choose?	British Chimneys have inspired much of Robert's work. This sculpture was inspired by the elaborate chimneys of Hampton Court Palace in London, a Tudor building that has the largest number of decorative chimneys in the country – 241! He created the sculpture's structures from working with fresh, wet brick and pipe clay.
Fruit Gatherers Peter Randall Page (7)	Robbie Robertson and the Red Road Ensemble –	Choose a place in this group and stand there, still as a statue. Who are the three others in your	Peter Randall-Page was inspired to make Fruit Gatherers after seeing a photograph of Native

	Heartbeat Drum Song	group? What is your story?	American women carrying baskets on their heads taken by Edward Curtis in 1907.
The Shrine at Nemi Peter Lewis (8)	Alfonso Ferrabosco - Dovehouse Pavan	Diana might be watching you, but climb up the steps and see if you can peer into the tiny temple. What do you see?	The Shrine at Nemi was made to commemorate a special part of Rufford's history. One of the former owners of the Rufford estate, Sir John Savile, was a keen artist and archaeologist. In 1885 he sponsored an archaeological dig near Nemi in Italy, at the site of a temple dedicated to the Roman Goddess Diana – the goddess of nature. Peter Lewis observed this when creating this interesting sculpture depicting the Goddess Diana overseeing the temple.
Pine Cube Richard Perry (9)	John Zorn - Mentiras	Why don't you have a seat? If you close your eyes, count to ten and then open them, have the shapes moved?	Richard Perry has made sculptures in both stone and bronze, which involve very different techniques; stone is carved and bronze is cast. Carving involves starting with a material and using tools to subtract that material to create shape. Casting is an additive process, adding a material to the cast to create shape.

The first sculpture in the experience was The Hand, a large metallic sculpture of a hand in a 'thumbs up' position. On looking closely, it is possible to read words on the sculpture that have been forged out of the metal the sculpture is made from. It was made by the artist Roger Lee who worked with local children, young people and their carers who use Makaton, a language programme that uses signs and symbols to support communication in those who struggle with speech communication. The words written on the sculpture include 'acceptance', 'community' and 'exclusion' – words that the artist found came up in his work with young people – and symbols such as arrows, hearts and the wheelchair access symbol. The sculpture is placed prominently in the garden and has space around it for visitors to walk around and look from multiple angles. *The Hand* was chosen to be included in the experience because of its prominence and size, and the interesting background to it being included in the garden.

Words that were raised for *The Hand* were: technology, metallic, busy, communication, disordered. The next step was to brainstorm musical genres, artists or particular songs that related to the themes. Relating to the ideas of 'busy' and 'disordered', and also fitting with the 'metallic' form of the sculpture, a first suggestion was experimental jazz music featuring brass instruments. A band whose

music evokes ‘communication’ was Penguin Cafe Orchestra, a group of musicians with a unique style that draws on folk and jazz. One of their popular songs, Telephone and Rubber Band, fitted especially with the communication theme since its composition features instrumental parts that bring to mind the sound of dialling a telephone. A number of Miles Davis recordings were listened to in order to find a suitable piece, however, it was thought that they might not be easily accessible pieces of music for a wide range of visitors, especially as *The Hand* was to be the first sculpture in the experience. Telephone and Rubber Band was listened to, but judged to be not quite as fitting as had been thought before listening as it had a fairly slow tempo. Another song by the same artist was Music for a Found Harmonium, which had a similar style but a more positive and upbeat sound. The piece that was chosen for The Hand was played and it was decided that it was appropriate for matching the themes and visual form of the sculpture.

The form of *The Hand*, with words written all around the sculpture and not just on the side facing the path visitors usually walk along, presented the opportunity for an instruction that involved moving around the sculpture to read words from different angles. The final instruction for *The Hand* was: “There are words written on this sculpture. How many will you read today? What story do they tell you?”

The text that was chosen explained what was thought to be the key points from Rufford’s own interpretation on the website – what the sculpture was intended to represent and how the artist collaborated with others to design it.

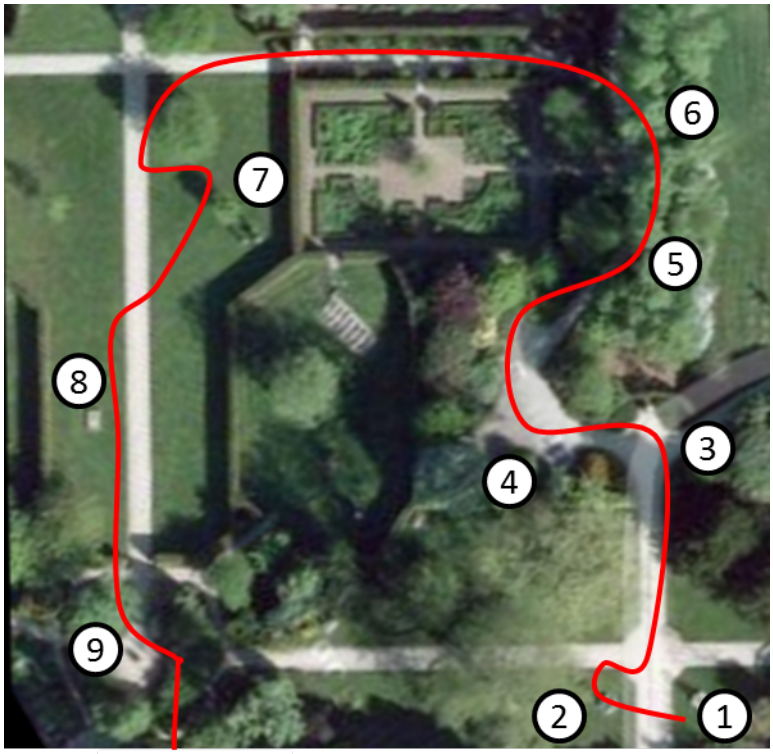


Figure 5: Aerial view of the sculpture garden, marked with the nine sculptures that made up the visiting experience and the path along which they are found

3.3.5 Designing the Experience Trajectory

As introduced in Chapter One, the experience design draws on the trajectories framework as a conceptual starting point for structuring the experience (Benford et al., 2009). This section will now explain how the key trajectories concepts were used to in the experience design.

3.3.5.1 Designing the canonical trajectory

The first step was to design a *canonical trajectory* through the experience. Early design work uncovered that the experience through the sculpture garden in fact required thinking about two levels of canonical trajectory: one that oversaw the entire experience of vising the sculpture garden – visiting the sculptures in order, perhaps – and one that dealt with the sequence of engagement – listening to music, following instructions, and reading text – at each individual sculpture. Visitors were not required to follow the experience in a particular order, so the two levels of canonical trajectory separated out the design of, on one hand, the visitor's path through the experience, and on the other, their engagement with each sculpture.

This involved thinking at two levels of scale: establishing a global trajectory through the garden based on a sequence of *episodes* involving individual sculptures, and

designing local trajectories that would enhance engagement with each individual sculpture. At the global level, a visitor can choose to experience up to nine sculptures, presented as a list on a smartphone interface. The list was arranged to reflect the order in which the sculptures would naturally be encountered when following the highly visible path that runs through the garden. It was anticipated that visitors would most likely follow this existing canonical trajectory, though they were free to diverge and visit the sculptures in any order they wished.

Key to the design was the structure of local trajectories into and through each sculpture. These were divided these into five stages – approach, engage, experience, disengage and reflect – as shown in Fig. 6, with each requiring a consideration of key *transition*s.

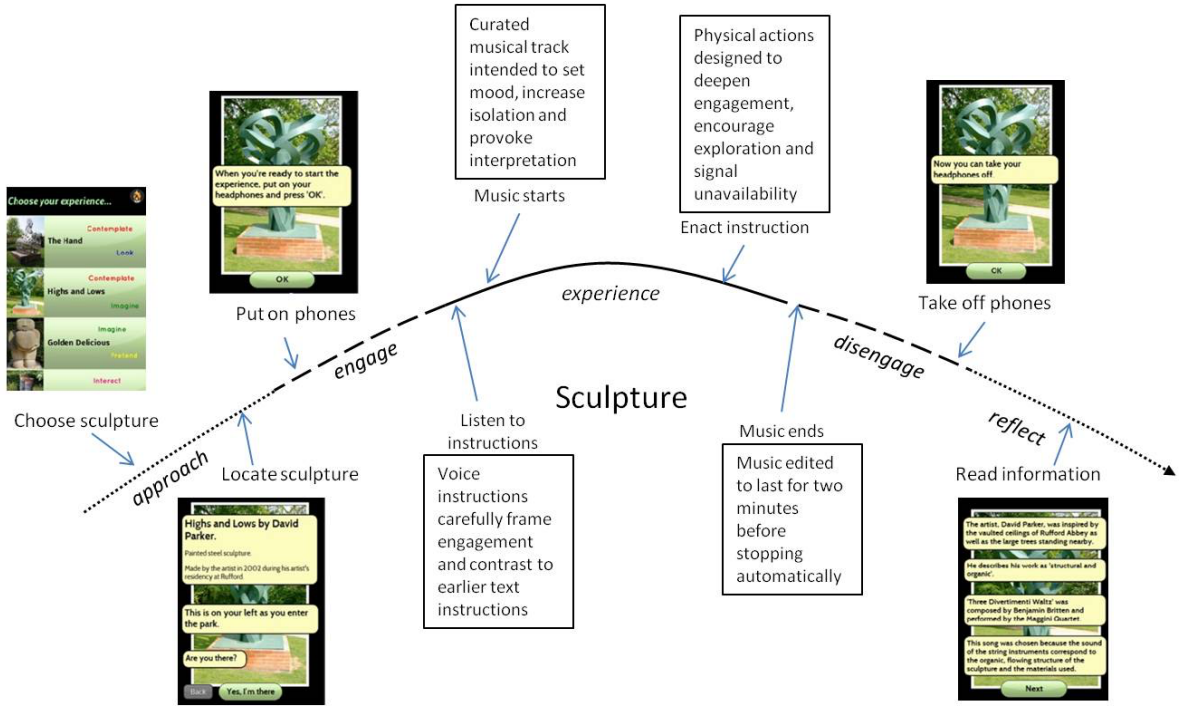


Figure 6: Local trajectory for 'Highs and Lows'

Approach

The approach phase describes the journey from choosing a sculpture, finding it in the garden, to standing in front of it. This is supported by a series of textual instructions delivered on the smartphone. The initial list gives the name of each sculpture along with two words that suggest the kind of experience that is to follow, so as to provide a gentle framing. We used the set of words: “contemplate”, “look”, “imagine”, “interact”, “pretend”, “touch”, “move”, “pose” and “think”. On selecting a sculpture

the visitor learns its title, the sculptor's name, the material, a one sentence history, and also a clue as to where to find it.

The key transition of *seams*, gaps and inaccuracies in the underlying infrastructure of positioning and communications systems was considered in the early stages of design. Early testing revealed that the seams in GPS would cause glitches in the experience. However, it was realised that visitors should be able to find the sculptures for themselves from just an image and a clue given their distinctive form, the constrained nature of the garden and the visible path. It was decided to drop GPS (or any other automated positioning service) in favour of simply showing visitors an image of the sculpture and asking them to manually confirm when they had found it. The approach therefore ends when the visitor stands in front of a chosen sculpture and presses *"Yes, I'm here"*.

Engage

They now enter the engage phase that aims to prepare them for a deep and personal engagement with the sculpture. The first step involves a further key transition, that of *putting on an interface*. The visitor is given the text instruction: *"when you are ready to start the experience, put on your headphones and press OK"*. The donning of headphones is intended to signal a shift of focus, isolating the visitor from the outside world. They now hear a series of audio instructions that have been written and recorded by our performance poet and that ask the visitor to undertake a particular action while at the sculpture.

These instructions were designed to encourage the visitor to *access the physical resource* of the sculpture in a distinctive way, adopting specific viewpoints, moving in particular ways, and reaching out and touching. A key part of this transition involved presenting the instructions as audio in order to disengage the visitor from the screen, reengage them with our poet's performative voice, and enable them to gracefully fade into the subsequent music.

Experience

The experience stage begins as the voice fades out and the selected music track fades in. At this point, it was expected that the visitor would carry out the suggested action.

Table 3.1 summarises the musical accompaniment and action chosen for each sculpture (numbered 1-9 in the order they would be encountered along the path).

Disengage

Each musical accompaniment was edited to play for up to one and a half minutes before fading out, at which point it was anticipated that the visitor would disengage. It was considered that visitors may want to control the timing of the track for themselves, ending it when ready or even allowing the full track to play on. However, it was eventually decided that any design features that would invite the visitor to look at or interact with the smartphone while engaged with the sculpture would detract from the *engage* stage of the experience. Fading the music before its normal end might also leave a sense of something being unfinished, a hanging question that invites closure. The visitor is then asked to remove the headphones, a key transition in reengaging with the surrounding world.

Reflect

Building on the concept of the *historic trajectory*, a key feature of our design was the idea to give the official interpretation of a sculpture only after encountering it. The intention was to invite visitors to make their own interpretations (encouraged by the physical actions and the music) before explaining the 'official' interpretation.

3.3.5.2 Interleaving trajectories

The trajectories conceptual framework emphasizes the importance of considering how different participants' trajectories may overlap and the need to explicitly design in moments of *isolation* as well as *encounter*. In response, the above trajectory was designed to consciously switch the visitor from being engaged with their partner while moving between sculptures, to being 'isolated' from them when experiencing a sculpture (see Fig. 7). The use of text instructions during the approach and reflect stage allows for talking, while additional information during the reflect stage was intended to stimulate discussion. In contrast, donning headphones was intended to isolate visitors from social interaction while at the sculpture, and the relatively unusual physical actions were designed to signal to others that the visitor was engaged in a special activity and so should not be interrupted. The problems of using headphones in group visiting have been discussed in previous literature, and novel solutions have been proposed such as group members being able to eavesdrop on

others' audio guides (Aoki et al. 2002). The solution employed here was to employ them to create and mark a key transition between isolation and encounter. The aim was not to make the visit any less (or indeed more) social, but rather to achieve a more balanced and productive separation between moments of contemplative reflection and of rich discussion between partners.

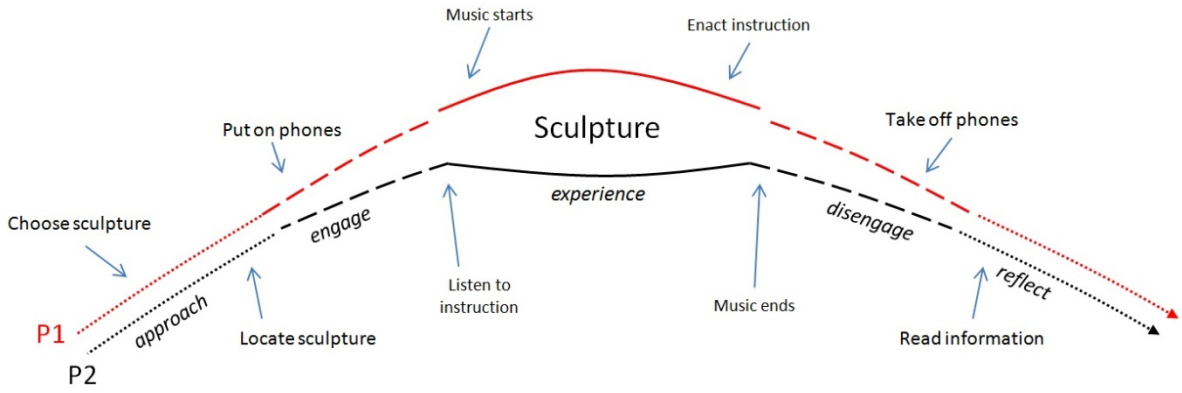


Figure 7: Participant trajectories at a sculpture

3.3.3 Implementation

The experience was implemented using the AppFurnace development tool for cross-platform mobile applications. AppFurnace is a web-based development platform that builds apps that can be downloaded onto a range of touch-screen mobile devices. The user interface was kept simple and incorporated buttons that visitors could tap to trigger content such that visitors could progress through the experience at their own pace.

The music tracks were downloaded in .mp4 format from Amazon.co.uk's music service. The instructions were recorded by the performance poet. They were added as media files to the application to be played when the user puts on their headphones and presses "I'm ready."

3.4 Studying the Experience

The experience was tested by members of the public at Rufford sculpture garden over a period of two weeks in July 2013. The application was installed onto two Apple iPhone 3GS devices which were lent to visitors, alongside a set of over-ear headphones, to try out the experience as they visited the garden.

3.4.1 Study design

The study involved recruiting participants to try out the experience during a visit to the sculpture garden. Visitors were recruited on site by approaching them and detailing what the study would involve, and asking if they would be interested in taking part. The study involved participants using the experience as they visited the sculpture garden, followed by a semi-structured interview.

3.4.2 Participants

Overall, 29 people took part in the study, 26 in pairs and 3 lone visitors who were enthusiastic to try the technology while their partners preferred to experience the sculptures in the traditional way. Of these 29, 17 were female; 12 were male; 4 were aged 16 – 25; 12 were aged 26 – 40; and 13 were older than 40. 17 visitors were recruited by being approached at the site while a further 12 were recruited beforehand through a network of people interested in interactive cultural experiences. See Table 2 for the full list of participants.

Once recruited, visitors were asked to sign a consent form, given a mobile device each and a set of over-ear headphones, before being introduced to the system, including how to operate the touch-screen and use the volume controls. Visitors were then told to commence their visit when they were ready, using the guide. They were informed that while only a subset of sculptures had content loaded onto the guide they were free to explore the entire set of sculptures. Visitors spent between 20 minutes and an hour on the experience.

Table 2: Participants in the study of the Rufford experience

Study ID	Participant ID	Gender	Age	Recruitment Method	Additional Information
1	1	Female	46	On site	
	2	Male	45	On site	
2	3	Female	61	On site	
	4	Male	64	On site	
3	5	Female	52	On site	Visiting with partner who did not participate.
4	6	Male	57	On site	Visiting with partner who did not participate.
5	7	Female	26	On site	

	8	Male	26	On site	
6	9	Female	33	University	
	10	Female	51	University	
7	11	Female	41	University	
	12	Male	65	University	
8	13	Female	34	University	
	14	Male	35	University	
9	15	Female	22	On site	
	16	Male	23	On site	
10	17	Female	52	On site	Visiting with partner who did not participate.
11	18	Female	19	On site	
	19	Male	19	On site	
12	20	Male	26	University	
	21	Male	27	University	
13	22	Female	26	University	
	23	Male	27	University	
14	24	Female	26	University	
	25	Male	29	University	
15	26	Female	38	On site	
	27	Female	42	On site	
16	28	Female	46	On site	
	29	Female	48	On site	

3.4.3 Data Collection

Video was used to record visitors' interactions from a distance, capturing an overview of their physical actions but without interfering with the experience. When visitors had finished touring the sculpture garden they were interviewed in pairs. The interviews followed a rough structure starting by asking how participants found the experience; what they liked and disliked about it; how much they felt they were able to interact with their partners; how they felt about the music, instructions and text; and what they felt they got out of engaging with the experience. They were prompted to reflect on most, if not all, of the sculptures they visited and also how their experience of using the system compared to their usual visiting habits. They were finally given an opportunity to offer views on topics that hadn't been covered.

3.4.4 Data Analysis

The approach to analysing the video data was to adopt an ethnographic style across a number of data sessions, reviewing participants' interaction throughout their visit.

Key behaviours of interest were the extent to which participants followed the trajectory as designed, whether they followed instructions, and how and when they interacted socially with each other. An overview of what happened in each interactional sequence was summarised, based on an analysis of participants' gaze, gestures, utterances and interactions with relation to the instructions they heard to draw out behaviours that were broadly successful, uniquely interesting or problematic. The interview data was used in conjunction to explain what was seen, with participants elaborating on what they thought and did at each stage of the visit. In taking this approach, it was possible to build a case study of each pairs' engagement with the experience from start to finish.

3.5 Findings

In the following, the findings are presented under three themes: Did visitors follow the designed trajectory? How did they engage with individual sculptures? And how did this lead them into making interpretations?

3.5.1 Following the designed trajectory

In general, the technology worked very reliably and visitors quickly picked up how to use it and understood what they were supposed to be doing. Fig. 8 provides a summary overview of the extent to which visitors followed the trajectory and engaged with the sculptures. Each row represents an individual visitor (with pairings highlighted), while each column represents a given sculpture (numbered as in Table 2). Each cell is coloured with an estimation (from reviewing the videos) of the extent to which this visitor followed the instructions at this sculpture. Red shows when they did not appear to follow the instructions at all, standing at a distance, looking away or making no attempt to act in the prescribed way. Orange represents partially following the instruction, clearly making an attempt, but one that was hesitant, for example only briefly touching a sculpture. Yellow shows cases of closely following an instruction over an extended time, for example completing a prescribed sequence of movements or continuing to touch for the duration of the music. Grey-shaded cells show where a visitor missed out this sculpture altogether; asterisks show sculptures that were visited out of sequence (i.e. not in the canonical order); and musical notes show where the music was replayed.

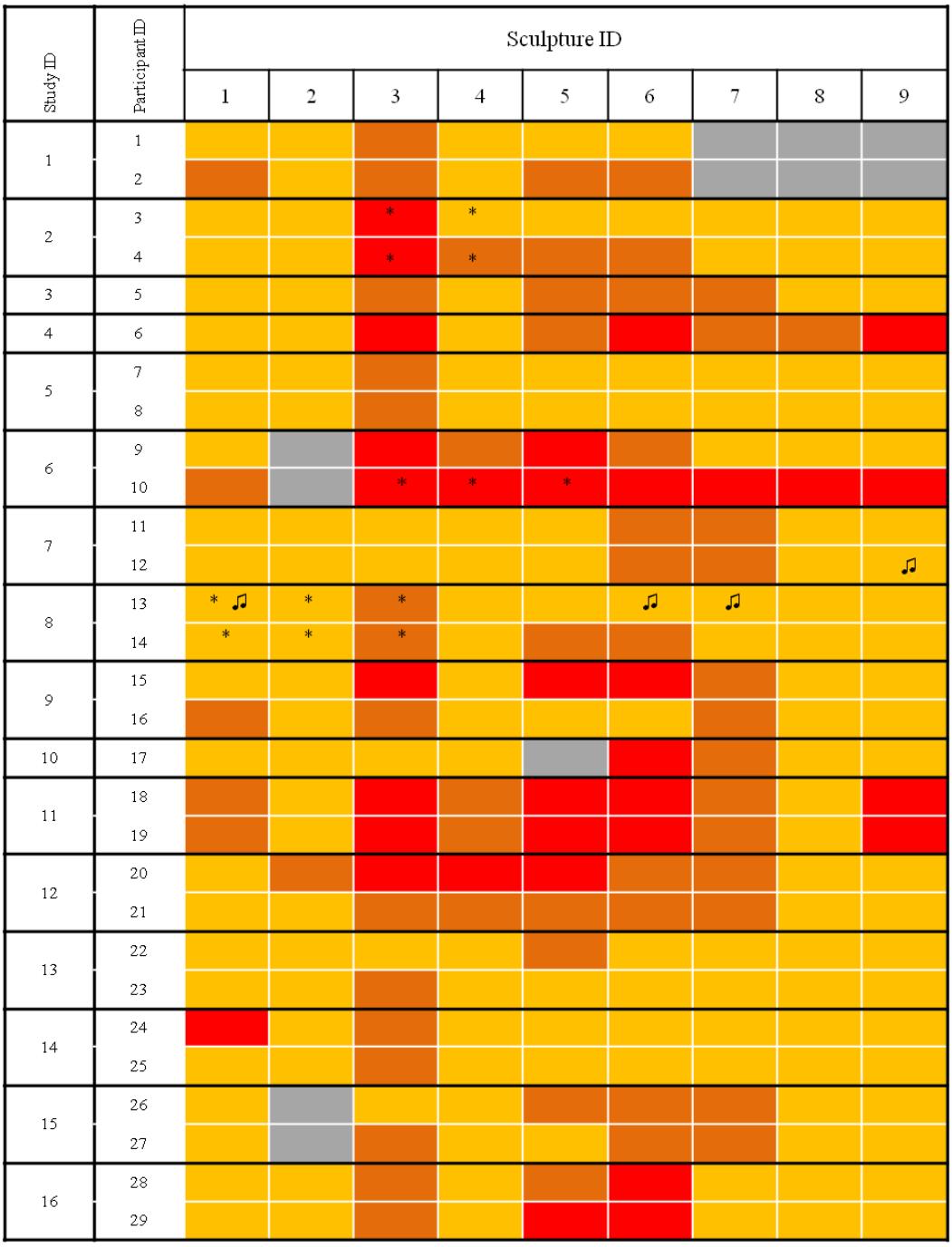


Figure 8: Visualisation showing the extent to which visitors engaged with the instructions

Legend

- Participant followed instruction closely
- Participant followed instruction partly or hesitantly
- Participant did not follow instruction
- Sculpture not visited
- * Sculpture visited out of sequence
- ♫ Participant replayed audio

The table reveals that the large majority of visitors followed the *global trajectory*, completing all nine sculptures, and mostly in the canonical order (only one pair stopped before the end, two pairs missed out the second sculpture, and the occasional reversals of order in the middle of sequence).

There were four examples of participants repeating the music; this always involved just one partner in a pair and was carried out immediately. In two cases the action was also repeated, once when one play of the music was not enough to fully complete the action (*Chimney Stacks*) and once to repeat the action from a different viewpoint (*Fruit Gatherers*).

There is also evidence that many people followed the *local trajectories* through sculptures. It was the case *in all of the examples* that visitors listened through to the end of the music before disengaging. Moreover, the rough coding of physical actions in the table suggests that people very often attempted to carry out the instructions to some degree, and appeared to closely follow them more than half of the time. Sculpture 3 (*Golden Delicious*) was perhaps the most problematic in terms of visible engagement, and it is notable that this calls on the imagination by demanding an impossible physical action.

Pairs mostly stayed together throughout the visit, attending to the same sculptures at the same time and walking together between sculptures. They often attempted to coordinate putting on their headphones and triggering the audio instructions and music, usually when they had arrived at a sculpture, but sometimes as they approached. Visitors were not observed to deliberately start the audio separately, for example, taking turns. Pairs also tended to wait for each other to finish before moving on to the next sculpture. Pair 6 was the only one to separate during the experience (visiting different statues) and they varied greatly in their responses. Pair 11 was unusual in that they were the only couple who discussed and shared the decision about how to respond before physically engaging. Eight of the 29 visitors kept their headphones on throughout the experience, disregarding the instruction to take them off between sculptures, which may have caused uncertainty for their partners.

In short, the initial impression from video observations is that visitors followed the trajectories to a first approximation. The next question is what did this involve in detail, specifically how did the trajectory shape their engagement with the sculptures?

3.5.2 Engaging with sculptures

It is now considered how the designed trajectory led visitors to engage with the sculptures: how they performed the physical actions, and how they coordinated this as pairs.

3.5.2.1 Performing physical actions

It was noted above that visitors most often made an attempt to follow the instructions for physical action. However, the fine details of what this meant and how they felt about it varied considerably. For example, at *Fruit Gatherers*, visitors were asked to *"Find a place in the group and stand there, still as a statue".* Responses ranged from standing still *near* the sculpture for only a few seconds, to standing visibly still *among* the figures for the duration of the music.

Instructions that directed visitors' attention to detailed features and information were very often followed, for example at *The Hand* ("*There are words written on this sculpture. How many will you read today?")* and at *The Shrine at Nemi* ("*Climb the steps and peer into this tiny temple")*. At these sculptures, visitors tended to begin the audio while standing back from the sculpture, on the path. Upon hearing the instruction, they would begin moving to see the parts of the sculpture that had been pointed out. For example, having approached *The Hand* and positioned themselves in front of it, the two visitors in Fig. 9 hear the instruction and then physically move around the sculpture to read the text written around its sides. This level of compliance at *The Hand* was seen by 23 of the 29 participants, as shown in Fig. 8.

Figure 9: Participants reading words on 'The Hand'

Instructions that required a slightly higher level of physical engagement, such as touching a sculpture or adopting a pose, were often followed. Upon hearing an instruction, most visitors did not hesitate before carrying it out and remained physically engaged throughout the music. For example, at *Two Vessels* ("*Take your hands and move them down the pillar to feel the texture"*) visitors would typically hear the instruction, approach the sculpture to begin feeling it, and remain at the sculpture, touching it and looking at it, until the music had faded. This level of compliance at *Two Vessels* was displayed by 22 out of the 29 visitors. Most visitors welcomed being given license to touch the sculptures: *"I especially liked ones where it was like "touch it", because I always want to touch sculptures and I'm never sure if you're really meant to".* Indeed, we observed that once instructed to touch one sculpture, visitors became more tactile with subsequent sculptures. However, some remained nervous at breaking what is seen as a taboo behaviour: "*I'm very conscious of walking through art when you're not allowed to touch ... the very first one it said "what does it feel like?" and I just thought, I can't touch it, surely?"*

Instructions demanding theatrical rather than tactile engagement, for example marching through the arches of *Chimney Stacks*, invoked greater reluctance. Having been asked, *"Is anyone around? Why don't you hold your head high and march through the arches?"* some visitors stood back to listen (Fig. 10), while others hesitated before carrying out the action, and many performed it half-heartedly as if to

minimise their visibility. In fact, 8 out of the 29 visitors at *Chimney Stacks* made no attempt to follow the instruction, and 11 followed it only partially. When asked in the interviews how they felt about carrying out these more performative actions, visitors admitted to feeling "silly" or "self-conscious" about doing them. As one commented: "*I did not march with my head high, because I was conscious there were people around who were already looking at us thinking what on earth are they doing?"* That said, a minority embraced being asked to perform this sort of action and did so in a flamboyant way.

Figure 10: Participants standing back from 'Chimney Stacks'

Finally, other instructions were challenging because they demanded impossible actions, for example "*This man has brought you an apple. Why don't you take it and put it in your pocket? Or maybe you would like to eat it?*" at *Golden Delicious* could not be followed literally. Most visitors were not able to interpret it as a clear instruction for action and remained stood still in front of it. However, a few (only 5 out of 29) made attempts to touch or grab the apple.

3.5.2.2 Coordinating engagement

The large majority of conversations took place while moving between sculptures or after the audio had finished and headphones had been removed at a sculpture. For the most part, visitors did not try to talk to or otherwise interrupt one another once the headphones were on and the audio was underway, apart from the occasional short exclamation (e.g., *"It's warm"* on touching *Two Vessels*) which largely passed unacknowledged. In a few exceptional cases, visitors moved their headphones off of

one ear to hear a partner's comments, while there were occasional periods where pairs communicated intensively, for example taking a series of photographs of one another. However, such behaviour was atypical, and for the most part visitors seem to mutually respect their isolated engagement.

There were, however, many examples of tacit coordination in synchronizing engagement with sculptures. It was noted earlier that pairs generally tried to begin their engagement together. However, the two devices were not technically synchronised and so there was often a few seconds delay between them. Participants often exchanged glances and smiles to confirm that they had heard the instructions before both had followed them (Fig. 11).

Figure 11: Participants exchanging glances at 'Chimney Stacks'

Physical contention for the sculptures was usually not a problem as the garden was relatively quiet, but there were a few problematic cases where limited physical access meant that one partner had to wait for the other, for example at *The Shrine at Nemi* where visitors are invited to climb the steps and look through a small aperture. *Chimney Stacks* provided another example of coordinating actions, with cases of one partner following the other, sometimes copying their actions in solidarity, but with at least one case of one partner marching ahead and the second following with reluctance. Local coordination was also evident when one partner would wait nearby while the other replayed a music track before both moved on together, as seen in Fig. 12 where one partner takes photos while the other repeats her experience at *Chimney Stacks*.

Figure 12: One partner waits while the other replays the music

3.5.3 Making an interpretation

This shaping of engagement with sculptures could often lead to a deeper understanding. Our interviews showed that an important part of this was how the physical actions led to distinctive ways of viewing them. At Pine Cube, one visitor found after closing and opening their eyes: “you can actually see the shapes, and then it reframes itself”, while at The Shrine at Nemi a visitor described discovering further detail: “I went up the stairs and looked through the thing after she said because I wouldn’t have known that was there otherwise”. Furthermore, visitors found this led to a deeper understanding: “because you were being prompted to look at certain things…it possibly helps you to understand what the artist was trying to achieve and the mood they were trying to set, and, you know, the cultural or ethical reasons they made the art. So yeah, I guess from that point of view, it defined what you needed to look at a bit more.”

Interviews also revealed the significant role of the music in interpretation. Visitors mostly judged the music choices on whether they “worked” or not, meaning whether they could make a connection between the music and the sculpture. One of the ways music was deemed to work for visitors was by setting a general emotional tone for engaging with the sculpture. A slow, dragging guitar piece (Girl by PJ Harvey) was selected to accompany the sculpture Young Girl, with the intention of creating an eerie mood to accompany the headless sculpture. Visitors picked up on this mood,

with one even reporting feeling apprehensive before approaching the sculpture: “I didn’t like the one for the statue without the head, because that made me not want to go near it.” More positive emotional reactions were reported at Golden Delicious: “It kind of cheered me up… I was kind of looking at him and then the music and the app encouraged me to like, engage with it and feel jolly, and get into a cheeky mood and it, it was quite uplifting. The music definitely influenced that one.”

Others looked to make specific meaningful connections. The sculpture Fruit Gatherers abstractly depicted a group of Native American women carrying fruit on their heads. The traditional Native American music chosen for this sculpture enabled one visitor to focus on it: “It did make you look at it and realise what it was, and picture the ladies actually there, actually putting the fruit on their heads.”

Ultimately, it was the performing of physical actions, as seen by most visitors, and the effects of the music, which the interview data suggests prompted visitors to engage intellectually or emotionally with the sculpture, that suggested that visitors were experiencing deep engagement and which fostered interpretation: “What you were being asked to look at and contemplate, and after you’d done that for a little second then obviously your mind drifts because of the music. That was a nice experience because it allowed you to think about it in your own way as well, rather than just the way you’re being told.”

This notion of “not being told“ seems to have been especially important, and had been directly embedded in the trajectory design, in that interpretive information was only provided at the visitor’s completion of the trajectory. The majority of visitors appreciated learning the official interpretation after engaging with the sculpture rather than before: “I think you need to look at it first. And then have the information. Because if you have the information up front it colours how you look at a sculpture.”

As a result, visitors’ interpretations were not always in agreement with those presented in the experience. Some criticized the musical interpretation of the sculptures. The choice of the experimental jazz piece, Mentiras by John Zorn, to accompany the sculpture Pine Cube was criticized by several people: “I thought that the last Pine Cube, the music for me was completely alien to what we were looking at. I couldn’t understand... I know it was explained but it didn’t feel right for me.”

Another criticized the musical choice for The Shrine at Nemi: “I didn’t think that, since it was a sculpture about Roman things, and the music was about from Italy, they were totally different eras, they didn’t seem to quite, it didn’t add anything.” There were also disagreements with the visual interpretation of the statues presented in the experience: “At the start it told you to look up into the tree, and that twisty metal sculpture. It hadn’t registered that that was what it was trying to do because it didn’t, it was a sculpture that was enclosing, it didn’t open out like a tree does to the sky.” It seems then, that the trajectory did help visitors reach their own interpretations, importantly, ones that were not always in agreement with the “official“ view derived from the visitor centre’s website.

3.6 Summary of Key Findings

The findings presented above suggest that an experience blending different types of interpretation can lead to an interesting and engaging visit. Pairs of visitors were able to enjoy the experience together, and the structure that involved switching visitors between moments of social engagement and relative isolation appeared to be effective in allowing visitors time for personal reflection as well as conversation with their partners.

This section now discusses the key implications of the findings presented in this chapter. Practically, how did the trajectory-designed content and structure work as a visiting experience? Theoretically, how do the results relate to the three wider themes of the thesis: interpretation, personalisation and social visiting?

3.6.1 Designing the Outline Structure

This chapter has presented how an outline template structure was developed for a visiting experience that appeared to successfully combine different aspects of visiting:

i. Experiential engagement;
ii. Receiving interpretations;
iii. Interacting with peers; and
iv. Flexibly managing the ordering and timings of visiting particular exhibits.

This template was based on an interpretation and refinement of existing trajectories concepts for designing the experience, which had previously been applied only to the evaluation of experiences. The key features are discussed below.

The concept of the *canonical trajectory* was refined by separating it into two levels. The global trajectory follows the existing path through the sculpture garden, while the local trajectory passes into and through each sculpture. Furthermore, the local trajectory took on a five-stage structure at each exhibit to move people into and out of engagement.

Three types of content – music, instructions and text – were blended and delivered at key points along the local trajectory to support visitors in making interpretations. Music and instructions gently suggested ways to physically and intellectually approach the sculpture, with the more informative and traditional text interpretation only being revealed after visitors had the chance to explore their own interpretations.

The overall experience structure balanced moments of isolation – when listening to music and instructions – and encounter with peers in a social experience that also supported deep and personal engagement.

3.6.2 Interpretation

The study's focus was on how to deliver and support interpretation in a novel visiting experience. The results of the visitor study suggest that by following the local trajectory at each sculptures, visitors were able to engage deeply with sculptures and develop an interpretation through their engagement with the experience.

The experience presents a set of interpretations from the sound artist, the performance poet and the designers in the form of the music, chosen to match themes and forms, the instruction, designed to encourage deeper engagement and reflection, and the text, selected to give a more traditional interpretation, presenting information about the sculpture. Alongside these interpretations delivered by the visiting experience, visitors are also given the opportunity to make their own interpretations. The points when interpretations are given and made are organised by the local trajectory. It first leads visitors into a fairly open position where they are presented with the sculpture, music and instruction, but without being given any explanation as to how they are related. This creates a sense of ambiguity which invites visitors to make an interpretation in an attempt to resolve and understand the experience. After a short time, however, the text content is delivered which offers up an "official" interpretation in line with the

sculpture garden's website. This is only given once visitors have had a chance to make their own interpretations.

Visitors using the experience move between a state of being open to multiple interpretations and being subject to suggested interpretations at others. This can be expressed as a *trajectory through interpretation*, establishing mood, engaging the senses and the imagination, openly inviting sense making, before then revealing a set interpretation.

Overall, this template provides a foundation experience that can be taken forward to address the remaining research objectives, personalisation and socialisation, which will briefly be discussed here.

3.6.3 Personalisation

The focus of this study was on the structure of interpretation that combines several important aspects of visiting. It was outside of the scope of the study, however, to address the personalisation of interpretations, and as such each visitor received the same set of content.

Having gained an understanding of how interpretation can be successfully delivered along the trajectory structure that was presented, the major focus for the next chapter will be on how to personalise the content that is delivered along the trajectory.

3.6.4 Socialisation

The study touched on how visiting experiences might be designed for social use. The experience was designed to be used by two companions and the majority of the visitors who participated in the study were indeed in pairs. There was a strong tendency for visitors to experience the sculptures together (rather than splitting up to visit different sculptures). They were able to coordinate with each other to a degree, for example attempting to synchronise the beginning of each engagement with a sculpture, and coordinating engagement with sculptures that had limited access. The study offered preliminary evidence that switching pairs of visitors between moments of personal engagement (while engaging with a sculpture and the audio content) and social engagement (while moving between sculptures) can work as a way of structuring a visit to balance personal and social aspects of a sculpture garden visit.

The trajectory structure supported use of the experience by pairs of visitors at the sculpture garden, but it remains to be seen whether this would scale up to larger, or more diverse, groups, or if it would work in different settings. The next chapter will explore the pairwise structure when personalised interpretations are introduced into the trajectory in a new setting. Later, in Chapter 5, the thesis will explore how the experience can be scaled to larger groups, including those with children.

3.7 Conclusion

The study set out to investigate the design of a visiting experience that supported visitors in engaging deeply with sculptures and interpretation materials in a way that allowed them to formulate their own interpretations. The study suggests that the careful design of the experience using the trajectories framework enabled the development of visitors' own interpretations along a 'trajectory through interpretation'. The findings suggest that this movement back and forth between openness and closure and through multiple interpretations may be suitable for many cultural experiences, especially ones that involve a didactic element such as museums and exhibitions.

While the study suggests that allowing visitors to experiment with their own interpretations may result in each visitor having a relatively unique experience, the content itself was not tailored to the individual visitors. The next goal will be to establish a method for delivering personalisation within small visiting groups. The thesis will investigate how to personalise the global and local trajectory structure – what exhibits are visited in the experience, and what content is presented to accompany it.

The two key questions for consideration can be summarised as:

- How can global and local trajectories in a visiting guide be personalised towards individual visitors?
- How could personalisation be achieved in a way that retains the sociality of a small group visit?

These questions form the basis for the study to be presented next, in Chapter 4, which draws upon gift-giving to investigate a novel method for personalising experiences within pairs.

Chapter Four: Investigating Gifting as a Method for Personalisation within Pairs

There is a hugely diverse range of people who visit museums and galleries, which means that providing access to multiple interpretations of an exhibit increases the chance of each visitor finding his or her own way to connect with it. Providing a variety of interpretations can, however, threaten to overwhelm visitors with more information than they can digest and make sense of. This has prompted an interest in personalisation: filtering or adapting interpretation based on the individual visitor's unique preferences, prior knowledge or visiting style. Many museum visits are a social activity taking place in the company of friends, family or organised tours, and there is a need to balance personalisation outcomes with a consideration of the social aspects of the visit.

This chapter addresses the challenge of personalising an experience for pairs of visitors to an art gallery. The experience design introduced in Chapter 3 is used here as a template that can be personalised by substituting content (exhibit recommendations, music, instructions and text) that is tailored for a particular visitor. A novel method of personalising content in small groups is explored with pairs of visitors. One visitor in each pair is supported in designing and 'gifting' a personalised experience for their partner.

The chapter describes the design of the personalisation method with reference to a review of the literature on gift-giving, before reporting on a study of pairs of visitors engaging with the personalisation method and subsequently trying out the personalised experiences in a gallery visit. The findings are discussed with relation to the key thesis themes of interpretation, social visiting and personalisation.

4.1 Approach and Objectives

In Chapter 3, a structure was established for a visiting experience that supports engagement and interpretation and appeared to work for pairs of visitors, which forms a template for personalisation. The approach was to introduce a method for personalisation that can be applied to the template within pairs of visitors.

The choice of method was motivated by gift-giving, a social practice that involves choosing or making something with a particular recipient in mind. The approach continued by focussing on how visitors designed personalised 'gift' experiences for each other, and how they were received in a joint gallery visit. The chapter explores gift-giving as an innovative method for personalising visiting experiences that also work as a social experience. The objectives for this piece of work are as follows:

- To establish a method for personalising visiting experiences for groups
- To understand how visitors personalise for each other
- To understand the effect of carrying out a personalised experience on designer and recipient

This chapter will now present how the study went about investigating these research questions. It first takes a detailed look at the design of the personalisation method with reference to a review of gift-giving literature. Next, the study approach and results are presented, before the implications for the wider thesis questions are summarised.

4.2 Design of the Personalisation Method

As discussed in Chapter 2, personalisation of museum guides and experiences is a well-researched area but one that has yet to adequately address the issues that arise when visiting in a group. The research sought to build upon previous work to address the combined problem of delivering personalised interpretations in a way that accommodates group visiting. Unlike many previous approaches in which computers try to recognise or respond to people's interests, profiles or histories with automated recommendation or adaptation of content, the approach here is to allow people to directly create personalised content for others as a form of gift. The intention is that this content will be both appropriately and deeply personalised for the recipient while its creation will be rewarding for the giver.

The approach was motivated by the age-old practice of gift-giving. Gifts are exchanged between people for reasons of obligation and reciprocity, but the practice is also important in building relationships and human solidarity (Mauss, 1990). To buy or make a gift for somebody involves reflecting upon the person's interests, personal characteristics and the relationship between gift-giver and recipient. Choosing a gift in this way imbues the gift with emotional and instrumental meaning for the giver and recipient (Sherry, 1983) which may be explained or alluded to in the exchange. The gift exchange is a strongly social occasion that involves a gift-giver, a gift-recipient and possibly onlookers, and involves the recipient carefully managing assessments to decode the gifter's intent and give an appropriate response (Robles, 2012). HCI research has engaged with gift-giving to help explain various social practices surrounding digital technologies, notably text messaging among teens (Taylor and Harper, 2002), and to express closeness between long-distance couples (Haazanzahl et al., 2012).

It's not uncommon for people to visit attractions such as museums as part of a gift experience, treat or holiday, and the literature tells us that gifting is a powerful mechanism that involves deep personalisation and is embedded into a social occasion. It was therefore anticipated that by bringing the two together as a novel mechanism for personalising museum experiences within groups, it would be possible to create deeply personal experiences that are also inherently social.

The approach involved inviting visitors to choose exhibits for each other and then design interpretations of those exhibits that were specifically tailored for others they were visiting with, to be delivered as part of a mobile guide. It was anticipated that visitors could use this method of personalising gift experiences from one person to another to communicate interpretations that were tailored to visitors by drawing upon interpersonal knowledge of one another, facilitating experiences that are at once personal and social.

4.2.1 Developing a Personalisation Method around Gift-giving

Instead of asking visitors to design an interpretation from scratch, it was decided that a template would be used as a basis for their gifts. The template was based on the previously designed experience for pairs of visitors at Rufford sculpture garden presented in Chapter 3. The experience consists of a tour of a set of sculptures with,

for each sculpture, a curated music track, an instruction for how to engage with the sculpture, and a portion of text to read after engaging. The delivery of the different components of the experience was structured to support social interaction between pairs of visitors using mobile audio guides. This provided a template that required visitors to choose a set of objects to visit, and for each object, a piece of music, an instruction for how to engage and a portion of text. The visitors' designs would then be used to produce a bespoke mobile guide that delivers the content.

4.3 Studying the Personalisation Method

An exploratory study was carried out to establish how the proposed approach would work in practice and to frame key issues for further technology development and study. This took the form of a naturalistic field trial, studying users as they first designed an experience for a partner at an initial workshop and then tried it out with them under the realistic, 'in the wild' (Crabtree et al. 2013) conditions of a live gallery setting. Audio and video recordings were captured and interviews were conducted with participants to build a rich picture of visitors' design rationales and then how the designs subsequently unfolded and were received by their partners.

4.3.1 Overall Approach

A study was carried out to explore the opportunities and challenges associated with this approach, following an "in the wild‟ approach. A local art gallery was selected to be the setting for the study. The study investigated pairs of visitors engaging with the approach where one member of each pair designed and gifted an experience for the other. It involved two stages of participation: an initial design workshop and a second visit where the pairs of participants were able to use the experiences that were produced from their designs.

4.3.2 Setting

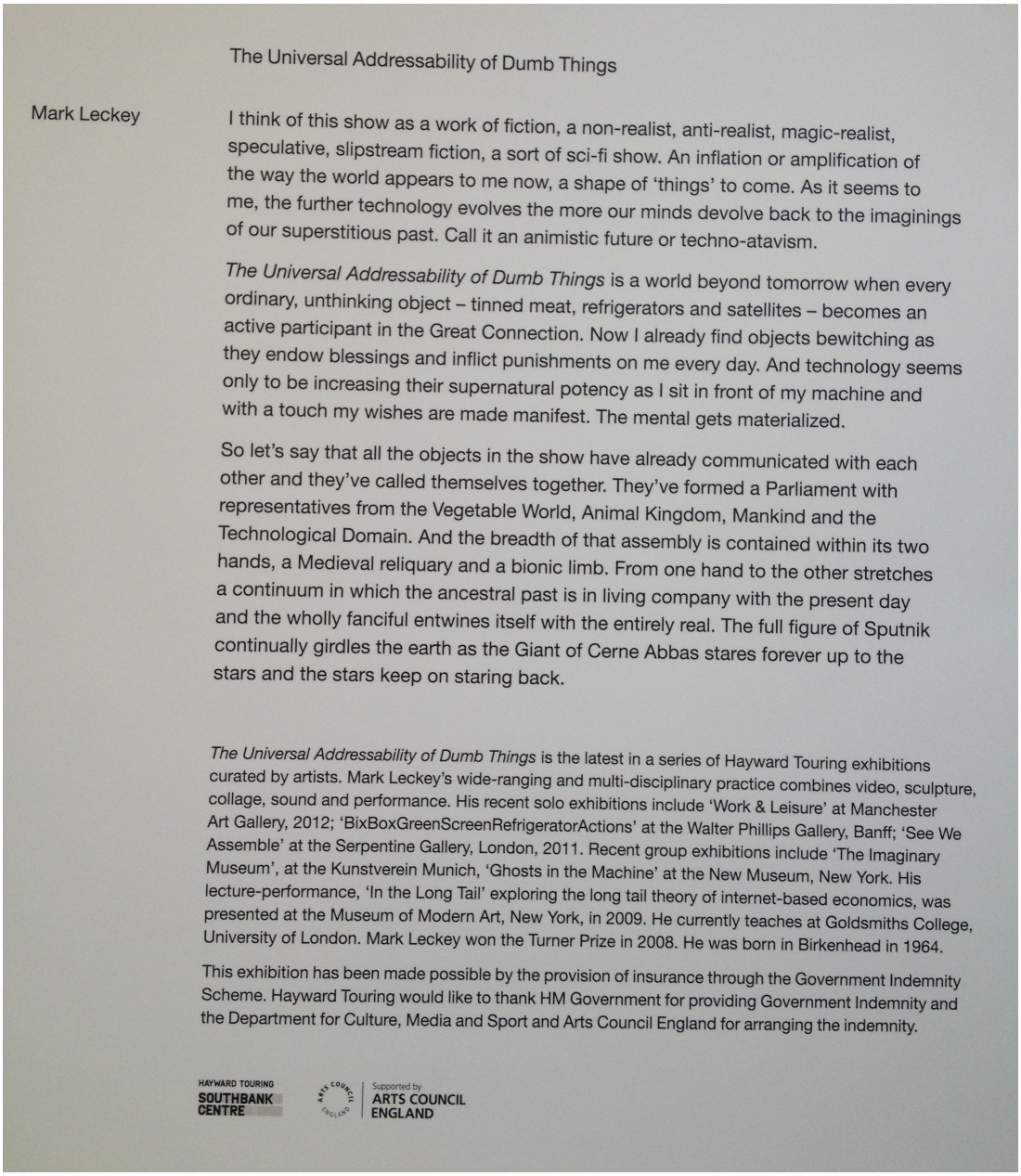
The study was based at Nottingham Contemporary, a modern civic contemporary art gallery. Contemporary art can be notoriously difficult to engage with and interpret, and so offered a challenging domain for exploring the approach. Following initial discussions with the gallery, a decision was made to focus on a major visiting exhibition, 'The Universal Addressability of Dumb Things', curated by the Turner

Prize-winning artist Mark Leckey[5]. This set of around 200 objects included historical and contemporary artworks, videos, machinery and iconic objects, presented with minimal information, typically just title, artist, date and materials (Figs. 13 and 14). The curator's idea was to bring together a collection of sometimes unremarkable objects, alongside those of historical and cultural relevance, to highlight the connections between them. See Fig. 15 below for the artist/curator's own description of the concept. Fig. 16 shows the layout of the gallery space.

Figure 13: The exhibition 'The Universal Addressability of Dumb Things'

[5] http://www.nottinghamcontemporary.org/art/universal-addressability-dumb-things

Figure 14: The exhibition 'The Universal Addressability of Dumb Things'



The Universal Addressability of Dumb Things

Mark Leckey

I think of this show as a work of fiction, a non-realist, anti-realist, magic-realist, speculative, slipstream fiction, a sort of sci-fi show. An inflation or amplification of the way the world appears to me now, a shape of 'things' to come. As it seems to me, the further technology evolves the more our minds devolve back to the imaginings of our superstitious past. Call it an animistic future or techno-atavism.

The Universal Addressability of Dumb Things is a world beyond tomorrow when every ordinary, unthinking object – tinned meat, refrigerators and satellites – becomes an active participant in the Great Connection. Now I already find objects bewitching as they endow blessings and inflict punishments on me every day. And technology seems only to be increasing their supernatural potency as I sit in front of my machine and with a touch my wishes are made manifest. The mental gets materialized.

So let's say that all the objects in the show have already communicated with each other and they've called themselves together. They've formed a Parliament with representatives from the Vegetable World, Animal Kingdom, Mankind and the Technological Domain. And the breadth of that assembly is contained within its two hands, a Medieval reliquary and a bionic limb. From one hand to the other stretches a continuum in which the ancestral past is in living company with the present day and the wholly fanciful entwines itself with the entirely real. The full figure of Sputnik continually girdles the earth as the Giant of Cerne Abbas stares forever up to the stars and the stars keep on staring back.

The Universal Addressability of Dumb Things is the latest in a series of Hayward Touring exhibitions curated by artists. Mark Leckey's wide-ranging and multi-disciplinary practice combines video, sculpture, collage, sound and performance. His recent solo exhibitions include 'Work & Leisure' at Manchester Art Gallery, 2012; 'BixBoxGreenScreenRefrigeratorActions' at the Walter Phillips Gallery, Banff; 'See We Assemble' at the Serpentine Gallery, London, 2011. Recent group exhibitions include 'The Imaginary Museum', at the Kunstverein Munich, 'Ghosts in the Machine' at the New Museum, New York. His lecture-performance, 'In the Long Tail' exploring the long tail theory of internet-based economics, was presented at the Museum of Modern Art, New York, in 2009. He currently teaches at Goldsmiths College, University of London. Mark Leckey won the Turner Prize in 2008. He was born in Birkenhead in 1964.

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HAYWARD TOURING
SOUTHBANK CENTRE

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Figure 15: The artist Mark Leckey's description of the exhibition

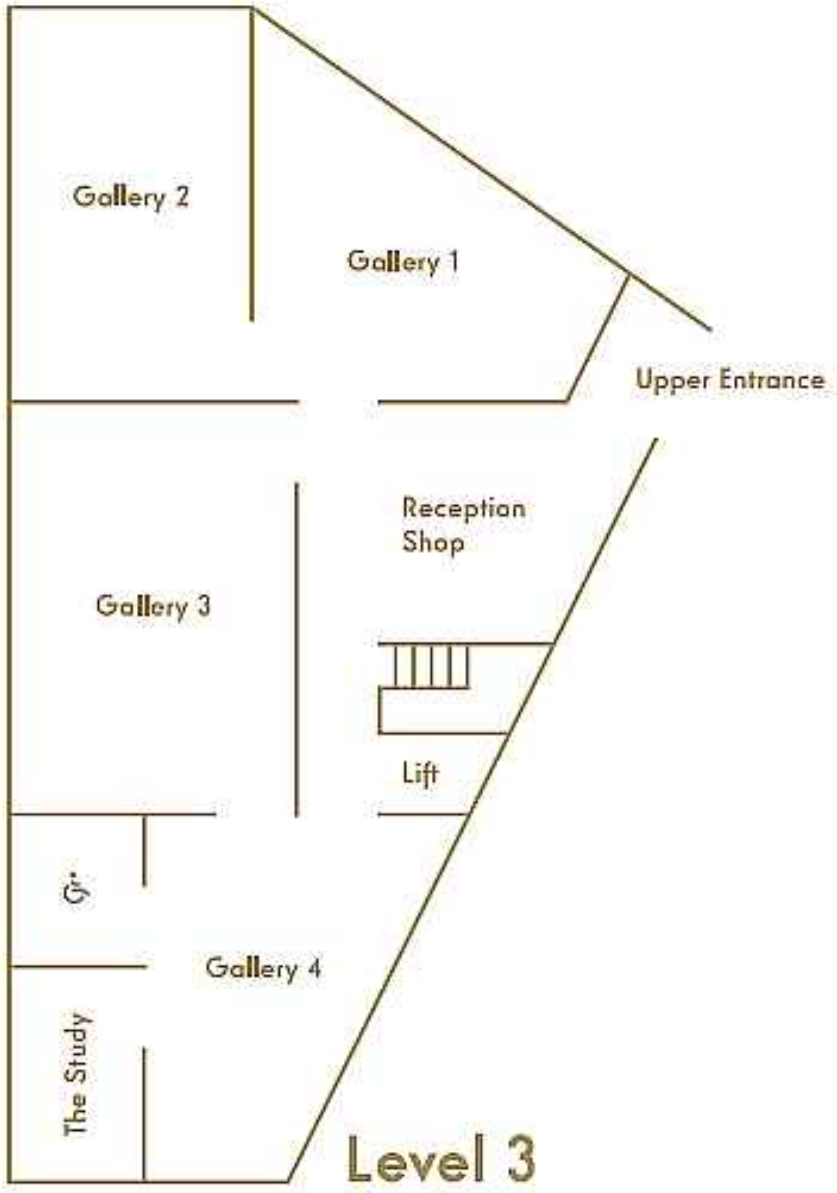


Figure 16: Floorplan of the gallery space

4.3.3 Design Template

To make it feasible to design a personalised interpretation for someone else from scratch within the constraints of a single workshop, it was decided that the designs would be based on an existing template. For this, the trajectory designed for Rufford sculpture garden was employed. This configurable structure was designed to guide pairs of visitors through a sequence of exhibits. To quickly recap this, at each sculpture, visitors are presented with a piece of music, a voice instruction telling them how to engage with the sculpture (how to look, move around and gesture), and a

fragment of text to be delivered as they walk away from it afterwards. The trajectory was designed to switch each visitor between having a personal experience, isolated from their partner while experiencing each sculpture, before reengaging with their partner between sculptures. It was anticipated that this would provide an appropriate and clear template for visitors to design a gallery experience for another person, with ample opportunities to personalise an interpretation through choice of music, instructions and text.

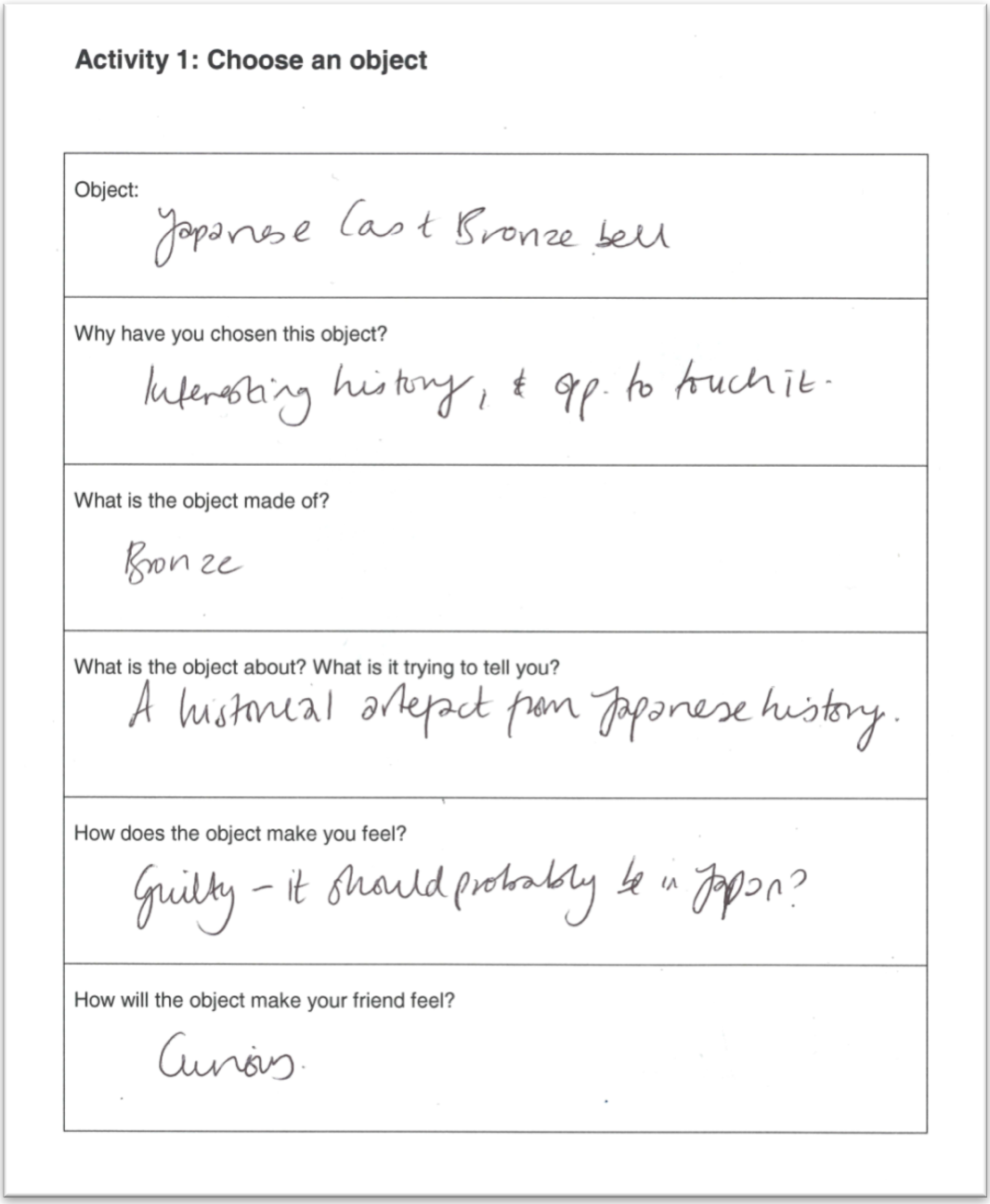
4.3.4 Design Workshops and Materials

Six two-hour design workshops were held at the gallery, each attended by one or two participants. Those that attended together were able to discuss ideas and selections, and for both individual and paired workshops we asked questions to elicit the participants' initial motivations and design rationales. Data collected at the workshops consisted of audio recordings and participants' written responses to a set of worksheets that were used to help structure their ideas.

Figure 17: Participants listen to music at the design workshop

Figure 18: A participant tries out a physical action at the design workshop

Participants were first asked to identify some broad aims for their experience, thinking about the person they were designing for and what they would want to get out of the experience. They were then asked to go into the gallery and choose five exhibits that they wanted to include in their experience. Next they were asked to identify styles of music that might fit each object's themes. They were given the option of listening to specific music tracks using the music streaming website Grooveshark.com to help choose a piece of music to go with each exhibit (Fig. 17). Next they were invited to consider what styles of interaction would be appropriate for their design, e.g. a physical action or a thought exercise, before deciding on what their partner should do while engaging with the object and a specific phrasing for the voice instruction (Fig. 18). Finally, they were asked to consider what style of text their partner would receive for each object, e.g. factual information or a personal message, then find or write a portion of text by reviewing the exhibition catalogue, searching on the Internet or drafting a personal message. Participants kept track of their design choices on paper worksheets (see Figs. 19-22) which, at the end of the workshop, were taken away and used to develop their designs into individual smartphone applications.



Activity 1: Choose an object

Object:
Japanese Cast Bronze bell

Why have you chosen this object?
Interesting history, & opp. to touch it.

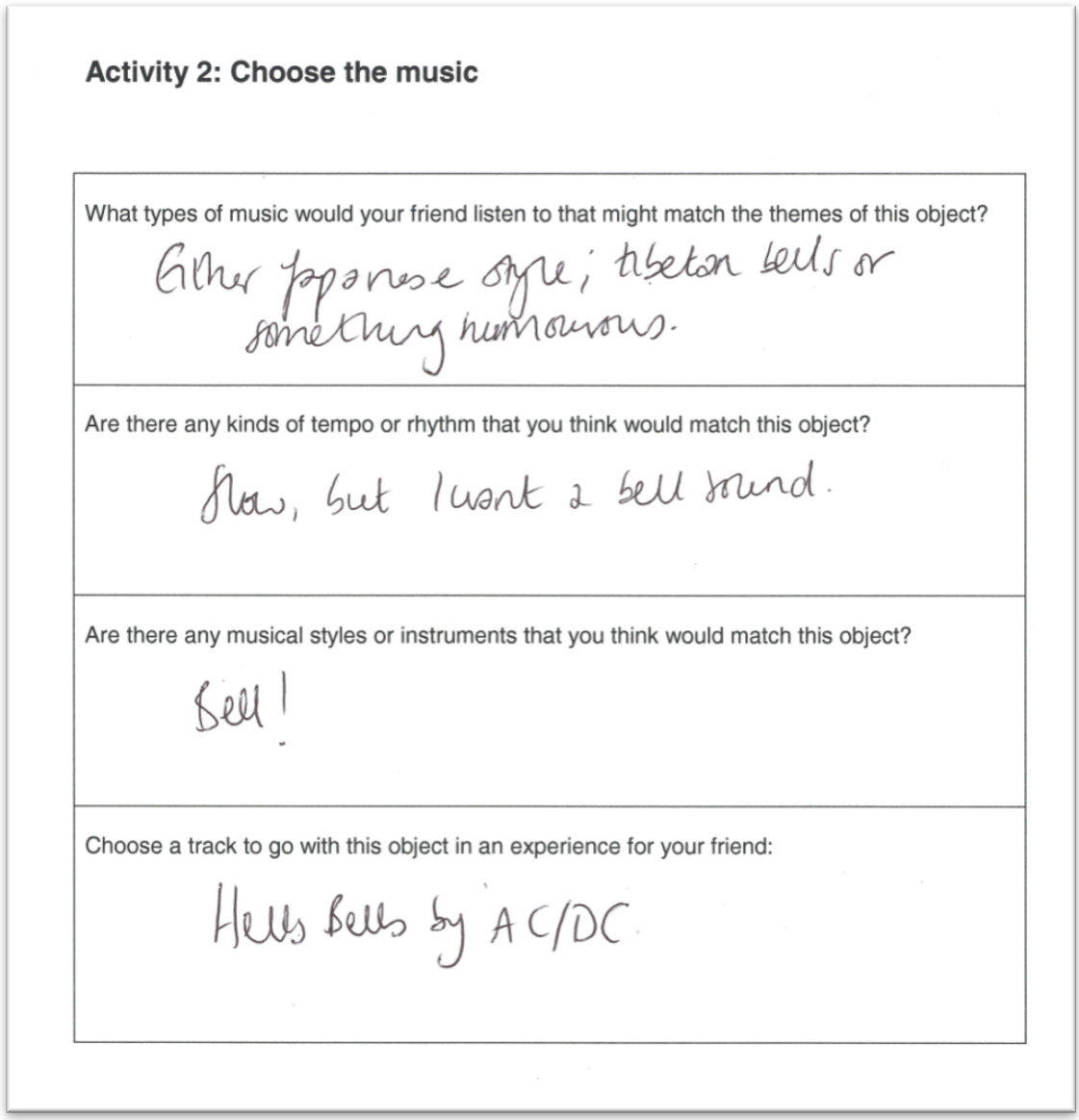
What is the object made of?
Bronze

What is the object about? What is it trying to tell you?
A historical artefact from Japanese history.

How does the object make you feel?
Guilty - it should probably be in Japan?

How will the object make your friend feel?
Curious.

Figure 19: Design worksheet for choosing an object



Activity 2: Choose the music

What types of music would your friend listen to that might match the themes of this object?

Other Japanese style; tibetan bells or something humourous.

Are there any kinds of tempo or rhythm that you think would match this object?

Slow, but I want a bell sound.

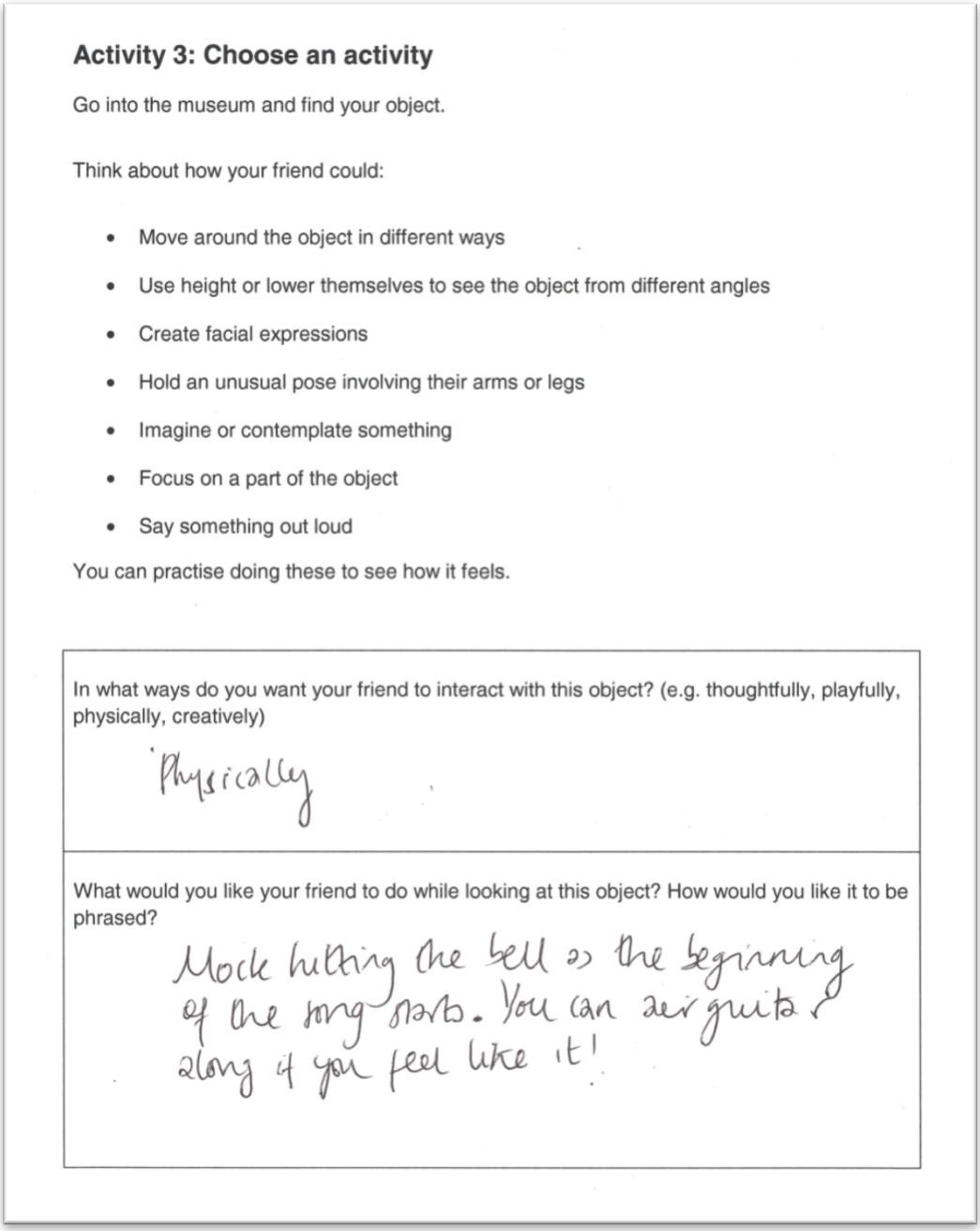
Are there any musical styles or instruments that you think would match this object?

Bell!

Choose a track to go with this object in an experience for your friend:

Hells Bells by AC/DC

Figure 20: Design worksheet for choosing music



Activity 3: Choose an activity

Go into the museum and find your object.

Think about how your friend could:

- Move around the object in different ways
- Use height or lower themselves to see the object from different angles
- Create facial expressions
- Hold an unusual pose involving their arms or legs
- Imagine or contemplate something
- Focus on a part of the object
- Say something out loud

You can practise doing these to see how it feels.

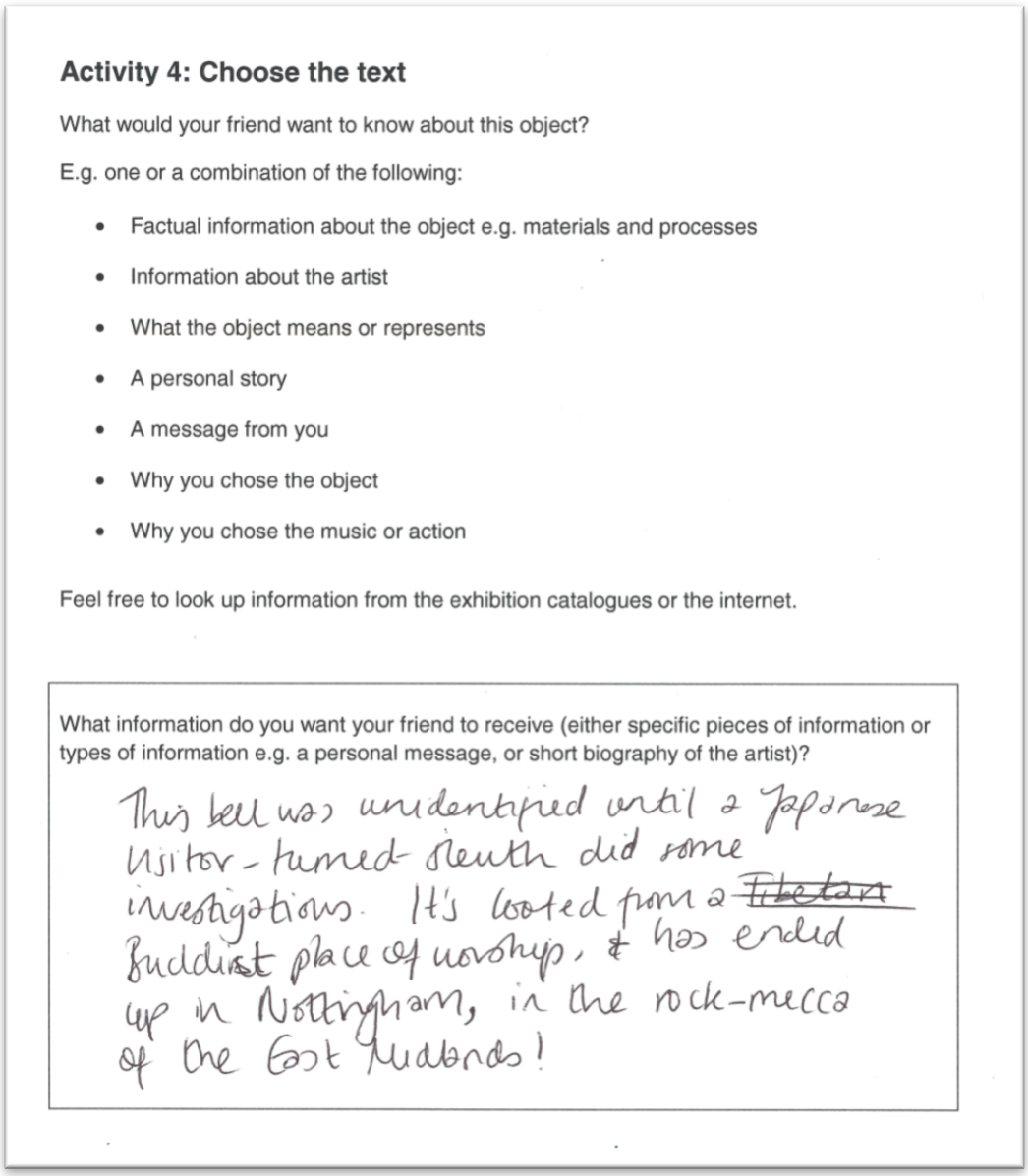
In what ways do you want your friend to interact with this object? (e.g. thoughtfully, playfully, physically, creatively)

Physically

What would you like your friend to do while looking at this object? How would you like it to be phrased?

Mock hitting the bell as the beginning of the song starts. You can air guitar along if you feel like it!

Figure 21: Design worksheet for choosing an instruction



Activity 4: Choose the text

What would your friend want to know about this object?

E.g. one or a combination of the following:

- Factual information about the object e.g. materials and processes
- Information about the artist
- What the object means or represents
- A personal story
- A message from you
- Why you chose the object
- Why you chose the music or action

Feel free to look up information from the exhibition catalogues or the internet.

What information do you want your friend to receive (either specific pieces of information or types of information e.g. a personal message, or short biography of the artist)?

This bell was unidentified until a Japanese visitor-turned-sleuth did some investigations. It's looted from a ~~Tibetan~~ Buddhist place of worship, & has ended up in Nottingham, in the rock-mecca of the East Midlands!

Figure 22: Design worksheet for choosing text

4.3.5 Summary of Participants

Eight pairs of visitors were recruited to take part, six of whom were romantic partners and two of which were close friends. Of the 16 participants, ten were aged 20-29, four were aged 30-39 and two were over 50. One member of each pair was invited to design a personal tour for their partner, who came along to use the experience once it was designed. A more detailed list of participants follows in section 4.4.1.

4.3.6 Visits

The participants' designs were implemented by hand, after the design sessions, using the AppFurnace tool[6], with the vocal instructions recorded by a voice artist. Since the exhibition was moderately sized and in a constrained gallery space, and it was presumed that the designer would be present when the visit took place, the experience was set up so that visitors were required to find their own way between exhibits and manually confirm when they were ready to begin their experience of each, rather than relying on an automated location system. Furthermore, as the aim was to study to gifting mechanisms, the risk of potentially unreliable indoor positioning technology was removed in order to avoid any possible confounding factors.

Around two weeks after the initial workshops, participants were invited back to attend the gallery in their pairs. They were briefly introduced to how the system worked before being left to try the experience. They were video-recorded from a distance to capture an overview of their interactions, using a directional microphone to capture their conversations. Once they had finished, they were interviewed in their pairs, which involved asking them both to reflect on each of the episodes in their visit. While it was recognized that participants might be more objective about the experience if interviewed separately, they were interviewed together to maintain the sense of a shared experience that they had carried out together, and also allowed the capture of any back-and-forth dialogue about their different experiences and their personal interpretations.

4.3.7 Analysis

The approach produced a rich set of data for each pair of participants, telling a story through the initial design workshop, the visit itself and the interview that followed. The audio and worksheets from the workshop were used to build a picture of the motivations and justifications for participants' personalised designs. The approach to analysing the video was to adopt an ethnographic style across a number of data sessions, reviewing each pair's interaction with each object in their visit. An overview was summarised of what happened in each interactional sequence, based on an analysis of participants' gaze, gestures, utterances and interactions with relation to the

[6] http://appfurnace.com/

instructions they heard. While no two sequences were the same due to the different objects visited and the bespoke content delivered, it was possible to draw out behaviours that were broadly successful, uniquely interesting or problematic. The interview data was used in conjunction to explain what was observed, with participants elaborating on what they thought and did at each stage of the visit. In taking this approach, it was possible to build a rich case study of each pairs' engagement with the experience from start to finish.

4.4 Findings

The findings are now presented in two parts. The first part presents a general overview of the participants, their motivations, the designs they created and how these were experienced in the gallery. The second drills down into four specific examples of designs and subsequent interactions that best illustrate the key themes to emerge from the study.

4.4.1 Participants, Motivations and Reactions

P1.a, a female in her 20s, designed for her boyfriend P1.b, also in his 20s. P1.a wanted to design an enjoyable and educational experience. During the visit they both visibly engaged with the experience with P1.a demonstrating to P1.b what to do.

P2.a, a female in her 20s, designed for her boyfriend P2.b, also in his 20s. She designed a fun experience that might allow P2.b to learn something new. Both reported feeling uncomfortable during the visit; P2.b at using the experience and P2.a at watching P2.b's reaction.

P3.a, a male aged in his 20s, designed for his friend, P3.b, also male and in his 20s. P3.a wanted to design an experience that would show P3.b a different take on art. Both engaged enthusiastically during the visit, with P3.a often taking the lead and showing P3.b what to do.

P4.a, a female in her 20s, designed for her boyfriend, P4.b, also in his 20s. The experience was designed to be a personal "emotional journey". During the visit, P4.a stood back and let P4.b do the experience largely on his own.

P5.a, a female in her 30s, designed for her husband P5.b, also in his 30s. She designed a personal experience that would communicate her views on art. P5.b used the experience completely on his own and had trouble finding some objects and interpreting the instructions.

P6.a, a male in his 20s, designed for his girlfriend, P6.b, a female in her 20s. The design was intended to be amusing and inspiring. During the visit they both enthusiastically engaged with the art works.

P7.a, a female in her 30s, designed an experience for her husband, P7.b, also in his 30s. P7.a designed an educational but light-hearted experience. During the visit the participants were mostly engaged in the experience but did not interact physically with the art.

P8.a, a female in her 60s, designed an experience for a friend, P8.b (male, 60s), out of his comfort zone. P8.a wanted to design a challenging experience that might take her friend out of his comfort zone. They did not return to use the experience as P8.b was unable to attend the gallery.

4.4.2 An Overview of the Designs

To understand how the participants engaged with the personalisation method, the four key steps in designing an experience are now considered in turn: choosing exhibits, choosing music, designing actions, and writing the 'take away' text for each.

4.4.2.1 Choosing Exhibits

Between them, the participants chose 30 unique exhibits for their designs. Six exhibits featured in two separate designs while one recurred in three. The participants tended to choose objects to fit the type of experience they wanted to design. The two participants who aimed to design a primarily personal experience (P4.a and P5.a) chose objects that could represent the personal messages they wanted to get across, while the six who wanted their experiences to be primarily educational chose objects that they could craft an interesting message around. Perhaps because the exhibition was so varied, all but one participant was able to easily choose five exhibits they felt would work in the experience, the other only finding four within the time given.

Choices often related to a specific aspect of their partner's life, for example one chose Map of the World and Double Dome because "it appeals to [my partner]'s interest in globalization, maps and travelling". However, participants also chose exhibits that they liked and wanted to share with their partner, for example P2.a chose Kaleidoscope Cat V by Louis Wain, an artist she had been interested in since before coming to the exhibition, so used the experience to share an interesting story relating to it.

4.4.2.2 Choosing Music

Music was often directly inspired by the exhibit, for example one participant chose Time by Pink Floyd as she felt the exhibit was representative of the world existing through time, and that the ticking clock featured in the song supported this interpretation. At other times the music choices were based on physical characteristics of the exhibit, for example the track Crystalline by Bjork for the object Nunhead, a car engine covered in blue crystals. This said, in almost all of the cases, participants chose pieces of music that they knew their partner liked and some chose pieces that had a particular meaning for them as a couple, for example P4.a chose Saturate by Beastie Boys which was a song she and her partner used to listen to in nightclubs, while P6.a chose a piece of music from the soundtrack to a film, Ghost in the Shell, that he and his partner both liked.

4.4.2.3 Designing Instructions

The actions to be carried out at exhibits ranged from the physical to the cerebral. Physical actions might be designed to establish particular moods, for example contemplatively sitting in front of an exhibit. Other times they were designed to be playfully provocative, demanding unusual and potentially embarrassing actions such as dancing in public view. One way of upping the stakes was to imbue such actions with personal shared meaning. For example, this instruction to dance in front of an exhibit - "Stand as close as you can to the image. Step back and delicately step side to side. Do the coma cat dance move." - directly invoked this couple's special shared dance move. The more cerebral activities invited thought and reflection without overt physical action. Some of these directly encouraged the partner to consider the exhibit from the same interpretational stance as the designer. For example, one participant

thought the piece Eyes in Space was about the beginning of time and used the instruction to directly ask, “Think about the very beginning of the world, infinite space and the potential within it.”

4.4.2.4 Designing Text

The textual information to be displayed on leaving the exhibit often included factual information such as a short biography of the artist or a fact about how an artefact was made. This might be drawn from the official catalogue or from the designer’s own personal knowledge. Of particular interest was the use of this ‘take away’ text to offer justifications of the designers’ choices, or to directly explain the designer’s interpretation of the object, for example, “These two pieces of art span decades and both are examples of humans trying to come to terms with their place on earth. I chose them and the music to encourage a feeling of transience on earth, but also to connect it to the past, present and future.” In some cases this extended to an apology for an especially demanding action, for example the text following an instruction to shout ‘Hello!’ at a sculpture of a telephone read: “Sorry, that must have been really embarrassing!” On other occasions participants chose to give more concrete snippets of information that they anticipated their partner would be interested in, such as, “This is the first drum machine ever made. A knob selects one of 10 preset combinations of sound to create patterns such as Tango, Fox Trot, Waltz, and so on.”

Participants were able to successfully choose music, instructions and text that they felt was appropriate, and often used the workshop prompts and worksheets to guide their design choices. One participant chose to deviate from the experience template, leaving out instructions where she thought the music, object and text were sufficient for her partner’s experience. Below are a selection of example experiences to illustrate how participants approached the design task, what they designed and how they thought about the person they were designing for.

4.4.2.5 The Designs

Design 1: Participant 1a.

P1a is a female aged in her 20s who chose to design an experience for her boyfriend (P1b). P1a identified the type of experience she wanted to design for P1b as an enjoyable experience, an education in the exhibition and a way for him to get to know

her better. She felt that in a gallery experience, P1b would want to learn about the motives behind the individual pieces of art, be challenged on his preconceptions about contemporary art and move closer to understanding a new viewpoint. Fig. 23 shows the experience she designed.

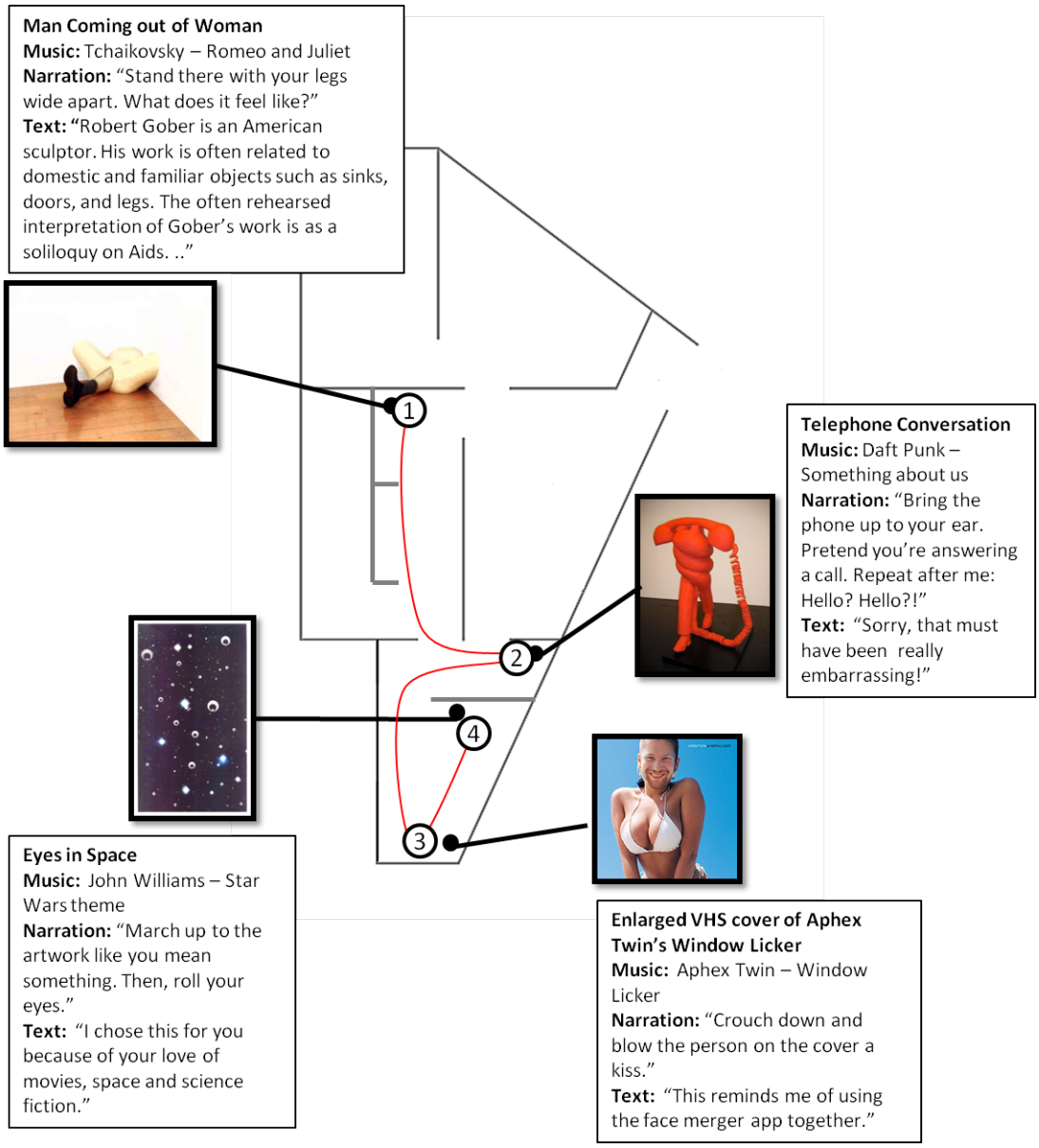


Figure 23: Participant 1a's design

This section will now briefly zone in on the final object, Eyes in Space, to examine why the object and accompanying content was chosen. The reason P1a gave for choosing this object was that "P1b loves space!". She found the object fun but also thought there was something strange about it, making her feel watched. She thought it would make P1b feel happy. She thought the types of music that would work with it

could be instrumental or dance music, but with a steady or hypnotic rhythm. She wanted the music to be theatrical, and decided to use a piece of music that would tap into P1b's love of space and sci-fi – Star Wars main theme by John Williams. P1a then decided that she wanted P1b to interact with it playfully. Drawing on the dramatic music she decided to ask him to "march up to the artwork, like you mean something. Then, roll your eyes". The text was then used to explain why she had chosen the object: "I chose this for you because of your love of movies, space and science fiction".

Design 2: Participant 2a.

P2a is also a female in her 20s, designing for her boyfriend (P2b). She wanted to design a fun experience which would allow P2b to see himself through P2a's eyes. She thought he would want to be amused, to learn something and to be reminded of a good memory. The experience is represented in Fig. 24.

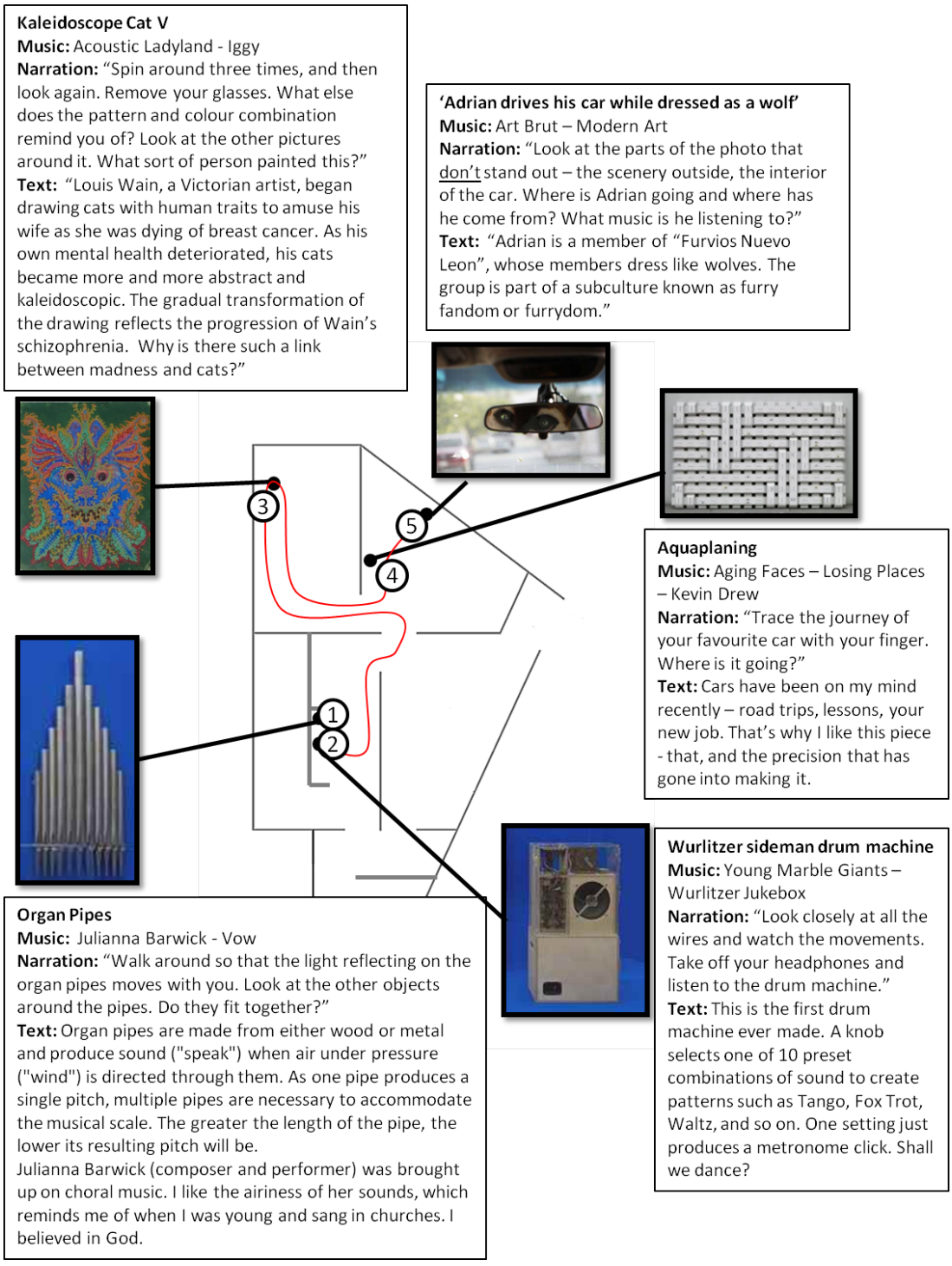


Figure 24: Participant 2a's design

The second object in this trajectory was Organ Pipes, which P2a chose because she found the contrasts of the object striking, and because she personally liked the object. She wanted a piece of music that reflected the theme of church organs, something slow, choral and acoustic. She chose a choral piece of music called Vow by Julianna Barwick. When choosing the activities P2a said, "I'm thinking about the person I'm

doing this for and I know he will not want to do anything that draws attention to himself", therefore she was trying to choose activities that were more contemplative than ones likely to draw attention through overt physical movement. The instruction P2a chose for Organ Pipes was for P2b to "walk around so that the light reflecting off the organ pipes moves with you"; while this involved physical movement P2a thought that it wouldn't look too dissimilar from normal gallery behaviour. P2a chose to use the text to give a piece of factual information about organ pipes, and also a personal message about why she chose the music, "I like the airiness of her sounds, and it reminds me of when I was young and sang in churches".

Design 3: Participant 3a.

P3a is a male in his 20s who chose to design for a friend (P3b). P3a wanted P3b's experience to allow him to have a different take on art and to learn some new facts he might not know.

P3a started off by stating that he wanted to use "a range of different objects that you could like do different things with, play with different heights, play with different things and maybe wasn't always looking at the object." He wanted objects that were spread through the gallery in different rooms: "I want him to go in, not knowing what's in the room and go towards it and then have that sort of instant sort of, be intrigued by it." In terms of personalising the object choices to P3b, P3a said "there was a danger that I was sort of choosing for myself possibly," because after having identified P3b's interests in nuclear disarmament and political activism he struggled to find things for which he could "put in something about war, about drones and stuff". See Fig. 25 for the complete design.

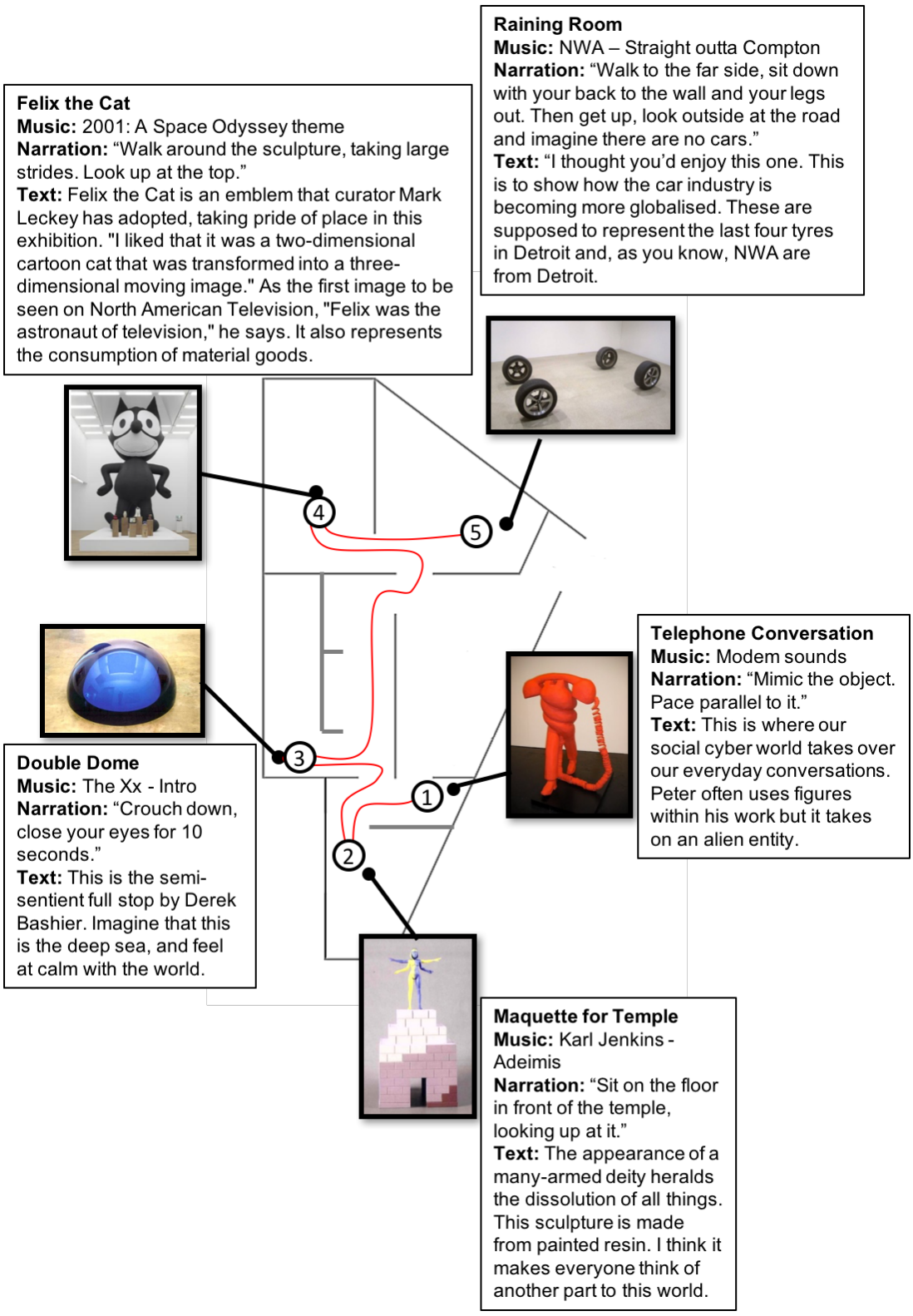


Figure 25: Participant 3a's design

The third object chosen was Double Dome. P3a chose this object because it was a "good, interactive object, [that] contrasts with the other objects I've chosen". P3a said the object made him feel "calmness, tranquillity" and that it could make P3b feel

“deep in thought and appreciate the world”. This fitted into his idea of having different objects as this one would be quite contemplative. P3a thought the music for this piece should be “calm, instrumental, relaxing music” that was “reasonably slow”. He chose Intro by The Xx which he thought was “a thoughtful one”. P3a wanted P3b to interact thoughtfully with the object, so chose the activity as “crouch down and close your eyes for 10 seconds”. The text information for this object was partly taken from the exhibition catalogue, and followed by a personal message reinforcing how he wanted the object to be viewed: “Imagine this is the deep sea and feel at calm with the world.”

Design 4: Participant 4a.

P4a, a female in her 20s, chose to design an experience for her boyfriend, P4b. P4a wanted to design a fun, positive experience for P4b that would make them feel like they know each other well, and allow P4b to see the exhibition in a new light. She wanted to make him feel happy, interested and reflective of himself.

P4a said she was looking for objects that would interest P4b but she also had an idea of the types of music she wanted to play, so let the music partially guide what she was picking. She said that the night before the workshop she had been brainstorming songs that had a “particular resonance for use as a couple” because she wanted it to be a really personal experience, “his girlfriend making him a special thing”. However, having seen the objects in the exhibition she said, “a lot of the objects are making me laugh so it’s drifted a little bit to being a bit humorous”. Fig. 26 shows the complete design.

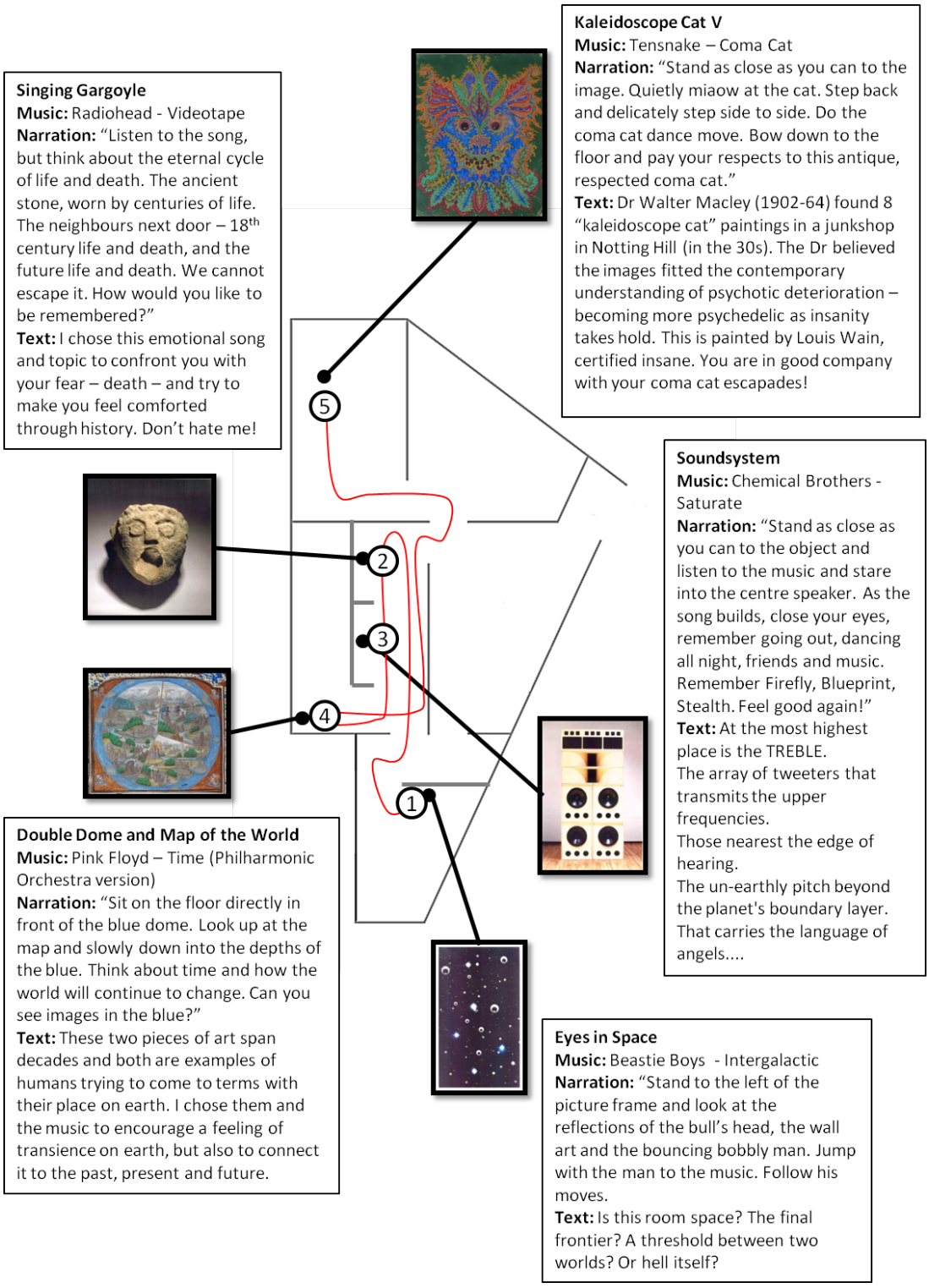


Figure 26: Participant 4a's design

The first object chosen was Eyes in Space, which P4a chose because "the glass was acting like a mirror and I thought that was really interesting how it interacted with the rest of the room, and how it had been curated like that". She then chose to frame the object in her experience with respect to the whole room rather than just the object.

She thought that P4b would think it's fun and that it would make him look differently at art that he might previously have looked at, which is what she aimed to do with her experience. She found the room to be scary and felt its themes were to do with space, hell and anxiety and wanted to choose a piece of music that reflected this, but also something that "bounces at the same beat as the bouncing ball piece in the background". She then thought of the song Intergalactic by The Beastie Boys, which suddenly came into her head because it was about space. She thought this was suitable because "it's got quite a pounding beat, it's about space and it has a menacing sound". For the activity P4a wanted P4b to interact with the object itself and the other objects in the room, so chose for him to look at the reflections in the glass and then jump up and down with the video piece of a bouncing man. She then wanted to add a "cryptic message" at the end, referring again to the artwork being in a particularly curated space.

Design 5: Participant 5a.

P5a wanted to design an experience that was very much based around the art but also was very personal between her and her husband (P5b). She said she picked objects very much with her husband in mind. P5a noted that P5b rarely listened to music on his own, that instead she is always the one to put music on in their home and is therefore his "music mediator". Fig. 27 shows P5a's design.

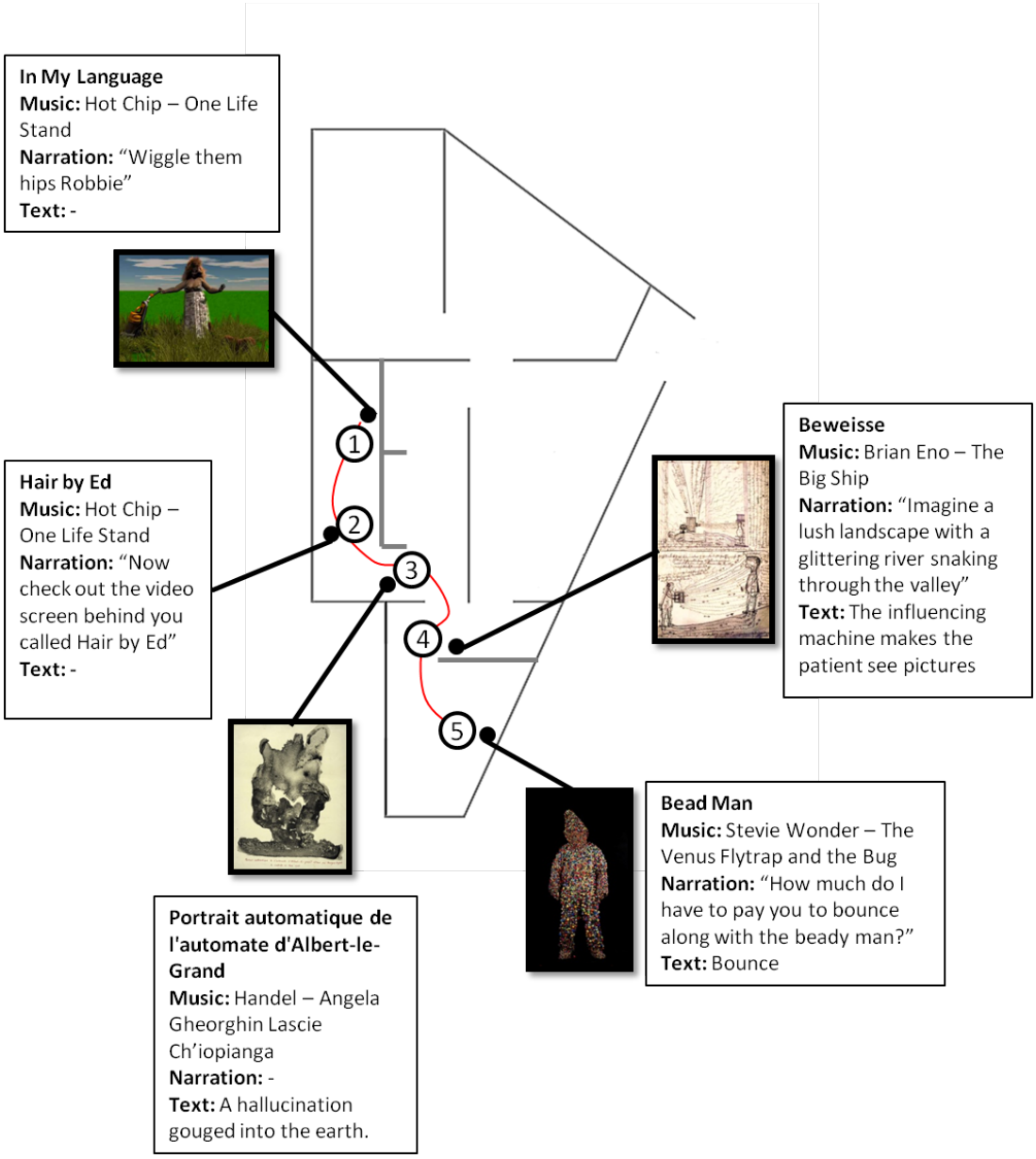


Figure 27: Participant 5a's design. Please note there is no image available for Object 2: 'Hair by Ed'.

The third object P5a chose was Beweisse, an ink diagram of a technological or science fiction scene. She chose this because she is herself an artist and though that it reflected her own exploration into the relationship between nature, technology and the human experience. She thought the picture was "like a message to aid my quest" and that it would "help [P5b] to understand what I'm prattling on about". P5a wanted the music for this object to have a very different type of tempo, to "slow things down" in relation to the rest of the trajectory. She thought of using something ambient but electronic, "euphoric in a quiet way". P5a struggled to think of something so I suggested the Brian Eno album Another Green World. After listening to a couple of tracks P5a selected The Big Ship for this piece, saying "I wanted to convey how that

image made me think of nature, and I think this really articulates that really beautifully". Next, P5a wanted P5b to "imagine what's not there", asking him to imagine a particular scene on top of the image. For the text, P5a found a quotation from the exhibition catalogue by the curator, "the influencing machine makes the patient see pictures", which alluded to the function of the apparatus depicted. The quote also resonated with P5a's interpretation of the object – "to me this image is like a representation of something else, of another image like a landscape".

Design 6: Participant 6a.

P6a is a male aged in his 20s, designing for his girlfriend (P6b), who he said likes to visit galleries to find something beautiful, to remind her of her art history degree and to laugh. See Fig. 28 for the design.

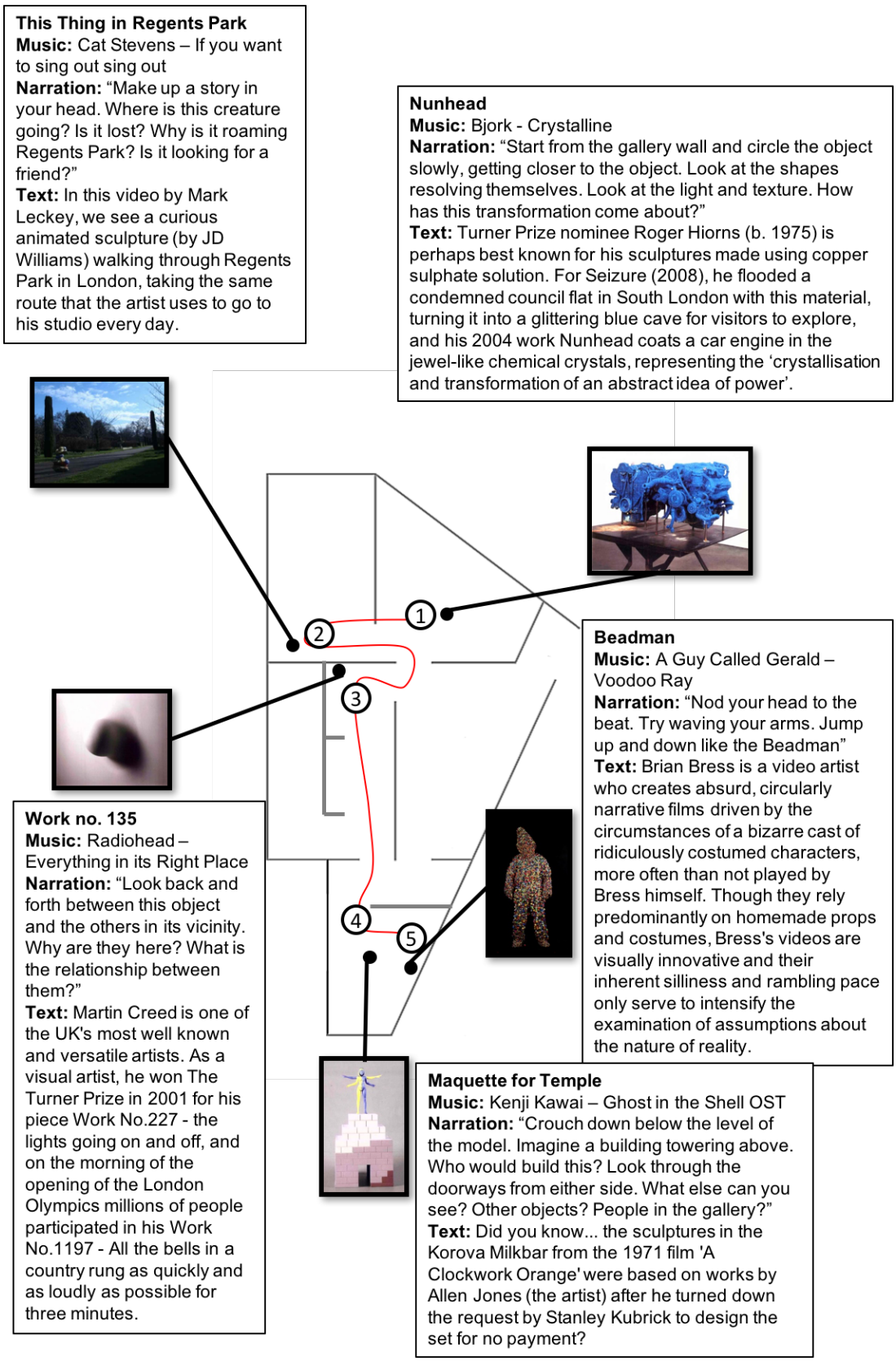


Figure 28: Participant 6a's design

P6a's first choice was Nunhead, a car engine covered in blue crystals, chosen because it caught his eye and seemed like a good starting point for the experience. P6a thought

the object was about a transformation, “changing something ordinary into something unusual or beautiful”. He said the object made him feel calm and intrigued by the light and shapes, and hoped that it would make P6b feel thoughtful about time and natural processes. The piece of music P6a chose for this object was Crystalline by Bjork, which came to mind due to the object being covered in blue crystals and knowing that P6b likes Bjork. P6a wanted the activity to be thoughtful but also physical, asking P6b to slowly circle the object and get closer, looking at the light and texture, then asking “how has this transformation come about?”. P6a then chose to use the text to explain how the object became covered in crystals, the artist’s processes etc., including some information about an earlier piece by the artist. P6a said he preferred to use factual information in the text portion of the experience to contrast with the more personal messages he was giving through the instructions.

Design 7: Participant 7a.

P7a is a female in her 30s designing an experience for her husband, P7b. She wanted to design an experience that gave P7b a deeper insight into the works of art, a light-hearted experience and a way of interacting with the art, while she thought P7b would want to get a better understanding of technology in exhibitions and a familiarity with mobile apps. See Fig. 29 for the design.

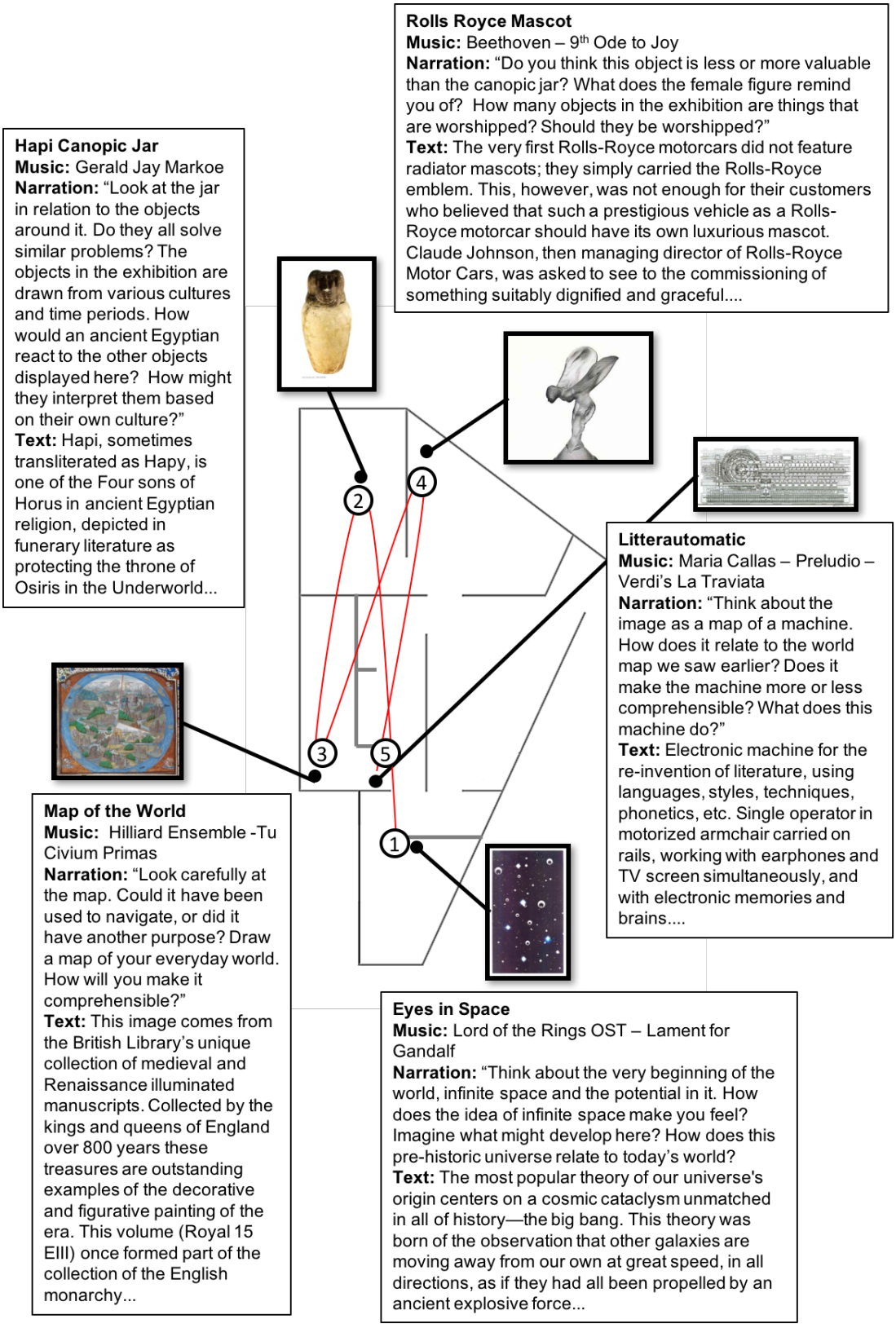


Figure 29: Participant 7a's design

P7a selected two themes from the exhibition upon which her experience was designed to draw upon. One of them was the idea of mapping, or drawing diagrams, to make

the world comprehensible. Three of the objects (Eyes in Space, Map of the World, and Littererautomatic) relate to that and the other two were chosen based on the idea of A History of the World in 100 Objects (Radio 4 show), and were designed so that P7b could compare two objects from different time periods. P7a said, "[P7b]'s quite conservative in his taste as far as art is concerned so I was trying to choose a mixture of objects some of which were very traditional or widely accepted as art objects".

The fifth and final object P7a chose was Litterautomatica, a drawing of a literature machine. She chose it to go into her mapping theme because she thought it was "like a map of an object, a way to understand it". She interpreted the object as "a way of mapping technology and making it comprehensible" and thought that P7b would be impressed by it. P7a chose a piece of opera music by Maria Callas to accompany the object which she thought would influence P7b's viewing of the object. The activity P7a chose was to "think about the image as a map of a machine. How does it relate to the world map we saw earlier?", wanting P7b to interact with it thoughtfully and creatively, reinforcing the theme of mapping and comparing the object to a previous one in the experience for educational purposes. The text was used to explain the image as a literature machine and give a brief biography of the artist to contextualise the piece.

Design 8: Participant 8a.

The final participant, 8a, is a female in her 60s, who designed an experience for a male friend also in his 60s. She wanted to design something that was challenging for her friend and took him out of his comfort zone as he was not likely to use a mobile museum guide in a natural setting.

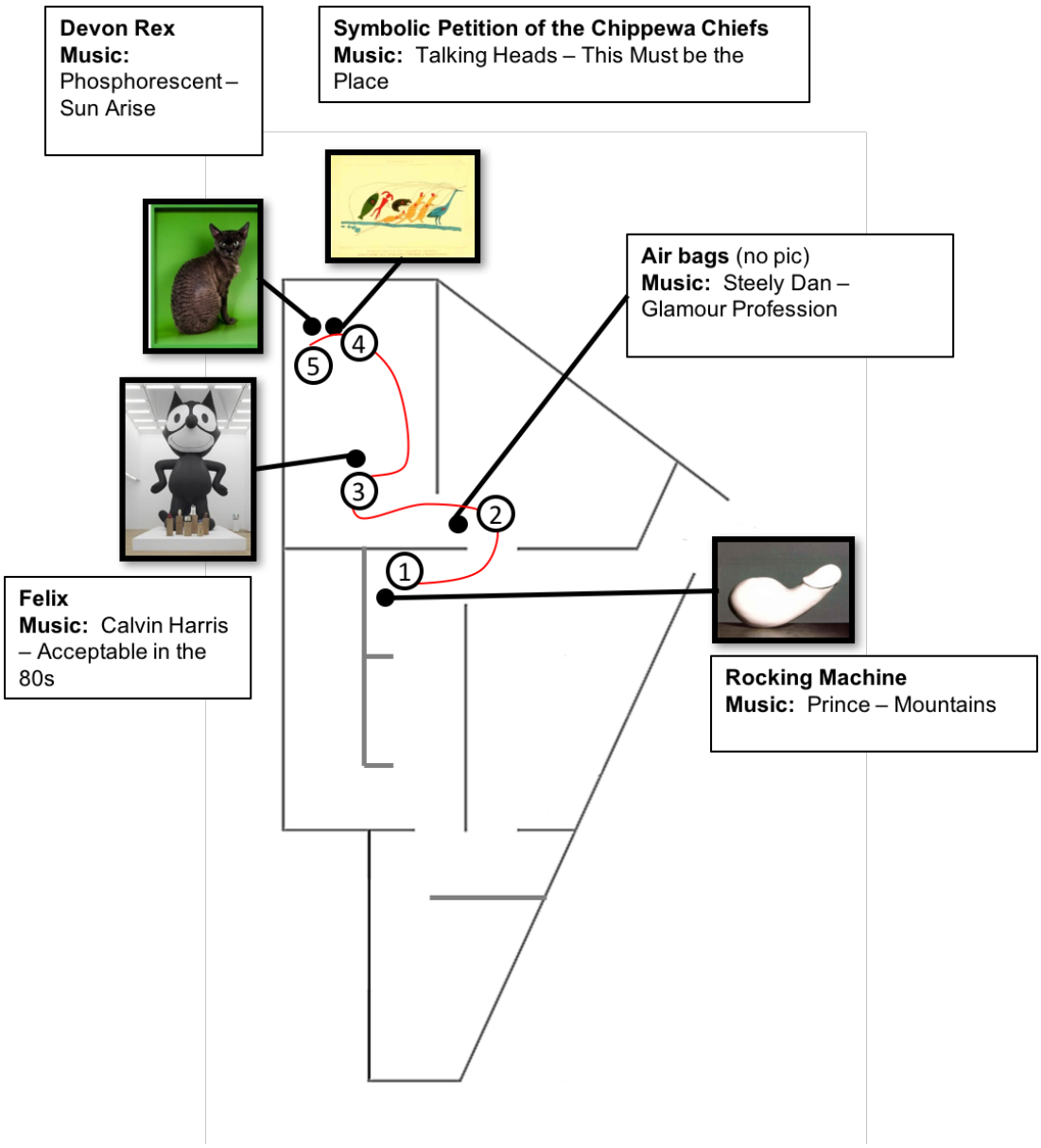


Figure 30: Participant 8a's design

P8a chose objects that she thought would stimulate her friend (see Fig. 30). She chose two objects depicting cats as she and her friend shared a passion for cats. The music selections were intended to be fun and to her taste. She decided not to use any instructions or text as that would have pushed her friend too far out of his comfort zone. She wanted them to be able to listen to the music then "have a chat".

4.4.3 An Overview of the Gallery Visits

A summary is now presented of what happened when these experiences were actually deployed in the gallery. Of the eight participants who designed an experience, seven brought their partner back to the gallery to use it; the other participant's partner did

not live locally and was unable to attend after all. Six of the seven pairs chose to try the experience together, while one pair, P5.a and P5.b, decided the recipient would use it alone as touring the gallery together would have been alien to their usual visiting pattern.

In the large majority of cases participants followed and complied with the designed experiences. All of the participants saw the experience through to the end and in all but one case they listened to the entire music tracks before disengaging from the objects. There was just one example from 34 exhibits of a participant, P2.b, moving both headphones from his ears part way through the audio and on a handful of occasions participants would briefly remove one headphone to speak to each other during the audio. It was observed from the video data that out of the 23 instructions requesting an overt physical interaction, in 18 cases the recipient followed the instruction, while in the other five they engaged by simply standing and looking. For the instructions that required non-physical activities such as contemplating, participants typically stood and looked at the objects for the duration of the audio, with little interaction between the pairs. Of the 32 exhibits for which the experiences included a portion of text information delivered after the audio, only one participant, P4.a, did not read the text that was displayed. Often there was discussion between the designer and recipient before they walked away from an exhibit, for example the designer expanding on the information or the recipient reflecting on the experience. Fig. 31 summarises how the participants interacted with the experience, with each row representing a visitor's engagement with the experience. There were seven studies and two participant taking part in each study. In a study, one participant (with the ID ending in 'a') designed the personalised experience and another (with the ID ending in 'b') being the intended recipient of the personalised experience. Both participants received the same content, except in the case of P5.a, who did not engage with the experience herself. While the experience, and instructions included, were personalised toward the recipient (person 'b'), Fig. 31 treats both persons 'a' and 'b' in terms of what they did while they engaged with the experience, for example, following a physical instruction.

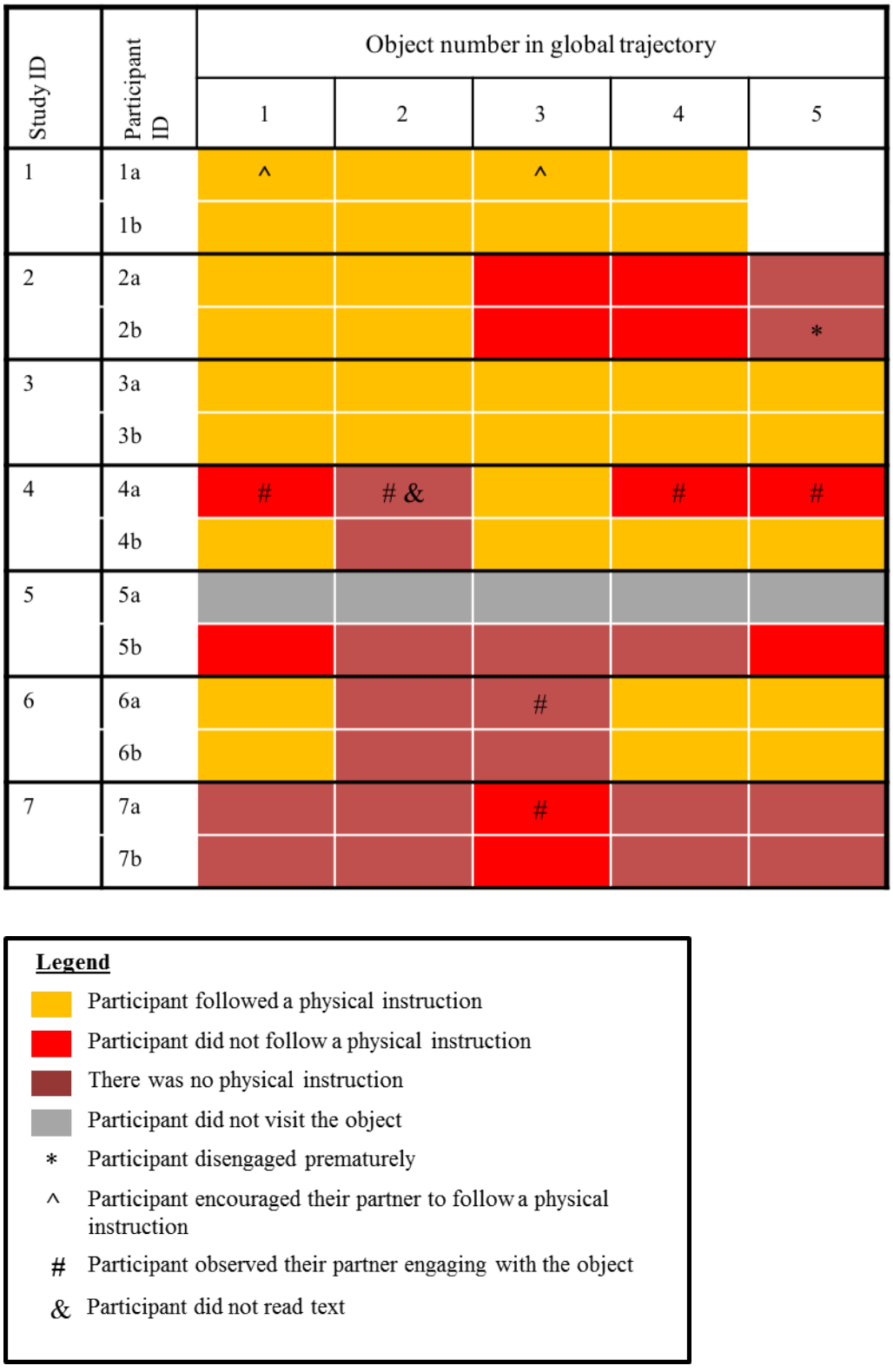


Figure 31: Visualisation showing how the visitors engaged with the experience

In terms of how they felt about using the experiences, six out of the seven pairs reported having a positive experience, finding that it was enjoyable, engaging and stimulated discussion, though could sometimes be challenging. One couple did not

enjoy the experience, as the recipient, P2.b, felt it was too prescriptive and did not give him freedom to visit as he wanted, and especially did not appreciate being given instructions for how to act. P2.a, the designer, in turn felt awkward doing the experience alongside P2.b, who did not hide the fact that he wasn't enjoying her design.

Having given an overview of the designs and experiences, four illustrative fragments of interaction are presented to explore more deeply. These are chosen from four different pairs of participants interacting at four different exhibits. Examples 1 and 2 focus on what might be called broadly successful and typical interactions where the experience generally proceeded as planned. Example 3 presents a case where the experience broke down, while Example 4 reflects on the experience of the one participant who completed it alone.

4.4.4 Interpreting an Artwork

In this example, P1.a and her boyfriend P1.b are at the first object they encounter, Man Coming Out of a Woman, a sculpture of a woman giving birth to a man's leg, complete with shoe and sock.

Design. During the workshop, P1.a reported choosing this object because it was lifelike, abstract and "quite eerie". P1.a wanted P1.b's experience to be "dramatic", and chose a piece of classical music to achieve this effect: Romeo and Juliet by Tchaikovsky. P1a wanted P1.b to interact with the object "thoughtfully" and "physically". She chose the instruction, "Stand there with your legs wide apart. What does it feel like?" to stimulate P1.b to imagine how it might feel to give birth to a leg. For the text, P1.a thought that P1.b would want to learn about what it meant to the artist to produce the object and so included information about the artist and how his artworks are generally interpreted.

During the visit. P1.a initially leads P1.b towards the object and they stand together, glancing at each other to confirm they are in the right place before turning to focus their attention on the object itself. As the experience starts, P1.a looks at P1.b while laughing nervously as she waits to see how this first interaction will unfold. They both look at the object while listening to the music. Upon hearing the instruction, P1.a moves her legs outwards, demonstrating to P1.b what to do and P1.b follows with the

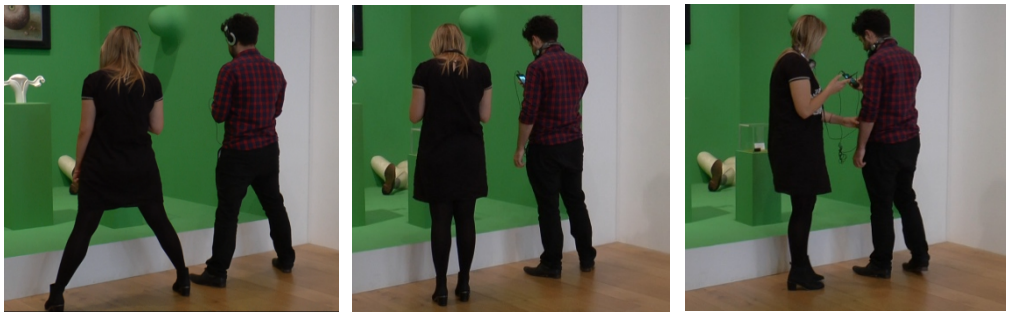


Figure 32: P1a (left) and P1b at 'Man Coming out of Woman'

same action (see Fig. 32). After around 30 seconds, P1.a moves her legs wider to exaggerate the action, and looks at P1.b and smiles, further demonstrating the gesture while also checking that P1.b is following. When the music ends, they move back to a normal standing position, take off their headphones and read the information. P1.a finishes reading first but sees that P1.b is still reading. She touches him on the arm while turning to walk away. P1.b follows while continuing to read the text.

After the visit. When interviewed, both participants said they enjoyed their experience, finding the action of standing with their legs apart particularly effective in prompting their imaginations, as P1.a had intended. However, their opinions diverged over the choice of music and revealed somewhat different interpretations of the work. After saying that he didn't see how the music fitted with the object, P1.b suggested that, "You could play a cheeky piece of music there because it's quite a cheeky piece of art", to which P1.a replied, "But I didn't think it was cheeky so that's why I chose [Romeo and Juliet]".

4.4.5 Engaging with a Personal Interpretation

This example follows P4.a and her boyfriend P4.b at the fourth exhibit in his personal "emotional journey".

Design. The participants in this example are visiting Singing Gargoyle, a medieval stone gargoyle dating from c.1200. P4.a designed the experience around this object to be the low point of P4.b's emotional journey. P4.a interpreted the object as being representative of P4.b's fear, death, and the fact that "everybody dies, now and in the future". P4.a wanted to find a "slow, sad" song which would reinforce the theme of death. She chose Videotape by Radiohead, a band that both she and P4.b are fans of. She then designed an instruction that directly asked P4.b to "Think about the eternal

cycle of life and death", and used the text to deliver a very personal message explaining and justifying her design: "I chose this emotional song and topic to confront you with your fear – death – and try to make you feel comforted through history", before adding, "Don't hate me!" – acknowledging the potential discomfort that he may experience.

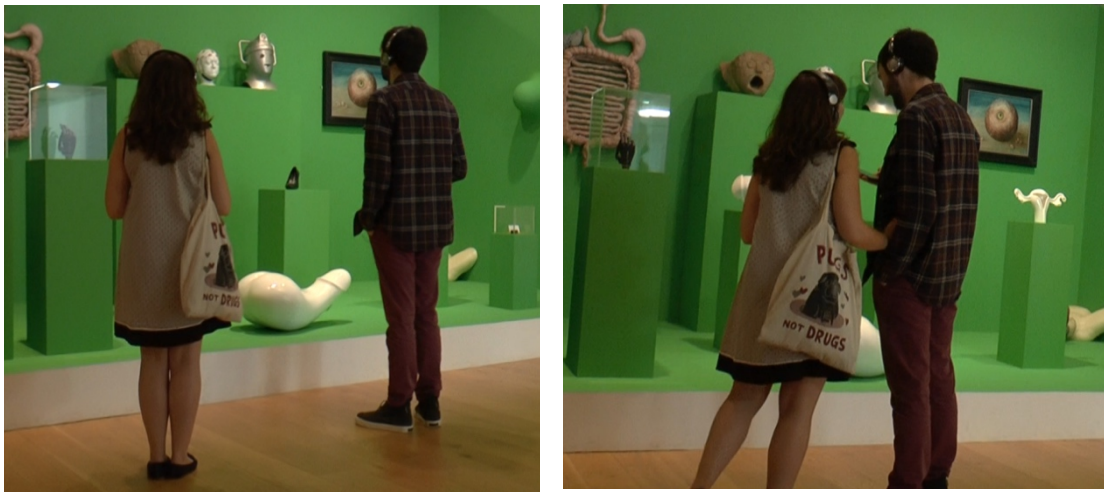


Figure 33: P4a (left) and P4b at 'Singing Gargoyle'

During the visit. As they reach the object, P4.b steps forward to stand in front of the object, while P4.a stands a few feet away, giving P4.b space to do the experience alone while orientating herself so that she can see both the object and P4.b (Fig. 33). They stay in this position for the duration of the audio with very little movement, seemingly immersed in their own experiences. As the audio finishes, P4.b orientates slightly towards P4.a while he reads the text. P4.a continues to watch P4.b. She laughs nervously while trying to gauge his reaction (instructing P4.b to confront a delicate fear is a somewhat risky strategy that might potentially backfire). P4.b notices and smiles back. P4.a then touches him on the waist, says "Sorry", and continues to laugh. P4.b says, "It's ok", smiles and walks away towards the next object.

After the visit. When interviewed, P4.b said that he thought the experience was effective, making him think about the passing of time "in terms of the age of the object", but that it "didn't quite get me in touch with a fear of death feeling". The effect of watching him, however, was more profound for P.4a. She said she found listening to the song in situ to be "much more powerful" than when she designed it. Furthermore, she found watching P4.b carry out the experience to be very moving, saying, "At one point you were like staring at the art and you just looked so, like,

downturned mouth and I was just like, oh my God, what am I doing to this poor guy?" This suggests that P4.a's initial interpretation was built upon through carrying out the experience with P4.b, allowing her to reflect on her interpretation, the content she chose, and the effect of giving the experience to her partner.

4.4.6 Failing to Engage with an Interpretation

This example shows the one experience that was observably problematic. P2.a wanted P2.b "to see himself through my eyes", but by the fourth exhibit P2.b has now ceased to visibly follow any instructions.

Design. The exhibit here is Aqua-planing, a piece of wall art featuring a grid of cardboard roads and small cars. P2.a chose this object because it reminded her of their plans to take a road trip around the USA, and chose a piece of music that drew upon the themes of "driving, escaping and holidays": Aging Faces – Losing Places by Kevin Draw. She then chose the activity, "Trace the journey of your favorite car with your finger. Where is it going?" P2.b used the text to explain what the piece of art meant to her: "Cars have been on my mind recently – road trips, lessons, your new job. That's why I like this piece - that, and the precision that has gone into making it."

During the visit. Prior to this episode the pair had visited three other objects with varying degrees of success. Here, they stand and look at the object until they hear the audio instruction, at which point P2.a looks at P2.b expectantly (see Fig. 34). P2.b turns his head briefly towards her but does not meet her eyes. He turns back to face the object while P2.a watches him. They both stare at the object for a short while, with P2.b expressionless, before P2.a initiates some interaction by pointing at it. Instead of following a car with her finger, however, she leans towards P2.b to engage him in conversation, perhaps avoiding what could have been an awkward couple of minutes stood in front of the object. They each take off one headphone and engage in a discussion about the artwork. After the music finishes and they have read the text information, the participants stay at the artwork for one and a half minutes before disengaging.

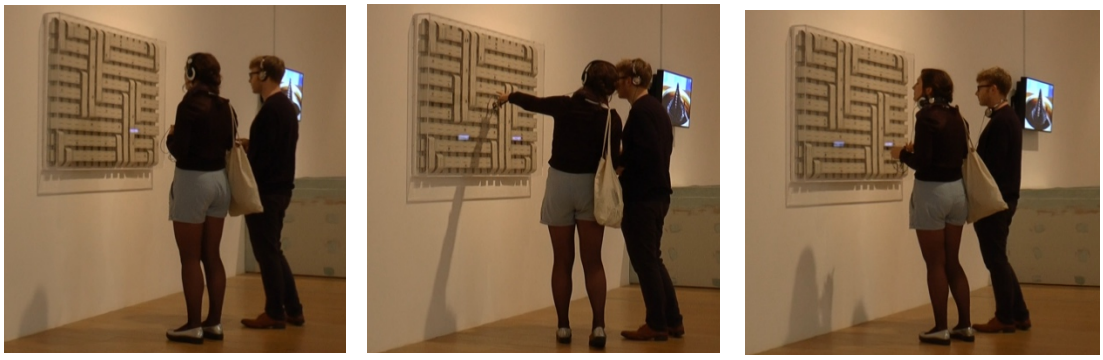


Figure 34: P2a (left) and P2b at 'Aqua-planing'

After the visit. During the interview it emerged that P2.b hadn't enjoyed the experience overall, mainly because he would rather "have the choice and freedom to look at what I wanted", and in particular didn't like the instructions. He found the instruction at Aqua-planing particularly challenging, saying, "I was baffled by it really. None of the roads went anywhere, they just went in straight lines, so I thought it was a bit ambiguous to trace where my favourite car was going". Further to this, P2.b had a different take on the theme of driving: "I guess I spend a lot of time in traffic now so I guess that was kind of different imagery for me". P2.a only realized that these connotations might arise when carrying out the experience with P2.b, saying, "When I was stood next to him I was like, oh actually this is going to probably remind him of being in traffic, which I didn't realize by myself."

Another issue that both P2.a and P2.b raised was using the experience together. P2.a said, "I think I'd have preferred to send him by himself… I just felt a bit like a spare wheel". P2.b agreed, saying "I felt under pressure to sort of show a reaction to what I'd seen". This suggests awkwardness for both parties – the designer witnessing the experience unfold (somewhat unsuccessfully) and the recipient feeling obligated to observably engage with the experience (e.g. through following instructions).

4.4.7 A Solo Experience

The final example is of P5.a and P5.b, a married couple who jointly decided that only P5.b, the recipient, would try the experience on his own without the designer, P5.a, present. A number of problems arose due to the designer not being present.

Design. P5.a, an artist herself, wanted to design an experience that was very much based around the art in the gallery but also was very personal between her and her

husband and therefore picked objects very much with her husband in mind. P5.a said of her music choices that P5.b rarely listened to music on his own, and that, at home, she often feels like his "music mediator". She felt this made it difficult to think of music that she particularly associated with him, so used the exhibits and her interpretations of them as inspiration for her music choice.

P5.a was the only participant who chose to deviate from the template structure provided for the design. When trying to select music for her second object, a video piece called Hair by Ed, P5.a decided that the song chosen for the first object would also go really well with the second object. She therefore decided to combine the two objects into the same local trajectory and give a further vocal instruction to "now check out the video screen behind you, called Hair by Ed to instruct P5.b to move on to the next object, rather than completing one local trajectory before beginning the next one. P5.a chose not to include any text information for the first object due to the music playing into the next object. She then made the decision to exclude any text content from the second object as well, explaining that she thought there was a lot going on already having combined the two pieces, and that she also wanted to keep the text really limited throughout the experience because as she did not want P5.b to be spending time focussing on the screen and not at the objects.

During the visit. Beginning the experience alone, P5.b immediately ran into trouble locating the first two exhibits, and had to be pointed in the correct direction by P5.a who had been trying not to be involved in P5.b's experience. Once he had found the objects and experienced the content, P5.b was able to settle in and follow the experience for subsequent exhibits. While he did visit every object and engage with the entire experience at each, he did not always visibly follow the instructions that were given for the exhibits. It was observed his gaze and orientation were very much fixed on the objects for the duration of his engagement with them, often leaning in to look very closely at objects, and occasionally was seen to respond to the experience by smiling and laughing.

After the visit. The interview process for this pair of participants was slightly different as P5.a hadn't been with P5.b while he engaged with the experience, so she was only finding out his reactions to the experience for the first time during the interview. P5.b started off by revealing that for "the first 20% [of the experience] I

didn't understand really what was going on, I was just trying to piece things together." He later said that even when he had got used to what the experience involved, it still remained that "I wasn't sure if I was supposed to be, if it was supposed to tell me something to do. I wasn't sure how much it wanted me for in terms of interaction… I didn't know what it wanted from me."

The interview revealed that it was unclear for the recipient what was expected of him, especially when hearing instructions, and consequently he did not perform any of the physical activities. Moreover, the designer was not there to support the experience in the ways already seen in the previous examples: making clear what was expected of the recipient, monitoring how the experience unfolded, leading or demonstrating where necessary, showing solidarity or even implicitly demanding compliance in a way that appears to have been successful in many cases (as illustrated in our first two examples yet was problematic in our third). Thus, while this participant was able to complete the overall experience, reported enjoyment and felt, once he had got used to the experience, that his partner's personalisation came through strongly, he appears to have had a quite different experience overall.

4.5 Overview of Emerging Themes

The findings reveal that visitors are generally able to create personalised experiences for people they know and then to successfully complete them together. The existing sculpture garden trajectory from Chapter 3 provides a suitable template for achieving this, with visitors being able to quickly knit together exhibits, music, actions and text into coherent experiences. Visitors created a wide range of interpretations, from the broadly didactic where they explained the general nature and possible meanings of the artworks, to the highly personal where the artworks were imbued with deeply personal messages. Experiences were very often completed and there was a high degree of compliance with instructions at particular exhibits. This mirrors Chapter 3's findings of how visitors followed a single trajectory that had been created with input from sound and performance artists. Finally, the overall experience of designing and undertaking these unusual visits appears to have been enjoyable and rewarding – if sometimes challenging.

What stands out, however, is the distinctive nature of the designs that emerged, often

challenging, provocative and highly personal. The observations show that the resulting experiences were often peculiarly intense. Although they were generally well received, it was observed how frequent laughter, glancing, reassuring smiles, touching and even kissing were required to maintain the social relationship between pairs and reassure anxious designers. The reasons for such anxiety are clearly illustrated by the one example where the experience was badly received, resulting in an uncomfortable experience for both parties. In short, it appears that while the approach encourages people to design unusual and personalised interpretations, this is also something of a high-risk strategy that demands careful management, frequent reassurance, and that can potentially backfire. In the following subsections is a preliminary discussion of the results in relation to the three thesis themes, which will frame the subsequent work presented in next chapter. A full discussion will be presented in Chapter 6.

4.5.1 Interpretation

The study suggests the gift-giving approach fosters interpretation in visitors on a number of levels. The design process involves the gifter making an interpretation as if they were a curator, to be experienced by someone else. The recipient experiences the interpretation that has been designed specifically for them, with which they may enjoy engaging but potentially disagree. As the interpretation has been made by a partner – another layperson, rather than a curator – they may be more open to challenging the interpretation rather than accepting it as they might an 'official' interpretation. The whole process provides many opportunities for reflecting, discussing and reassessing interpretations. The giver in particular gets to re-experience their own interpretations, which might have changed in the time that has passed since designing them. It is, therefore, perhaps the designer rather than recipient who derives the most benefit from the process in terms of interpretation, since they are involved at all stages.

The structure of the experience led to a range of interesting interpretations, from those that were fairly traditional in giving information about the exhibit and enhanced by pointing out personal connections, to those that had been imbued with much more personal meaning from visitors' reflections on their lives and relationships. This deeply personal kind of interpretation can be especially challenging for museums and galleries, and the gifting setup studied in this chapter could be a powerful mechanism

for achieving this.

4.5.2 Personalisation

While there were examples of personalising to general interests (e.g. P1.a choosing the exhibit *Eyes in Space* because of her partner's interest in Sci-Fi), there were also many examples of a 'deep' personalisation that involved making specific connections to particular events and issues (e.g. P2.a's planned roadtrip). Moreover, these experiences were actually personalised to two people with designers drawing on their own interests and knowledge or making privately shared references (e.g. P4.a and P4.b's special shared dance move). Of course, this approach is far from automated, requiring extensive effort by a human designer. This, however, may be of benefit as it is this effort that gives value to the gift and helps ensure that the experience will be taken seriously. Moreover, creating the gift and seeing it experienced by a partner may in itself be an enjoyable experience for the gift giver.

4.5.3 Socialisation

The study presented here aimed to deliver experiences that were personalised in a way that worked with pairs of visitors rather than ignoring the social context of each visitor. The gift exchange dynamic that was employed to achieve this appears to have shaped the social aspects of visiting between the pairs in the study. Experiencing the gift together appears to create a strong mutual obligation between the pairs. The recipient is obliged to complete the experience and comply with the instructions – even the unsuccessful visit in Example 3 saw the experience through to the end and complied in part. The giver is then interested in making sure the recipient can engage with the experience, by actively supporting them, joining in or demonstrating the actions. A very particular social dynamic was introduced by delivering the experience as a gift from one partner to the other, which appears to have made for an interesting but sometimes challenging visit.

These three themes of interpretation, personalisation and socialisation will be returned to in Chapter 6, where they will be discussed in detail.

4.6 Conclusion

The study presented in this chapter offers preliminary evidence that framing a visit to a gallery or museum as a gift from one partner to another, and then experiencing it

together, can lead to rich interpretations and an intense shared experience. By working with a predefined trajectory template, visitors were able to successfully design interpretations that were at once personal, informative and shared. This suggests that gifting experiences in this way may help to address some of the key challenges faced by galleries and museums today, namely the need for rich interpretation, deep personalisation, and coherent shared experiences. Yet, enabling visitors to gift such personal interpretations to one another also entailed some social risk, and further thought needs to be given to how this can be accommodated in the process.

The study raises issues to be explored further in the thesis. The research with pairs was found to be promising in giving visitors intensely personal yet shared experiences around objects. There remain a number of key points that need to be followed up to continue to answer the research questions. These are:

- How might this approach scale up beyond pairs to visiting groups of three or more?

- How might this approach accommodate more diverse groups, such as families and friends, with varied ages and potentially less intense social relationships as some of the couples seen here?

- How would any social tensions be managed in such groups?

The next step will therefore be to extend the approach to accommodate more diverse and mainstream visiting groups, moving from pairs to small groups, and to directly address the pervasive challenges of group visiting (Tolmie et al. 2014). The third and last study, to be explored in Chapter 5, will investigate how to enable small groups, typical of those that visit many museums, to share an experience in which they can enjoy personalised engagement with artefacts and interpretation while also paying attention to and meeting the needs of different group members.

Chapter Five: Extending the Gifting of Interpretations to Small Groups

Visits to museums and galleries are frequently the focus of social events such as a family day out or a time to enjoy shared interests with friends. Visiting as part of a group, however, poses the challenge of managing engagement with exhibits on one hand, while preserving group cohesion on the other. Visiting experiences that involve personalising content or recommendations to individuals can threaten to intensify this problem by neglecting to support the group dynamic alongside the individual's preferences. This chapter responds to this challenge, alongside addressing personalisation in group visits, in its extension of the visiting experience developed over Chapters 3 and 4.

The chapter describes how the gifting approach to personalisation is extended to groups of three to four visitors, reconfiguring the social dynamic while also delivering personalised content. It then reports on a study of twelve groups engaging with the experience over a design workshop and a group visit. The findings are discussed in relation to the thesis themes of interpretation, personalisation and socialisation.

5.1 Approach and Objectives

As documented in Chapter 2, HCI and CSCW research has investigated how museum and gallery experiences can cater to groups of visitors. In spite of this body of work, there is recent evidence that supporting group visiting remains challenging. Tolmie et al.'s ethnographic study highlighted the tensions that can arise when visitors' attention can be split between museum and gallery content and the needs of their companions (Tolmie et al., 2014).

This chapter attempts to develop this thesis' approach to designing personalised visiting experiences to alleviate the intensity and anxiety that arose in the study of gifting within pairs. The research also extends the gifting approach to accommodate more diverse and mainstream visiting groups, moving from pairs to small groups, and is set up to directly address the challenges of group visiting identified by Tolmie et al. in the design of a group visit.

The overall approach was to extend the personalised gift experience first introduced in Chapter 4 to groups larger than two, and investigate how it worked with more mainstream museum and gallery content than contemporary art, as seen in Chapter 4. The approach involved determining how one-to-one gifting could be scaled from pairs to families and small groups of friends and how it could potentially alleviate the discomfort observed in some trials of the approach with groups of two. The approach also considers more diverse groups in terms of age – for example families with young children – and social relationships.

A study was designed to investigate how group members designed personalised experiences for each other and how they organised themselves around receiving the experiences in a joint museum visit. This chapter therefore extends the exploration of gift-giving as a personalisation method but looks in more detail at the social experience that results. The objectives of the piece of work are as follows:

- To scale up the gifting approach introduced in Chapter Four beyond pairs to small groups.
- To scale up the gifting approach in a way that alleviates the anxiety seen when using the approach with pairs.

- To create an experience that supports social visiting alongside delivering personalised content.

This chapter will now present how the study went about achieving these objectives. It first takes a detailed look at the design of the extended gifting method and how it was configured to work with groups of three or more and with families. Next, the study approach and results are presented, before the implications for the wider thesis questions are summarised.

5.2 Extending the Gifting Method

The experience for this study was based on the gifting approach explored in Chapter 4 that saw one member of each pair of participants design a personalised trajectory for the other. The first challenge was to scale the approach up to cater to groups larger than two. This involved working out who would design and gift content, who would receive content and how it would be presented.

The results of the previous study, presented in Chapter 4, suggested that designing and gifting an experience was often more beneficial than receiving one, giving the designer the chance to develop and revisit an interpretation through experiencing it with their partner. It was therefore felt that each group member should get a chance to design interpretations as well as experience them. Gifting is highly ritualized and the literature tells us that when multiple people are involved, gift-givers are concerned about mutuality and equipollence, the absence of which can cause anxiety (Wooten 2000). The extended gifting model thus allowed each member of the group to design an interpretation for each other member, as shown in Fig. 35. For example, in a group of four friends, each person would pick out three objects – one for each of the other member of the group. The tour would then consist of twelve objects.

In extending the model, a number of questions had to be addressed. For each experience, there would be a gifter and recipient, and also at least one other group member. Should all group members get to see the experience? If so, when should the identities of the gifter and recipient be revealed? And in what order should the experiences be presented? These questions will be explored later in this chapter.

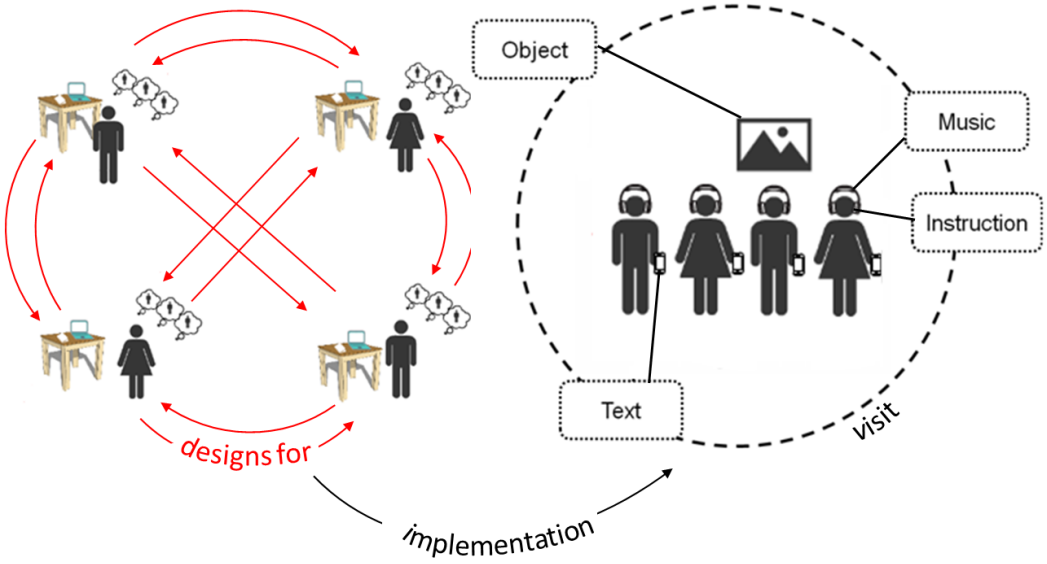


Figure 35: Model of gifting in a group of four. Red arrows denote an interpretation is designed and gifted form one person to another. Right side of figure represents one interpretation.

5.3 Studying the Approach with Small Groups

A study was carried out to test how the gifting approach would scale for use by small groups of three or more visitors. The study followed a similar approach to that presented in Chapter 4, but this time in a more traditional museum setting. This naturalistic field study followed visitors as they designed an experience at a design workshop and then tried them out as a group in the museum. Audio and video recordings were captured and interviews were conducted with the groups to understand both stages of the study: the collaborative design of a 'gifted' visiting experience by small groups and the use of this experience by the groups in a visit to the museum.

5.3.1 Setting

The setting for the experience was Nottingham Castle Museum and Art Gallery a traditional art and local history museum set on the site of Nottingham's Medieval castle. Among the various exhibitions in the museum – fine and decorative arts, local history, archaeology and temporary contemporary art exhibitions – we chose to focus on the exhibition named 'Every Object Tells a Story', a collection of decorative, historical and functional objects that, through our conversations with the museum's curators, we learnt was a collection that groups of visitors often struggled to engage deeply with, perhaps due to the large number of exhibits presented in glass cabinets

and the largely functional nature of the objects. Each of the display cases in the exhibition contains a grouping of objects categorised under a theme, such as ‘A Natural Selection’ and ‘Puzzling Objects’ (see Fig. 36).

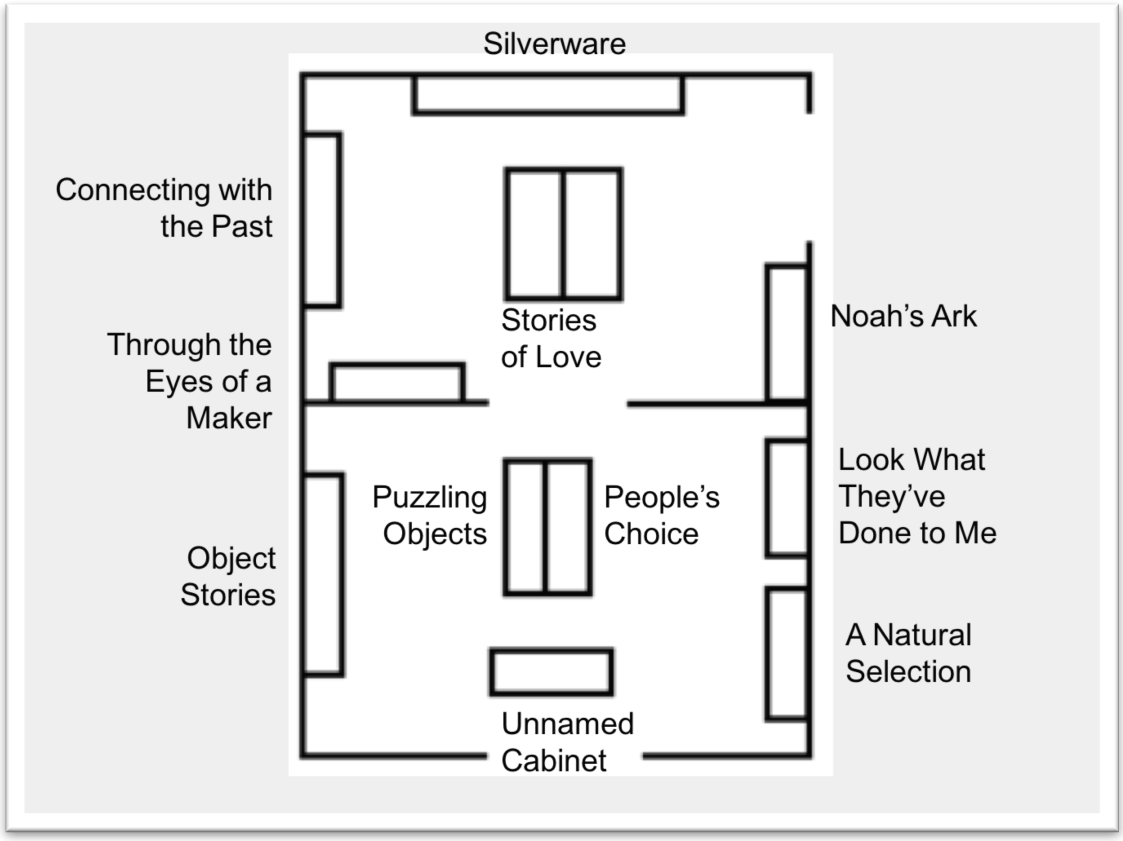


Figure 36: Floor plan of the gallery space annotated with the names of the display cases

Each grouping is accompanied by a large information panel explaining the common features of the objects within and giving some interpretation information. For example, in the grouping ‘A Natural Selection’, the information panel explains that all the objects are inspired by the natural world, before suggesting that the inspiration can be seen in the shape of the object or the surface decoration (see Fig. 37). Within the display cabinet, alongside the objects, are further interpretation resources such as quotes from the artists. One quote reads, “*As an object maker I try to capture the ‘essence’ of nature rather than to literally copy it*”.

Figure 37: 'A Natural Selection' display case

Figure 38: 'Puzzling Objects' display case and interactive panel

One display, named ‘Puzzling Objects’ includes an interactive game that involves solving a riddle to identify what each object was used for (see Fig. 38).

It was felt that this collection provided a challenging setting for testing the approach. The exhibition covers two mid-sized rooms adjacent to each other.

Figure 39: 'People's Choice' display case

5.3.2 Extending the Design Template

The participants were able to design the interpretation resources that would be delivered through the mobile guide to accompany the objects in the tour. They were able to choose three pieces of content to fit our experience template which mirrored that used in Chapter 4:

- a piece of *music* (to suggest a theme, mood or tone);
- an *instruction* for how to interact with the object (performing a physical action or looking in a particular way); and
- a portion of *text* to be presented as they walked away (information or a personal message).

In replication of the previous study of this approach between pairs, we encouraged participants to use the choice of object and resources to design a personalised interpretation for one another, perhaps communicating a particular message or viewpoint alongside or in place of the more traditional museum interpretation. No

restrictions were placed on the objects they could choose, nor the content they chose to accompany them. There were no constraints on overlap of choices or otherwise. The instructions were recorded by a voiceover artist and played alongside the audio track while the text was presented on the screen once the audio had finished.

A number of design questions were explored at this stage. First, who would be able to access each 'gift' experience? The gifting literature tells us that gifts are experienced as a social occasion, and are often exchanged in the presence of others (Robles, 2012). Onlookers – those present who aren't giving or receiving – can enjoy seeing another person experience a gift and play a key role in evaluating the gift. It was therefore decided that each member would be presented with the entire set of content, not just the parts that had been designed for them, which would also allow the group to carry out the experience out together, if they wished (if they only received the experienced designed for themselves, that would not be possible and may take away from the sociality of the visit). This would also mean there was more content for everyone to try and potentially less confusion around who is doing what.

Second, how to determine the order in which the experiences are presented? Having decided that each group member would see all the content, it was decided that rather than displaying the experiences into those produced separately for each person, they should be presented in a list based on where they would be found in the museum space, and grouped under the display case headings (as in 5.3.1) and annotted with the number displayed next to the object, for ease of navigation (see Fig. 40). This meant that visitors can follow a global trajectory through the space that takes them through the experience with each object. It was thought that this would introduce some level of randomness into the order in which the experiences for each recipient were presented. As with the global trajectory introduced in Chapter 3, the list of objects suggested an order in which to visit the objects but did not enforce it; it was possible to deviate from the global trjectory by selecting objects out of order.

Figure 40: Interface of the mobile guide showing the list of objects chosen for a group of three

A final key design decision arose from the previous two. As previously mentioned, onlookers play an important role in social gifting occasions and gifts are often exchanged with others watching and commenting. Therefore it was desirable that the group of visitors had the option to visit objects together as a group. It was thought that if the identities of the gifter and recipient were revealed up front, when the objects were presented, the group might disperse with each group member feeling they should follow up the gifts designed specifically for them – particularly given what the literature says around the 'obligation to receive' (Mauss, 1990). It was therefore decided that the identities of the gifter and recipient would only be revealed *after* the content had been delivered. Clearly, the designer of the gift would know they had designed it and who they had designed it for, and may choose to reveal this or wait until it is revealed in the experience. It was anticipated that by revealing the designer and recipient towards the end of the experience, an element of fun and expectation was introduced as participants undergo a process of 'working out' who the object was

for and from, while also keeping them engaged to find out whether or not it was designed for them – providing an incentive to see the experience through to the end.

5.3.3 Participants

A total of 41 participants were recruited through the author's University's network and the museum's mailing lists. The participants took part in a total of twelve self-organized groups: six groups of adult friends and six families consisting of one or two parents and one or two children. See Table 3 for details of the groups. Each group had three or four members who had formed a group prior to attending the study. All participants were interested in visiting museums either as a leisure activity, out of academic interest, or both.

Table 3: Overview of participants (M = male; F = female; (24) = aged 24

Group	Adults	Children	Relationship
1	1M, 2F (24-28)	-	Friends
2	3M (27-28)	-	Friends
3	1M, 3F (65-70)	-	Friends
4	3F (20-24)	-	Friends
5	3F (25)	-	Friends
6	1M, 3F (28-29)	-	Friends
7	1M, 1F (35, 37)	2M (7, 10)	Family
8	1M, 1F (36, 37)	2M (3, 6)	Family
9	1M, 1F (35, 36)	2M (7, 8)	Family
10	1F (34)	2F (4, 6)	Family
11	1M, 1F (37, 38)	1M (6)	Family
12	1M, 1F (39, 40)	2M (7, 8)	Family

5.3.4 Design Workshops and Materials

Each group was invited to the museum to attend a two-hour long workshop where they were able to self-design a custom mobile tour of the museum's objects. The group members were given a set of worksheets that guided them through the process of choosing objects, music, instructions and text. They were given access to the Internet to look up information and listen to music options. A description of how the

groups that contained children dealt with the design process will follow in section 5.4.3.

5.3.5 Visits

The participants were invited back to the museum in their groups to use their tours, which had been implemented onto Android smartphones using the AppFurnace tool[7]. The interface presented them with a complete list of all the objects chosen by the group in the design session (Fig. 40). Once selected, the participant is instructed to locate the object and prepare to start the experience (Fig. 41). The music and vocally recorded instructions are played through a set of headphones, before the music fades out after 1-2 minutes. The portion of information is then presented as text on the screen along with a 'label' showing who the object was chosen for and who it was designed by (Fig. 41).

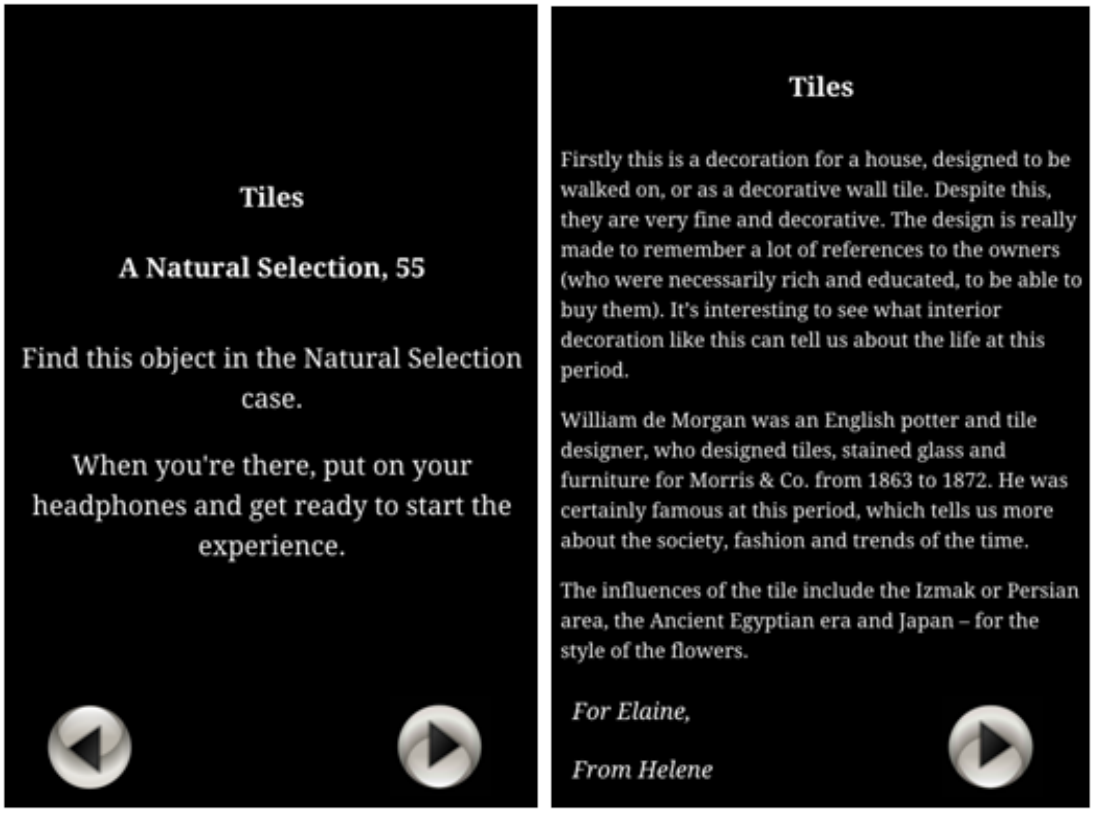


Figure 41: Screen shots - set up (left) and text

[7] http://appfurnace.com/

5.4 Findings

The findings of the study are now presented with a primary focus on how the visitors organized their group experiences of using the mobile guide. In what follows, there is firstly a general overview of the groups' makeups and how they approached the design of their experiences. The findings then turn to how the group visits were organized, before looking in detail at a set of examples where the key themes that typify the social organization of the visit are made manifest.

5.4.1 Summary of groups and their designs

Group 1 was made up of three architecture PhD students, one male aged 28 and two females aged 24 and 27. They had known each other for around six months and shared an office at the university. They described themselves as spending a lot of time together and getting to know each other over the time. They are all originally from China. They primarily chose objects of historical and cultural significance, pairing them with music of the same era or culture, and providing traditional interpretation material.

Group 2 saw three male friends aged 27–28 taking part. They have known each other well for two to three years and met each other through other friends. They spend a lot of time together socially as part of the same social group. They chose a range of decorative and historical objects that they could relate to one another's lives, choosing mostly contemporary music that matched the themes they identified. Their instructions involved overtly physical actions and their text included personal messages.

Group 3 was made up of four friends from an art appreciation group, all retired. Three were female and one was male, and of these, the male and one of the females were married. The married couple and one other female had been friends for almost 40 years, whereas the final female had only been friends with the others for around a year, having met through the art group. They meet as a group once a week. Their design focused on decorative objects, matching them with traditional and contemporary music, instructions that invited assessment or contemplation, and mostly informative interpretation.

Group 4 consisted of three female undergraduate students aged 20-24. They have known each other around a year and described seeing each other fairly regularly, both socially and at University. Their objects were mainly decorative and arts objects, matched with classical and contemporary music, instructions that invited imagination, and text often mixing information with personal sentiments.

Group 5 was made up of three female friends from an English language class, all aged 25. They had known each other less than a year and see each other regularly through the class and occasionally socially. Their objects were all of historical and cultural interest, and their music choices reflected the cultures of the objects. Their instructions invited careful inspection of the objects and imagination, and their text was mainly traditional interpretations.

Group 6 consisted of four friends who met at University, three female and one male. The male and one of the females were a couple. They had all known each other for around eight years, and regularly spend time together socially. Their object selections covered a range of decorative, functional and cultural objects, and their music choices were contemporary. Their instructions often invoked actions and their text often included personal meaning.

Group 7 was a family of four with a mother, father and two sons aged seven and ten. They chose objects that related to each other's interests, music that they listened to as a family and using the text to deliver information or stories they thought would be found interesting.

Group 8, a family with a mother, father and two sons aged three and six, chose objects from around the world that they found interesting or reminded them of something. One object, a decorative Gujarati child's jacket, was chosen twice – once by the mother for her youngest son, and once by the father and three year old son for the mother. They both gave similar reasons for choosing the jacket – the mother because it reminded her of when the son was very young and wore clothing that size, and the father and son because the father also made this connection, thinking that the mother would appreciate the jacket because she dressed her son in similar clothing.

Group 9 was a family of four with a mother, father, and two sons aged seven and eight. They primarily chose objects that were visually stimulating and objects that

they could relate to aspects of each other's interests and lives. Their music choices encompassed popular music that they could relate to the objects as well as each other's favourite songs. Their instruction designs often involved physical actions. The text included information found in the official exhibition guide and explanations of why they had chosen the particular designs.

Group 10 consisted of a mother and her two daughters aged four and six. They mostly chose objects they found visually attractive and objects with an interesting form. The music chosen was instrumental or well-known by all the family (e.g. from a film soundtrack). The instructions were mostly interactive, involving acting or sharing responses. The text was often used to explain the design or tell an interesting story.

Group 11 was a family of three with a mother, father and seven year old son. They mainly chose objects that had interesting uses throughout history such as a set of travelling candlesticks, a Persian helmet and a decanter. Their music choices reflected the themes they felt the objects evoked, and the instructions related to the functionality of the objects. Their choice of text tended to give information about the objects and also to explain their reasons for choosing them.

Group 12 consisted of a mother, father and two sons aged six and nine. They chose objects they thought would be interesting and music that was popular or well-known by the whole family. Their instructions involved thinking about particular uses of the objects and also carrying out actions related to the objects' forms. The text gave information found from the exhibition guide and also the reasoning behind the particular choices.

5.4.2 Design Process

The design process first involved browsing the exhibition, looking at objects to draw inspiration, until the participant found a suitable match between their knowledge of the person they were choosing for, their own ideas for a particular theme, the properties of the object itself and how they interpreted the object. Music was often used to reflect themes brought up by the object or to set a particular mood or emotional tone. The music choice tended to be a piece that was known and liked by both the designer and recipient, and matched the interpretation the designer wanted to get across. Some participants drew inspiration directly from the object, choosing, for

example, a traditional piece of music from the era or culture the object belonged to, which was the case for a visitor in Group 1 who chose to set a Japanese arrow quiver to a piece of traditional Japanese music.

The choice of instruction was also used to set an emotional tone for how the object would be experienced. Again, the inspiration for the specific instruction came from the object's properties, the intended theme or type of experience and the participant's interpretation of the object. Instructions included to "Strike a pose, like one of the chess pieces" (for a chess set chosen by the mother in Group 9 for her son), and to "Pretend you are at a grand tea party, and think about all the rich and pretentious people you'd meet" (for a tea caddy chosen by a member of Group 4).

Finally, the text, to be displayed after the music and instruction, was used by participants to wrap up the experience, delivering factual information they had found about the object or explaining their interpretation or reason for choosing it. It tended to follow on from the other resource choices – for example, a child in Group 7, after instructing his father to think about what an object was used for, chose to explain "This curved spike was twisted into the elephant's hide to make it behave in a certain way. I thought that you would put a piece of fruit on the spike to tempt the elephant to go in different directions, as the elephant would respect you more." Text was also used to deliver personal messages, for example, "I feel this sums up a part of your character and is a nice object to link our friendship."

5.4.3 Adapting the gifting model for families

Three of the six family groups (7, 8 and 12) chose to reconfigure themselves into subgroups to complete the design task, for example by splitting into two parent-child teams. The members of the subgroups were then able to help each other with their designs, with the parents generally overseeing the process and the children given control over the specific content. This approach proved successful in keeping the children on task and generating ideas, although it should be noted that the groups who did not team up were also successful in completing the design. A summary of the six family groups' configurations is now presented:

Group 7, a family of four (mother, father and two sons aged 7 and 10), paired up for the design workshop so each child was paired with a parent to create the designs for the other two participants.

Group 8 was a family of four with a mother, father and two sons aged 3 and 6. They paired up – father and three year old and mother and six year old – for the design workshop. The two parents each took the lead with the design process. The father in particular worked mostly alone on the design worksheets, and only occasionally engaged the three year old to help with the design process, for example by asking him if he liked a piece of music or not, or if he thought his mother or brother liked a certain object. The child was given some paper and pencils to draw with while the rest of the family worked on their designs. At three years old, he was too young to meaningfully engage with much of the design work, beyond picking out objects he liked and agreeing or disagreeing with his father.

Group 9 was another family of four with a mother, father and two sons aged seven and eight. Only three of them attended the design workshop – the mother and two sons – since the father was working while the mother looked after the children as it was the school holidays. In the design workshop, the three all worked individually, but rather than each participant just designing for the other two present at the design workshop, they all each chose to design for their father as well, as they intended to invite him along to use the experience. They came back to use the experience with the father present. They had told the father about what the experience would be, but had not revealed the specific content.

Group 10 consisted of a mother and her two daughters, aged four and six. The children's father was unable to attend the workshop or the following visit so was not involved in the study at all. The three participants worked individually on the designs and the two daughters were given assistance in writing their ideas on the design worksheets by the workshop facilitator. The children were able to complete their designs with the assistance of the facilitator who asked them questions to elicit their own ideas.

Group 11 consisted of a mother, father and their six year old son. They are bilingual, speaking both German (the mother's first language) and English, but completed the

designs in English. They worked individually such that each family member chose a design for each other family member. They were able to complete the designs largely on their own, however struggled with choosing music as they weren't used to listening to much music.

Group 12 was a family of four with a mother, father and two sons aged nine and six. They chose to configure themselves into subgroups to complete the design task, however, the two children worked together on a design for each of their parents while the parents worked together on a design for each of the children. Despite working on separate designs, the parents supervised what the children were doing by making sure they were working on the design and not 'messing around'. The workshop facilitator also offered extra assistance to the children by asking questions to elicit design ideas.

Each of the configurations was largely successful in that each subgroup or individual was able to produce a complete design – although sometimes with the additional help of a workshop facilitator for young children working on their own. The family group that encountered the most difficulty was Group 8, due to one of the children only three years old, and demonstrably too young to fully engage with the design work. The father, who was paired with the child, was able to complete the design himself, and consulted the three year old on some decisions. The child, however, was given colouring pencils to engage in some unrelated drawing, while the workshop facilitator chatted to him to avoid him distracting the attention of the rest of the family members. While most families and friend groups reported the design workshop to be entertaining and interesting in itself, that was not the case with Group 8 due to the youngest child not being able to fully participate.

One observation that did arise was that, at times, one partner's ideas would dominate the design – e.g. in Group 8, the mother and son working on a design for the other son chose a Gujarati child's jacket and instructed to "Imagine wearing something that makes you feel warm, loved and comforted", which the mother reported reflected her memories of looking after her son when he wore very small clothes. In this instance, the design was framed as being from the mother and son, i.e. they produced one design between them for the recipient. In other cases of two participants teaming up, they produced a design each but helped with each other's designs.

The child in Group 7, who worked on his own, used the design to relate a decorative knife blade to his father's background in the military, something that the father was surprised by and described as "really touching" once he came to try out the experience. As noted above, the ages of some of our younger participants put a limit on how much they could design independently.

5.4.4 The Designs

The experiences designed in this study of small groups differed from the designs that emerged from the study of pairs presented in Chapter 4. Rather than one person constructing an entire experience for their partner, that often involved considering the global trajectory – in what order the objects would be visited and why – as well as designing the specific content for the local trajectories, the designs from each group member were collected together and presented as one collaboratively-designed experience. In this section, a selection of example experiences are presented to illustrate how participants approached the design task, what they designed and how they fitted into the resulting experience.

5.4.4.1 Design example 1: Group 1

To recap, group 1 is a group of three architecture PhD students, one male, P1a, aged 28 and two females: P1b, aged 24, and P1c, aged 27. They have only known each other around six months but have shared an office for this time. They describe themselves as spending a lot of time together and getting to know each other well over the time they have known each other. They are all originally from China.

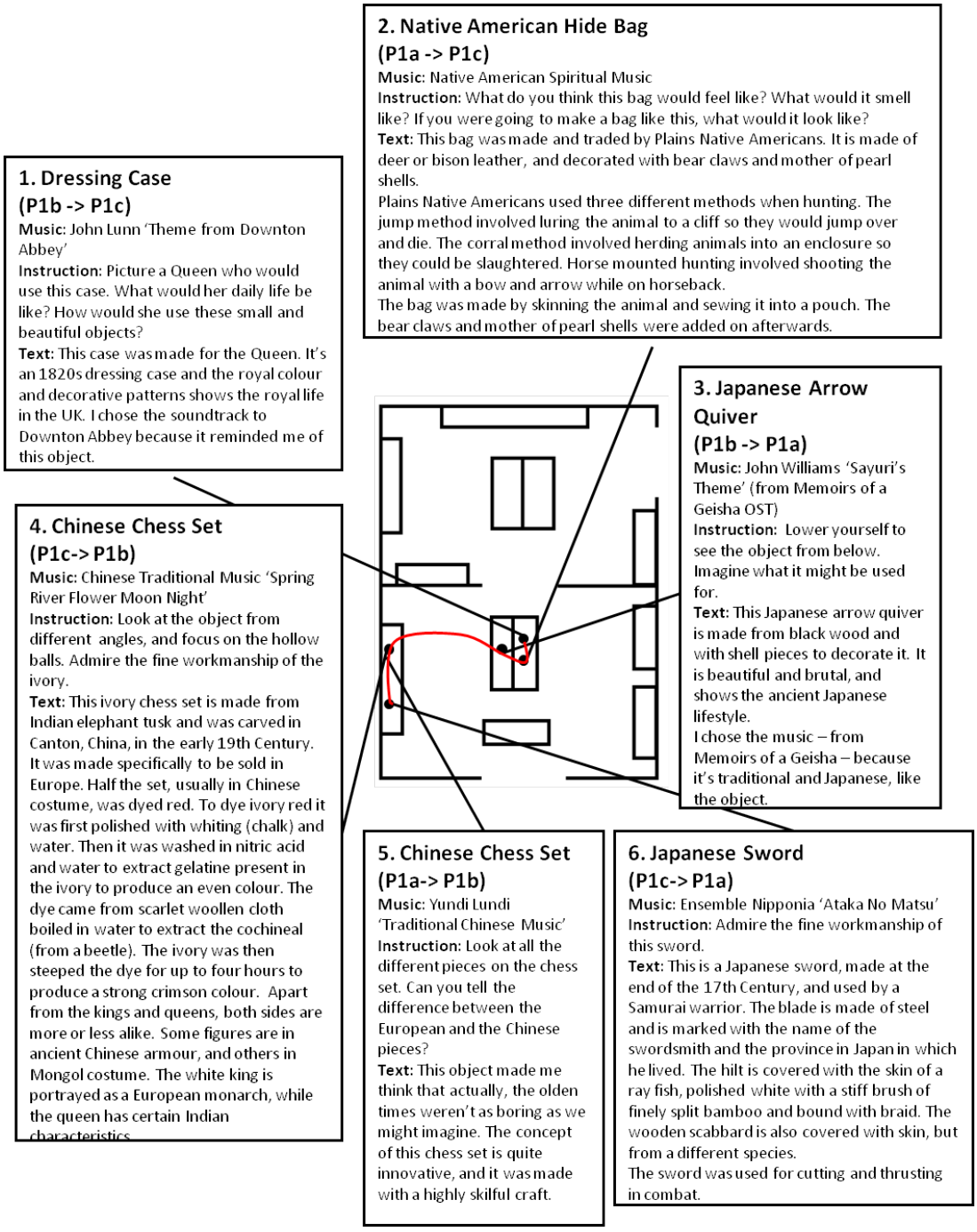


Figure 42: Experience designed by Group 1

The members of group one each chose objects that were of historical or cultural significance, including a traditional Chinese chess set (chosen by two participants for the same recipient), a 17th century Japanese sword and a 19th century British dressing case. The participants in this group tended to choose music that matched the culture or era of the object, for example opting for traditional music from the country in which the object originated. Their instructions tended to involve studying the artefact and

thinking about its properties, uses and visual appeal, while the text was generally information found about the objects from the museum's exhibition guide (see Fig. 42).

In terms of how they personalised the designs to one another, the participants in this group tended to choose objects that they thought would appeal to the recipient's likes and interests, and used music, text and instructions to create an experience that would be interesting and educational. Their designs were fairly in line with the more scholarly or traditional interpretations that are provided by museums.

Two participants, P1a and P1c, both chose the same object for the third participant, P1c. The object was prominently displayed in the museum which is perhaps why it was chosen multiple times in the study. The participants in Group 1 were all natives of China so it is not surprising that they chose an object from their shared heritage. Interestingly, P1a and P1c both chose similar content to accompany the object for P1b – traditional Chinese music and instructions to inspect the object closely. They differed in the text they chose, with P1a explaining his own thoughts on the object and P1c giving more general information on the object and how it was made. Figure 42 shows the full design for this group.

The next example, of a group of three male friends of a similar age, stands in contrast to this design.

5.4.4.2 Design example 2: Group 2

This example focuses on a group of three male friends in their late twenties who had known each other socially for two to three years. The designs in their case involved the participants linking artefacts' forms and themes to aspects of the recipients' lives and personalities. One participant, P2a, chose a sculpture of a raven that reminded him of his friend's avid interest in the television series 'Game of Thrones'. To make this link explicit, he chose the theme music from the television show to accompany the object and the text was used first to give a background to the object itself, from the exhibition guide, and secondly to explain why it was chosen, with reference to Game of Thrones. The instructions in this group's designs tended to involve performing physical actions, somewhat creatively, from touching the inscriptions on a bronze bell to attempting to sit on an invisible chair. One more outlandish instruction, for an

alabaster drinking vessel, was to 'dance around it and throw your arms in the air', suggesting an action that could potentially cause discomfort or embarrassment if performing it in the public gallery. The text that followed the music and instruction explained that the intention was more touching: 'I picked it out to remember all the good times we have had and will have in the future'. Fig. 43 shows the full experience design for this group.

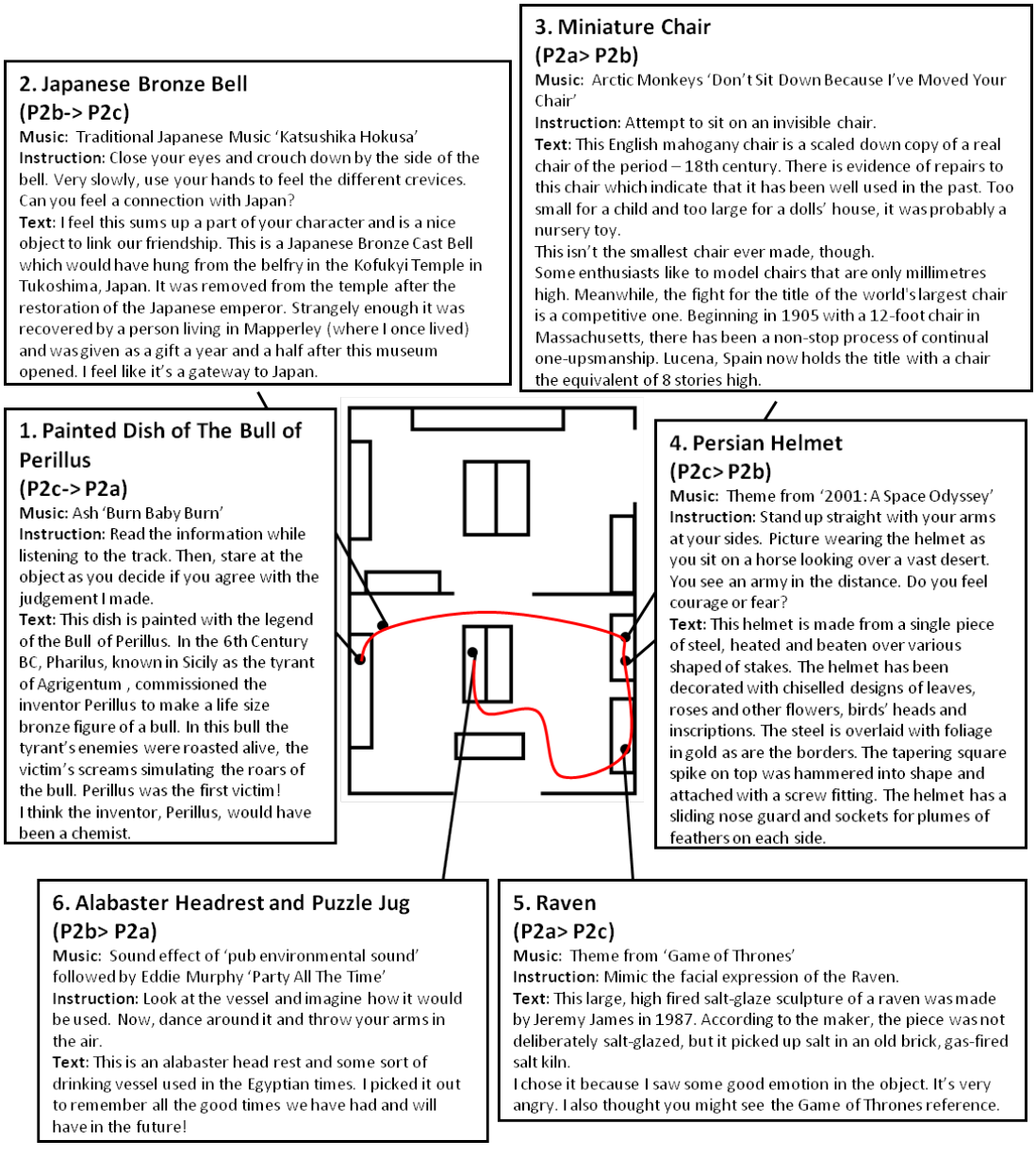


Figure 43: Experience designed by Group 2

Design example 3: Group 11

The third example looks at the design produced by Group 11, a family of three (a mother, father and seven year old son) who each choose an object for each other. The

family chose objects they thought would be interesting to each other or that they could relate to an aspect of their lives. The mother, P11a, selected a drawer filled with of shells and rocks for her son, P11c, because she wanted to make a connection between the objects and an upcoming beach holiday. The instruction asked him to think about what they were and if he had seen them before, and the text made this link explicit: 'I thought these objects would remind you of nice beach holidays- the sound of wave splashing and the wind in your hair. We can look forward to our seaside holidays this summer and perhaps we will find some of these objects'. The child, P11c, chose objects he liked the look of. P11a helped him remember the name of a music track for his design for P11b – a version of the song *Big Yellow Taxi* by Bob Dylan. P11c found it difficult to come up with a song for his second object so asked for a song that sounded like *Big Yellow Taxi.* The workshop facilitator played him a selection of songs in the same genre with a similar instrumental sound and emotional tone. P11c liked the sound of *Sun Song* by the folk artist Laura Viers so selected this for the design. P11c was also given assistance by the workshop facilitator in putting together the text, which he wanted to use to give some information about the objects from the exhibition guide but also explain why he had chosen them. Fig. 44 shows the full design for Group 11.

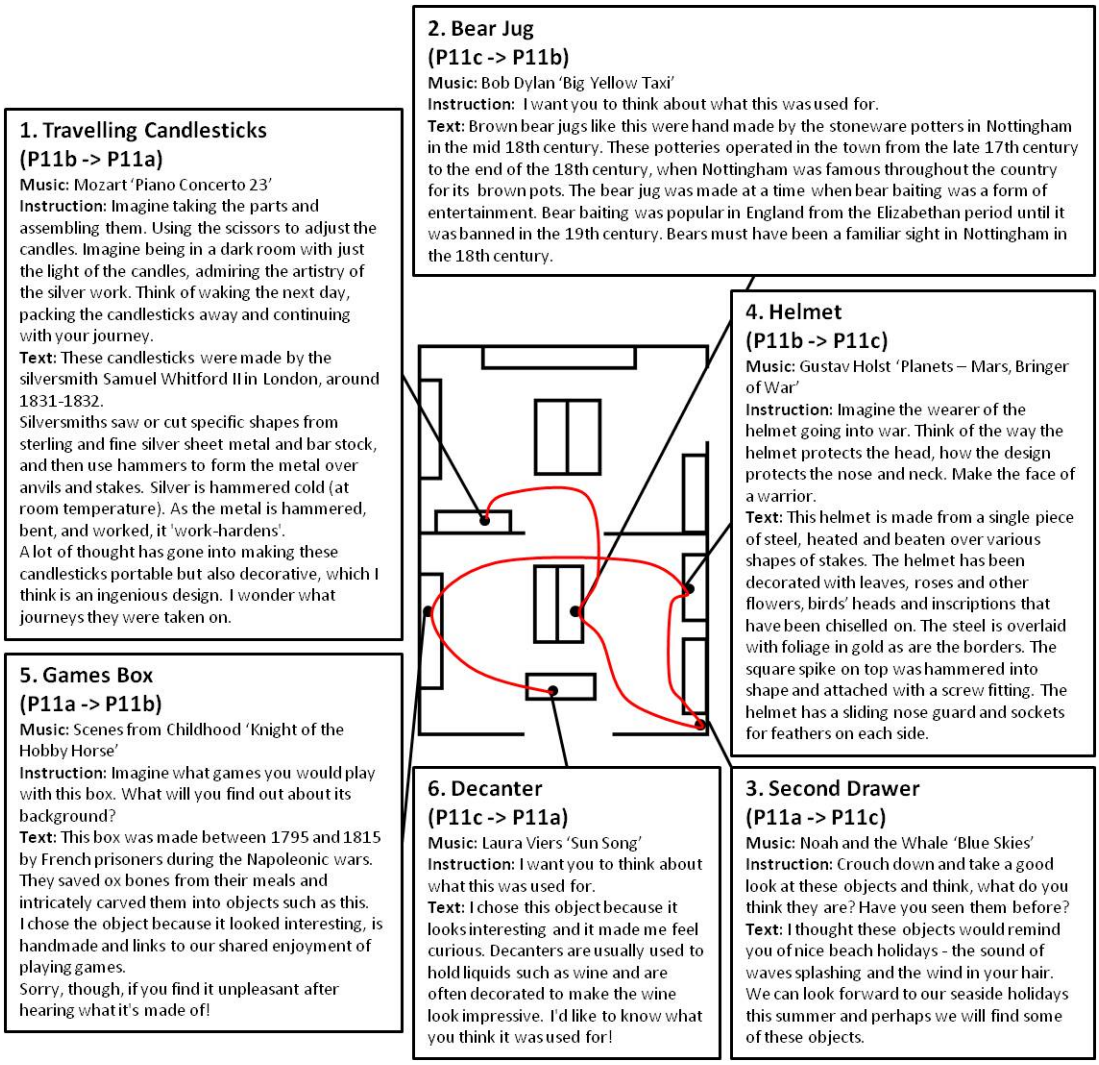


Figure 44: Experience designed by Group 11

5.4.4.3 Design example 4: Group 12

The final design example is that of Group 12, a family of four with a mother, father and two sons, who split into two teams to complete the designs. The objects chosen were those that were thought to be interesting to the person receiving them or that stood out. The music choices were influenced by popular films, with the team of parents, P1a and P1b, choosing music from two Disney films for the object for each of their children, and the two children, P1c and P1d, choosing the theme music from *Ghostbusters* to support the combat theme of the Helmet chosen for their father. For their mother, they chose *Happy* by Pharell Williams, which they admitted they chose because of their own love for the song, it being a particular favourite of the older child, P12c. The instructions designed by Group 12 tended to involve physical movement as well as looking and thinking about the objects. The text designed by the parents for their youngest son, P12d was written in a way that suggests they had

considered the recipient's existing knowledge when writing the text: 'These animals were made in Burma which is a hot country in Asia'. The children's text choices were used to explain their own thoughts, perhaps without such a focus on what their audience would draw from it, for example, 'We like this piece because it's kind of cool and it's really old and pretty'. See Fig. 45 for the full design.

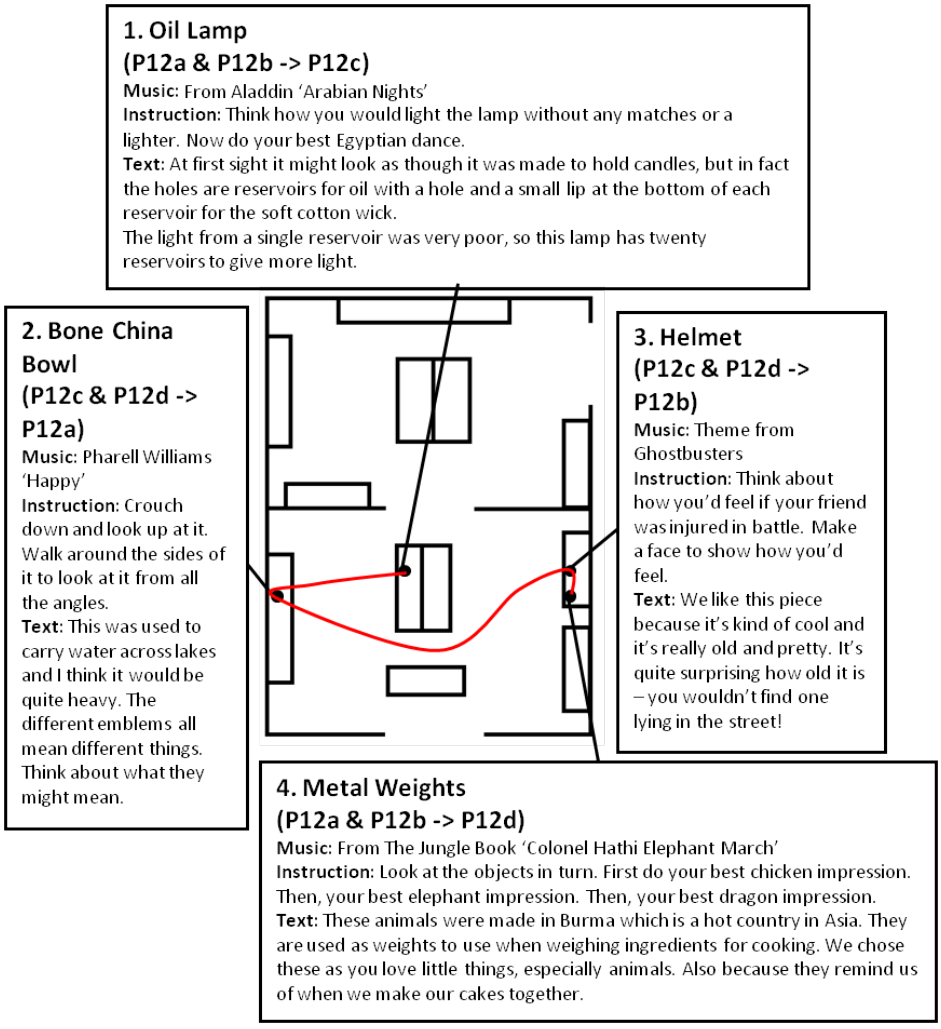


Figure 45: Experience designed by Group 12

This selection of examples shows a range of different designs produced by groups connected by different types of relationships, from those with close family ties to those who know each other as colleagues, and from groups with young children to groups of adults. They were all able to successfully complete an experience design, including the groups with small children, who were able to team up to complete the designs or be assisted by the workshop facilitator. Objects and interpretation (in the form of music, instruction and text) were personalised in a variety of ways. In these examples, the group who knew each other least well were Group 1, and this may have

been the reason for their designs being fairly in line with a traditional museum interpretation, personalised to the recipients' interests and preferences. In this group, there were few explicit links between the content designed and the participants' relationships and deeper issues. In contrast, Group 2's design was more explicit in how the object choices and interpretation design were provoked by the group members' knowledge and appreciation of each other's personal properties.

The examples also showed two experiences designed by families. The first, by Group 11, demonstrated an experience made by each family member working on their own to design content for each of the other family members, while the second, by Group 12, demonstrated an experience that came out of group members pairing up to work on designs together. Both groups included children of a similar age. The two examples show that some level of assistance was generally needed to guide the designs produced by young children. In the first example, the child worked largely on his own, but was helped briefly by his mother and was given prompts by the workshop facilitator, who read out questions from the worksheets and occasionally offered ideas. In Group 12, the two children paired up on the design task and were able to complete the design together with occasional help from the workshop facilitator.

The designs that came out of Group 12's workshop showed that creating a personalised experience for another group member was possible as a joint task between two group members – they were able to choose objects and interpretation that catered to the recipient's interests and education level. Of course, in the case of Group 12, each participant only got to receive one experience, rather than one from all three of the other group members, so the experience as a whole was much more limited.

It was also the case that when children and parents worked separately on their designs, as in Group 11, they could successfully produce an experience. The presence of the workshop facilitator was helpful in supporting the child to complete designs largely alone, and freed up his parents for their own design work. The child was able to generally able to tailor the content to the recipients with prompting and help with idea generation from the facilitator.

5.5 Returning to Use the Experience

The approach required groups to return to the museum when their designs had been implemented into a mobile guide. The groups took between two days and two weeks to return for their second visit. One of the family groups, Group 12, was unable to return within the timescale of our study so did not get to try out their experience. One member of Group 5 was also unable to return to use her experience, but the remaining two friends completed the full experience nonetheless.

5.5.1 Organising the group visit

All group members received the same set of objects regardless of who designed for whom – they were then free to choose whether to experience them all together or not. The interface to the guide suggested an order by presenting the set of objects in a list based on where they would encounter them in the museum. However, this order was not enforced, so groups could choose to visit objects in a different order, and decide whether to follow the order together or choose a separate order individually.

From analysing the video recordings it was possible to determine which objects group members visited across the duration of their visit. Fig. 46 provides a summary timeline documenting the time visitors spent visiting the objects in their experiences and the extent to which it was coordinated among members. The analysis involved judging when participants were visiting an object from the video recordings, specifically participants' orientation, gaze, wearing of headphones and interaction with the device.

For each group's timeline, a single row represents an individual group member, while the time in minutes (from the beginning of the video recordings) is noted along the horizontal axis. The time spent visiting objects is represented by the horizontal lines and numbers; the numbers denote the object's suggested order in the experience. The dashed horizontal lines show times when it was not possible to capture the visitor's exact movements – often due to the limitations of using only one video recorder to record multiple participants who might be in different areas of the gallery.

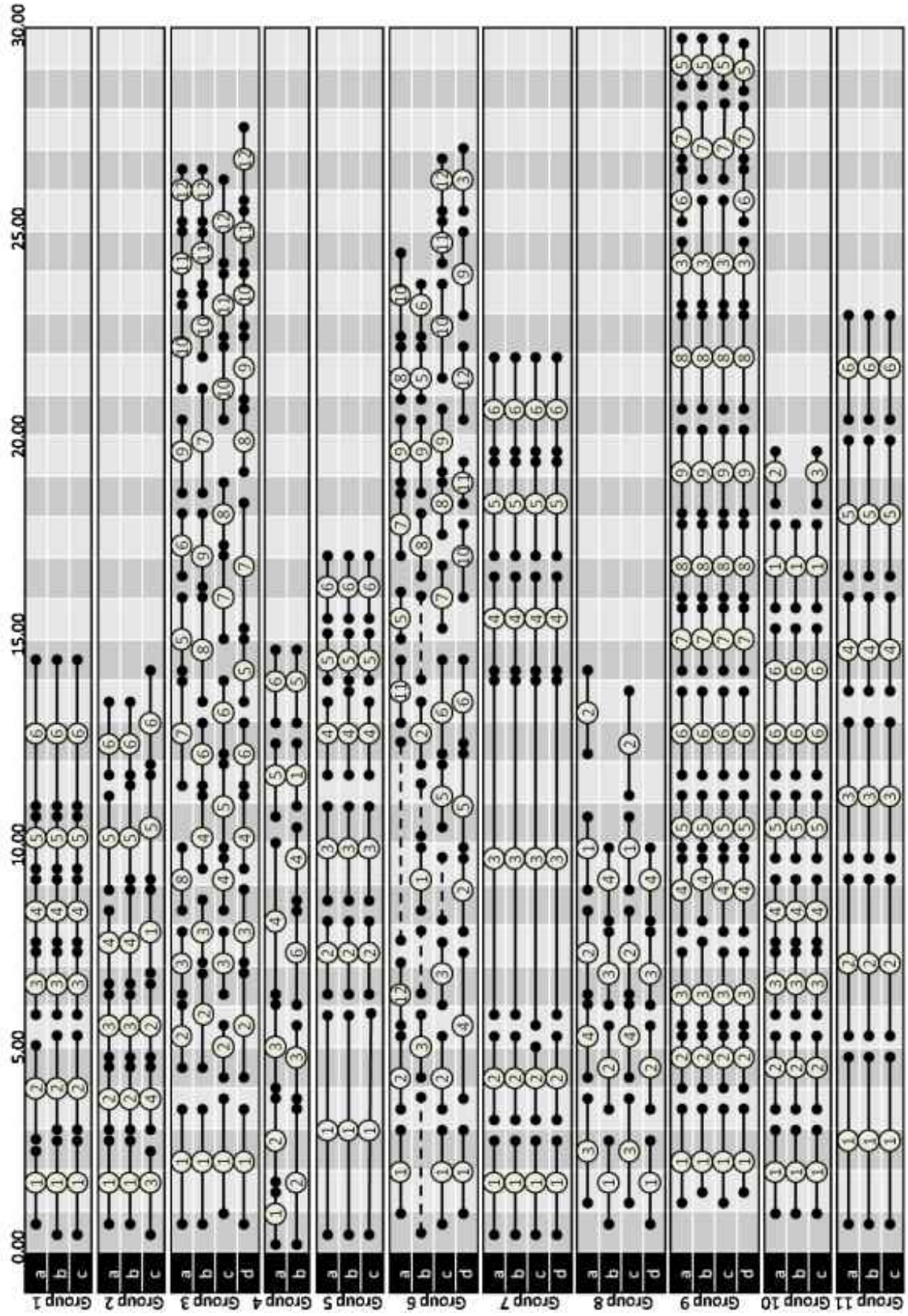


Figure 46: Timelines of the groups' interactions over the duration of their experiences

The timelines show an overview of how the different groups organized their visits, including which visitors were grouped together at different points of the visits. One approach, as displayed by groups 1, 5, 7, 9, 10 and 11 was to stay together for the entire visit, visiting the same object at the same time, and following the order suggested by the guide. At the other extreme, members of groups 2, 4, 6 and 8 visited objects separately or in subgroups, deviating from the suggested order and only crossing paths coincidentally. Group 3 showed a range of behaviours, often staying together but sometimes separating before coming back together again.

The timelines also show that it wasn't always the case that experiences were encountered with both the designer and recipient present at the same time. While those who stayed together were able to discuss, comment on and assess the objects as experienced, those who visited objects separately were not able to exchange such immediate feedback.

The video observations and subsequent interviews show that all but two visitors fully completed the experience – visiting all of the objects including those they had designed, those designed for them and those designed by others for others. One visitor chose not to visit the objects that she had chosen, stating afterwards that she was "embarrassed" that her text explanations were more detailed than others', reflecting the large amount of thought that she put into her designs and her anxiety at how they would be received. The youngest participant, aged three, did not engage with the experience himself but was shown parts of it by his father. All visitors who did engage with the experience listened through to the end of the audio (music and instruction) before disengaging, and most visitors appeared to follow the instructions that had been designed. There was often evidence of visitors working out who the object had been chosen for part way through the experience – one commented sarcastically, "Oh I wonder who this is for" – and sharing reactions to finding out the relationship at the end, for example, "That was for me", offering thanks and praising the designs.

Unsurprisingly, the highest levels of social contact were between those visitors who stayed together during the visit. These visitors engaged with each other to navigate between objects, coordinate starting each experience, share reactions and reflect on the interpretation. However, it was also observed that there was social contact

between those visitors who chose to visit objects individually. Sometimes this happened in the form of chance encounters, such as when two or more visitors find themselves at the same object without having consciously coordinated it, but there were also occasions where visitors deliberately initiated contact by greeting one another, asking questions, sharing reactions and asking questions. Some of the groups that split up spent significant portions of their visits in different rooms of the exhibition and out of line of sight, but they would often come back into each other's' visual fields at some point, and often coordinated coming together at the end of the visit.

The overall impression given from the video observations is that visitors were able to organize a structure for their group visit, and were generally able to maintain a level of sociality in any case. Nearly all participants did all of the content, and when they did, they listened through to the end of the audio and followed instructions. The video observations showed much acknowledgement, appreciation and comment, sometimes at exhibits and sometimes on encounters between.

5.5.2 Organising the group visit

The work involved in organizing a group visit with our experience is now considered more closely. For those groups that stayed together, how did they manage their continued shared engagement? For groups that separated, how did they manage disengaging and coming back together? We focus on a series of vignettes to illustrate how these various issues played out during the visit. The interactions are presented in detail to draw out the complexity of how the different visitors contribute to organising their group's trajectory.

Three key group behaviours are identified: sticking together, splitting up and drifting apart.

5.5.2.1 Sticking together

The first two examples illustrate what was involved for those groups that chose to stay together for the visit.

Example 1: Group 5.

This group of three female friends designed a tour of six objects of historical and cultural interest. Their approach to organizing their visit was to visit each object

together in the order suggested by the guide. They begin the experience by entering the gallery at a slow pace, looking around as they prepare to engage with the experience.

A: Er, which one do you, er? ((Holds device in front of her, Fig. 47a))
(3.0)
B: We could do it in the ((gestures to device, Fig. 47b))
C: ((looks at A and B, nodding))
(...)
A: In the order
B: Yeah
A: Oh. Natural Selection ((looks towards the display case "Natural Selection"))
A: ((stands to left of object))
B: ((stands to right of A))
C: ((stands to right of B))
((A, B and C listen to the audio and look at the object, Fig. 47c))
(2.07)
B: ((looks at A, Fig. 47d)) It's Egyptian?

Figure 47: Group 5 a) and b) (top) navigating towards the first object; c) and d) (bottom) at the object.

This fragment sees A and B jointly deciding to visit the objects in the order suggested by the guide. They choose and arrive at the first object of their experience, a set of earthenware tiles chosen by A for B. They arrange themselves in a semi-circle around the object where they stay while they listen to the audio designed by A. B, the intended recipient of this design, then queries A on the interpretation she designed for B. The fragment continues with B asking, "Can we play it again?" and going on to redo this experience, while A and C wait for her to finish before moving on.

Example 2: Group 7.

While it was most common for families to stay together during the visit, there was significant work involved in managing the children's visit. It was common for one of the parents to take a commanding role to ensure all members of the family stayed together and did not move on prematurely.

Group 7 is a family of four with a mother, D, father, E, and two sons (F, aged ten and G, aged seven). In this example, they are visiting their second object, a Japanese sword displayed in a glass cabinet.

D: ((Reading from device)) which was polished to look very impressive.
D: So all that [G], see all the bobbly bits ((pointing to the object, Fig. 48a)) (...) that's actually fish skin, ray- ray skin, that's amazing isn't it? (...) So it's actually fish skin in there that's covering the sword hilt. Can you see?
F: Who did the Chinese roof tile? (...) And where is it?
E: Don't know.
D: It's got to be here again, hasn't it?
G: Oh (.) I I I know, I know where that is ((looks towards the next object))
F: ((Walks towards the object and points at it, Fig. 48b)) G: It's there ((points to the object, Fig. 48c))
E: Object Stories ten, oh yeah (...) Oh right.

Figure 48: Group 7 (a) D pointing out fish skin; (b) F finding the next object; (c) G pointing out the object

The above fragment shows the mother's efforts to ensure both children engage with the experience: reading the text for them, checking they have read and understood the content, and even rephrasing the information. Meanwhile, F waits until his mother reaches the end before signalling he is ready to move on: "Who did the Chinese roof tile? (...) And where is it?" He begins looking and finds it on his own, but G, who chose the object, also moves to point it out, and they all move on to look at the tile.

5.5.2.2 Splitting up

Other groups were less concerned with staying together for the visit, with some group members actively seeking out their own paths through the museum, as shown in our next examples.

Example 3: Group 6.

This example is of a group of four friends who have all known each other for around eight years. They chose a range of objects and their designs were often playful, fun and with personal meaning. In this fragment, each of the four visitors is at a different stage of the visit, having chosen to visit objects separately and in different orders. J and K arrive separately at the same object, a set of duck-shaped weights chosen for J by H. The instruction for this object is to follow a stranger around the gallery. In this example, J and K are both coming to the end of the experience, having listened to most of the audio.

J: ((Looks around at K, Fig. 49a)) Ha ha ha. (...) I didn't do it, did you do it?
K: No I couldn't find anyone to chase but it did make me laugh.

J: Yeah.
K: It would've been perfect 'cause like, I'm finding that (...) it's better to have something to do while the music's playing.
J: Yeah it would be good I think if you could read as the music's playing.
K: Yeah.
J: I know what you mean, yeah.
K: ((reads device, Fig. 49b)) (h)That's s(h)o good. Th(h)at's really good though, I love it. The whole thing's great. Yours are really good, mine, I don't think mine are like (...) um (.) I can't think of the word for it, I'll have to think of the word for it.
H: ((Approaches J and K from behind, Fig. 49c))
K: Mine aren't um=
H: [Did you like it?
K: =[Connecting
J: It was great, yeah, it was so good.
K: It was really good.
H: Ha ha ha ha ha ha ha.
K: Love it ((turns to face H, Fig. 49d))
J: Heh heh heh. That's amazing.
H: Did you follow someone around?
J: No.
H: WHAT?
J: I looked around but then I was really embarrassed.
H: I did it.
K: No one was walking though I just walked instead by myself.
H: I walked (h)behind (h)a str(h)anger. Ha ha ha.

Figure 49: a) K and J (l-r); b) K and J (l-r); c) H, K and J (l-r); d) H, K and J (l-r).

Despite visiting separately, the visitors in this example were able to share experiences of objects, either when finding themselves at the same object without having expressly coordinated it (J and K) or by noticing when someone has visited a particular object and approaching them for feedback, as H did here with the object she designed for J. K, neither the gifter or recipient of this experience, joins in with assessing the experience while distinguishing between others' gifts and her own: "yours are really good".

Example 4: Group 8.

The one family group that did split up for the experience was Group 8. They start the experience with the father of the family, M, carrying the three year old, O, to the first object on the list. The mother, L, leads the six year old, N, separately to visit another object. L and N are at object three, where L is reading out the text content to the son. M, carrying O, approaches the cabinet where object two is located (Fig. 50a).

L: Oh look, it says for [N], from [O] (.) Shall we press the next one?
M: ((Puts O down, Fig. 50b)) L: Great. So we did that one (...) ((Turns to M, Fig. 50c)) I liked the music.
N: Where's the chess set?

L: Well, oh that's there so shall we go and do the other one and come back and do this one? Let's go and do the child's jacket. ((Guides N away to the adjacent room, Fig. 50d))

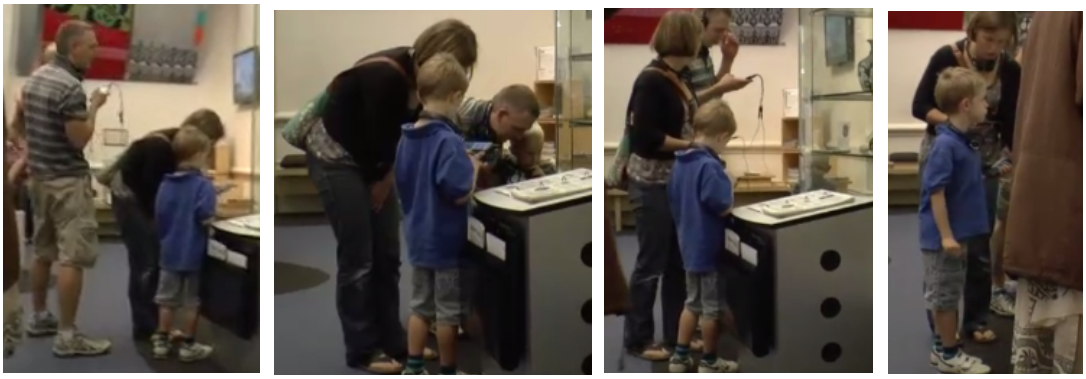


Figure 50: The two subgroups visit different objects

In this example, it is again possible to see interaction between those who are visiting objects in different orders (L saying "I liked the music" to M). We then see L deciding to deviate from the order N is expecting ("Where's the chess set?"), explaining that they will come back to visit that object. In the interview with this family it emerged that the two parents chose to separate into subgroups so they could take responsibility for a child each, which may have been particularly necessary with this group due to the age (3 years old) of the youngest.

5.5.2.3 Drifting apart

There were some groups that didn't seem to explicitly decide whether to stay together or split up, but that moved between states of being in and out of sync.

Example 5: Group 3.

The final example looks at a group of four friends from an art appreciation group. They start the experience together and visit the first object, a wax sealing fob. They arrange themselves in two pairs (see Fig. 51a) and, after listening to the audio, one pair confers while the other pair moves on to the next object in the display case behind. By the time the second pair reaches the second object, a decorative drinking glass, the first pair has started the experience. The first pair separate to make room for the second pair to access the object (Fig. 51b), reforming the group of four. Another conversation breaks out between a new pairing, and the other two move on to the third object, in the same cabinet. After visiting the third object, one of the women scrolls through the list of objects on her device and chooses a later one, then walks towards

the cabinet in which it is found. As the group is still within close proximity to each other (within line of sight) they continue to comment on the experience despite not visiting the same objects.

Figure 51: a) Group 3 arranged in two pairs, and b) reuniting

5.6 Overview of Key Themes

The findings presented above show evidence of a visiting experience in which small groups of family and friends, including those with young children, systematically engaged with museum content. The groups typically invested significant effort in designing experiences for one another at the orchestrated design workshops and the large majority "saw these through" on returning to the museum, by attempting and completing the content that was created. They generated personalised interpretations which were frequently discussed and commented on during their visits. Moreover, the groups were able to flexibly arrange the social aspects of visiting around the trajectories that had been designed both locally and globally. The ways in which this was made possible and achieved are now summarised in relation to the three thesis themes in an attempt to both explain and generalize them.

5.6.1 Interpretation

The findings presented in this chapter show how interpretations were designed by visitors as part of a group visiting experience. The experience gave all group members the chance to try out all of the content designed by their group, rather than just those that had been designed for themselves, exposing these visitor-generated interpretations beyond those they had been made for to the other group members, who, as seen in the study of visitors using the experience, may or may not experience the content in the presence of the rest of the group. The widening of the audience of the visitor-generated content in the experience might raise questions around the accuracy and authority of the interpretations.

On a number of occasions, an object from the exhibition was chosen by more than one member of a group of visitors. As the design work was done individually, and participants wanted to keep their designs secret until they were revealed in the subsequent visit, it was only when they came to use the experience that visitors were made aware that there was crossover in the object choices. There were instances of two visitors choosing to present fairly similar interpretations of the same object, as happened in Group 1's design, when the same facts and themes were picked upon to be highlighted in the design.

5.6.2 Personalisation

The design examples presented showed how the interpretations varied between the different groups, ranging from those delivering traditional interpretation personalised to each other's interests to those that linked the museum objects to aspects of each other's lives and relationships. Although the intended recipient and designer were only revealed after the content had been delivered at each object, there were times were the recipient was able to guess it was for them. Family members and friends alike revealed in the interviews how they were surprised about the creative, touching and sometimes surprising ways the person designing had thought about them and related the object to them, particularly in the case of some parents whose children's designs they found especially touching.

That said, by exposing all the group members to all of the groups' designs, visitors were able to engage with experiences that were not personalised to them as well as those that were. In the interviews that followed the visits, participants expressed how they had enjoyed seeing all of the groups' designs, and could generally appreciate those designed for others as much as those designed for themselves. Some family groups with young children approached the design task by teaming up to work together on the designs, and those that worked individually were given help by the workshop facilitator, however it was still possible for those receiving the personalised experiences to appreciate that the experience had been designed for them. This suggests that being able to flexibly configure the design arrangements was beneficial to groups with small children, enabling them to engage with both stages of personalising a design and receiving a personalised experience.

5.6.3 Socialisation

It was noted in Chapter 4 that there was a risk of potential anxiety and even discomfort that arose when gifts were given asymmetrically between visiting pairs. This led to extending the approach in three ways that appear to have alleviated such tensions. Firstly, the gifts were given reciprocally, with each group member giving to and receiving from each other member, sharing the inherent risk involved in revealing a gift and giving all concerned with opportunities to acknowledge and appreciate the gifts. Secondly, the approach was scaled up beyond pairs, which introduced others into the social occasion, such that gifts are received and appreciated in front of others who play a role in appreciating them. Thirdly, the gifts were given anonymously, so that they were not directly associated with gifters or recipients until the end of each experience. It is likely for this reason that visitors were committed to see through the experience to find out if it had been intended for them. Participants were observed trying all of the designs, rather than just those made for themselves or by others, perhaps motivated to find out if it had been designed for them. This meant all visitors in the group engaged with the same content. In addition, visitors who weren't sticking together were aware of what everyone else was experiencing, allowing for discussion when they did come into contact.

The findings reveal an experience that accommodated diverse group behaviours from sticking together throughout to splitting up and rejoining and from pre-formulated strategies to ad-hoc coordination. These observations stand in marked contrast to previous studies of group museum visiting that highlighted the ongoing tension of balancing engagement with content with paying attention to fellow group members. Even those groups that split up to visit exhibits separately were observed to maintain social contact and awareness of their fellow group members. There may be alternative explanations for the differences in group visiting compared with Tolmie et al.'s observations, such as the experience taking place over a limited timescale and physical space, which may have meant that visitors were less concerned about losing one another. It was observed, however, that a great deal of the social contact that took place was based around the experience content and involved commenting on the gifting dynamic, suggesting that the same level of social awareness might not be present without the intervention, or if the intervention did not contain the gift-giving dynamic.

The findings suggest that the many configurations in which groups organised themselves were supported by the underlying sociality imbued into the objects through the group gifting dynamic, which gave the visitors a shared set of relevant and meaningful content to engage with.

The outcomes that have been suggested here will be picked up again in Chapter 6 where a detailed thematic investigation into the findings from all three studies will be presented.

5.7 Conclusion

Tolmie et al.'s previous ethnographic study of two major museums revealed the significant problems facing both visitors and curators as groups of visitors struggled to balance their engagement with exhibits with the need to attend to one another – often to the detriment of the former (Tolmie et al., 2014). In response, this chapter has demonstrated how the previously proposed approach of gifting experiences can be extended – through reciprocity and concealed identity – to potentially mitigate these problems and deliver a group visiting experience that engages groups with content while remaining flexible to how they organize themselves locally.

This study completes the main empirical work of the thesis, which has progressed through the stages of designing an experience that works for pairs (Chapter 3), introducing a method for personalisation (Chapter 4) and, now, extending the approach to small groups of friends and families. The thesis will now embark on a broad discussion of the implications of the study findings for the three thesis themes, before closing with a summary of the research outcomes and the thesis' contributions to HCI and museum studies.

Chapter Six: Design Reflections and Discussion

Chapters 3, 4 and 5 presented the design and evaluation of a series of museum experiences for small groups, examining the ways in which both personalised content and social visiting were supported in the design of the experiences. Studying the experiences revealed how these played out with pairs and small groups of visitors who tried out the experiences in their naturalistic settings.

Three key themes emerged through the iterative research process. This chapter extends the three themes to encompass a broader discussion of this thesis' contributions to the design of museum visiting experiences, as well as their relation to previous accomplishments in the fields of HCI, museum studies and social computing. The chapter begins with a brief return to the trajectories framework, as introduced in Chapter 3, before delving into the three themes: how interpretation is supported in museum and gallery visiting experiences; how experiences can be personalised, and how group visiting can be supported.

6.1 Reflections on Designing with Trajectories

The trajectories framework, a conceptual framework developed by Benford et al. (2009), was first introduced to this thesis in Chapter 1 as a conceptual starting point for the design approach. In Chapter 3, it was described how the framework was used as a tool in the design of the Rufford sculpture garden experience, which will now be briefly recapped.

Several innovations in the design of the sculpture garden experience originated from key concepts of the framework. At the heart of the design was a *canonical trajectory* that followed both the existing path through the sculpture garden and also passing into and through each sculpture. It was then considered how the journey might unfold through key phases of approach, engage, experience, disengage and reflect. It was especially productive to consider key *transitions* along this trajectory. An important part of the design required visitors to put on and take off headphones at different stages of the trajectory, a consequence of considering *interface and role transitions* to mark the transitions into and out of engagement with a sculpture. As a result, a sharp distinction was made between using text and image to deliver content during the approach and reflect stage, as opposed to the audio instructions used during the experience phase. The design was also strongly influenced by consideration of *access to physical resources* at each sculpture. This led to the design of a series of distinctive physical actions at the sculptures that would shape how visitors view and engage with them, through posing and touching. It was also productive to consider *seams*, particularly when determining the underlying technology: this led to rejecting the use of location-based content in favour of the manual triggering of events by visitors themselves – a design decision that meant the trajectory could be transferred to indoor settings in the subsequent studies.

Trajectories played a crucial role in developing the initial sculpture garden experience for pairs of visitors rather than treating visitors as individuals. Applying the framework prompted the consideration of how each participant trajectory might *diverge* from the canonical trajectory, and how it might be *orchestrated* so as to subsequently *reconverge*. In response, visitors were able to choose the order of the sculptures, self-orchestrating their experience to fit with local conditions such as the presence of other visitors. Conversely, it was decided to take firm control of the local

trajectory at each sculpture, including choosing exactly how long the accompanying music would last. The framework also encouraged consideration of how visitors' trajectories might interleave, leading to the design of a trajectory that deliberately oscillates between moments of social encounter and isolated personal engagement. Key to the design was the use of instructions that told the visitor how to traverse the global trajectory into each local trajectory; how to experience sculptures within the local trajectory, while preventing the need for any live orchestration. Finally, the concept of *historic trajectories* influenced at what point visitors should receive 'official' information, inspiring the idea that this should be delivered as they walk away.

In addition to using existing concepts of the trajectories framework, it was necessary to extend the framework in a number of ways unique to the design. First, the canonical trajectory was structured at each sculpture into five stages – approach, engage, experience, disengage and reflect. By splitting the trajectory into these stages it was possible to judge where best to place the interface transitions and switches in media modality in relation to the visitor's experience. It was also useful to break down the previous idea of multi-scale trajectories into clearly defined global and local trajectories. By designing trajectories on these two levels, it was possible to separate out the flexibility required in the order in which visitors experienced sculptures with the carefully thought out local trajectory that would enhance engagement at each sculpture.

The trajectory designed to organise the content of the Rufford experience appeared to work successfully with the pairs of visitors who tried out the experience and therefore showed promise as a way to structure content for pairs of visitors (which will be discussed in more detail in section 6.5). It was clear, however, that the experience could be developed further to incorporate personalised content. The method chosen to personalise the experience involved using the trajectory structure designed for Rufford sculpture garden as a design template for visitors to design and gift experiences to one another at Nottingham Contemporary. It is now considered how the designed trajectory worked as a template for visitors' own designs.

Participants in the two gifting studies were presented the template via an example set of content, and given the chance to try out a trajectory for themselves, so that they

understood how the three pieces of content fitted together, so they could plan at what stage the different aspects of their interpretations were revealed (for example, explaining their music choice in the text made sense as this came after the audio). Participants were given a set of worksheets to take them through the design process of choosing objects, music, instructions and text and were able to talk to the workshop coordinator to discuss ideas or ask questions. With these resources, they were able to design each piece of content, and the results suggest that they thought about each piece of content separately as well as in the context of the other pieces of content and the local trajectory as a whole (e.g. choosing an instruction that complements the music choice and explaining choices in the text).

Participants chose both physical and thoughtful instructions, and often combined the two. They chose music that they thought matched the objects or suggested the type of mood or theme they wanted to represent. Their use of text spanned the informative – choosing information from the official exhibition guide – as well as explanatory and personal. One participant chose to forego any lengthy text in favour of short segments, such as, "Wiggle." The same participant chose to deviate from the trajectory that was given to them as a template. They chose to use the same music over two different objects, blending two objects into one extended local trajectory that spanned both objects, only giving text once the two objects had been visited.

On the whole, the participants were successful in designing experiences using the trajectory template and the worksheets, with the additional help of the workshop facilitator who both provided clarification and acted as a 'sounding board' for participants' ideas. Even the participants who deviated from the template were able to design coherent experiences that led their partners through the same five stages of the local trajectory, and the wider global trajectory of the visit.

An unexpected outcome of Study 2 (Chapter 4) was that around half of the participants chose to design a global trajectory that linked objects thematically or put them in opposition to one another, thinking on the global scale as well as the local. Some of these participants specifically ordered their object trajectories for the experience, considering carefully how each object would stand in relation to the objects either side of them. This reflects the findings from a previous study that investigated how participants put together musical playlists, in which order effects

were thought through in the process of compiling the playlists (Hansen and Golbeck, 2009).

The design work for Study 3 (Chapter 5) followed the same approach for the local trajectories of the individual objects and was also conducted successfully, although this time with no deviations from the template. The difference was that multiple participants contributed local trajectories to a collaborative global trajectory. They therefore weren't able to shape the global trajectory like some participants did in Study 2 – it was instead the job of the researcher to place the local trajectories in an order based on where the objects were located in the gallery, thus creating a coherent global trajectory through the gallery space.

The three studies show how the trajectories framework was used successfully as a design tool. First, as part of Study 1, Benford et al.'s (2009) trajectories concepts contributed to the design of the content and how it was structured in the experience. This led to an extension of the framework to include a five stage local trajectory and a wider global trajectory, both of which were useful in organising the content. The trajectory structure was then successfully applied as a design template to support participants in designing content for their own personalised experiences. The results revealed that participants were able to construct their own local trajectories using the template, and there was some evidence to suggest that they were able to design on the global level too.

6.2 Presenting the Thesis Themes

The three preceding chapters have presented a series of studies that have iteratively built upon each other in the order conducted and presented. The studies were each designed and analysed to respond in part to the overall research question – how to design digital technologies for museum and gallery visiting that support interpretation, personalisation and social visiting. The previous chapters have accomplished four things:

i. Developed a visiting experience that delivers a range of interpretations and supports visitors in making their own.
ii. Illustrated the iterative development of a novel approach to generating personalised experiences that support group visiting.

iii. Explored the ways in which visitors engaged with and responded to the approach.
iv. Analysed how well the approach met the goal of delivering personalisation in a group visit.

Alongside the documentation of the above activities, an ongoing analysis of the findings has seen three key themes emerge, as described below.

Theme 1: Interpretation. This theme has emerged from the many ways that experiences studied in this thesis support visitors in the making of meaning around exhibits in the settings investigated.

Theme 2: Personalisation. This theme relates to the ways in which museum experiences can be tailored to an individual visitor.

Theme 3: Socialisation. The third theme concerns the ways that museum experiences support the sociality of a group visit.

The themes will now be discussed in turn, beginning with interpretation.

6.3 Interpretation

A fundamental goal of galleries and museums is to engage visitors with exhibits in order to foster interpretation. Interpretation has also been an important topic within HCI, initially in terms of cognitive approaches to interpreting the workings of interfaces, but more recently widening out to consider more cultural interpretations of interfaces, experiences and their content.

For galleries and museums, the role of the organisation has expanded beyond the collection and preservation of cultural artefacts to also encompass content that supports their interpretation, particularly in recent years through digital media. The nature of this interpretation has also evolved from traditional pedagogic presentations of received knowledge, to enabling visitors to contrast multiple, even contested, interpretations and ultimately make their own (Whitehead, 2012). HCI has also become interested in interpretation: McCarthy and Wright have argued for the importance of ‘sense making’ in relation to emotional and aesthetic user experiences (McCarthy and Wright, 2007). Sengers and Gaver argue that the ambiguity of

artworks leaves them open to multiple interpretations; and discuss how HCI might evaluate interactive artworks (Sengers and Gaver, 2006).

6.3.1 Trajectories through Interpretation

The experience studied at Rufford sculpture garden (Chapter 3) was designed through a process of engagement with a performance poet and sound designer to create an experience that exposes visitors to an unusual set of interpretation content (music, an instruction and a portion of text), presented along a carefully orchestrated local trajectory at each sculpture. The study results suggest that pairs of visitors mostly followed the local trajectories at the individual sculptures, often leading to a deep engagement with and consequent interpretation of the artefact. There is a sense in which the experience combines multiple interpretations from the sound artist, the performance poet and the designers, but there is also openness in the design that lies in when interpretations are made and given. The trajectory organises this by first leading visitors into a relatively open situation in which they are presented with deliberately juxtaposed materials – sculptures and music – but without being given an explanation as to how they relate. This ambiguity begs a question – inviting them to make an interpretation in order to resolve the experience. However, a novel twist is that they are subsequently offered the "official" interpretation, but only after they may have reached their own. Thus, visitors move between being open to multiple interpretations at some moments while being presented with specific interpretations at others, following a *trajectory through interpretation*.

Of particular relevance to the idea of a trajectory through interpretation is a body of work that emphasises the importance of embodied experience (Dourish, 2006) and the roles of interpretation and reflection in making sense of sensory experiences (McCarthy and Wright, 2007). In the case of the trajectory through interpretation, the embodied and multi-sensory nature of our visitors' experience, adopting unusual viewpoints, touching sculptures and listening to music, appear to have been important in stimulating their imaginations and inviting them to resolve relationships, most notably between the sculpture and accompanying music. A key aspect of the trajectory is that it frames the experience in a way that gives visitors license to engage in unusual ways (for example touching sculptures). This may involve taking them out of their comfort zone or requiring them to act in unusual ways in a public setting,

reflecting recent discussions of the deliberate use of discomfort – including the idea that discomfort can arise through the visibility of one's actions, and that moments of discomfort should be embedded into a trajectory (Benford et al., 2012). Others have called for interfaces that are open to multiple interpretations rather than focussing on a single meaning (Sengers and Gaver, 2006).

The study at Rufford sculpture garden suggests that trajectories through interpretation, moving back and forth between openness and closure and through multiple interpretations, may be suitable for many cultural experiences, especially ones that involve a didactic element such as museums and exhibitions. There are a number of ways in which it might be possible to create richer trajectories of interpretation, such as through personalised visiting experiences that are tailored to individual's interests or visiting styles (Zimmerman and Lorenz, 2008). A further proposal returns to the concept of the historic trajectory, which suggests that participants should be provided with opportunities and resources to tell their own stories about an experience. While the experience at Rufford invited visitors to reflect between sculptures, they were not supported in reflecting on the whole experience afterwards or on creating their own accounts of the experience. This is currently a popular idea with many museums and galleries who are keen to reflect the visitor's own voice, which may form another layer in the multiple interpretations that surround cultural experiences, along with those of artists, historians, and curators. These two proposals were followed up in the following study which incorporated user-generated, personalised interpretations (though not strictly historic trajectories) and will now be discussed below.

6.3.2 User-generated Interpretation

The study at Nottingham Contemporary, presented in Chapter 4, was set up to allow visitors to create their own experiences based on the trajectory template structure, specifically to communicate an interpretation to a friend or loved one. This involved drawing upon their own interpretations while considering the person they were designing for. The resulting experience is presented to the recipient as an interpretation to support their viewing of the exhibition.

The results of the second study suggest that the dynamic introduced by the gift-giving approach influences and scaffolds how visitors make interpretations in multiple ways. First, the approach is inherently dialogic, fostering a dialogue between the giver and recipient as to the meaning of the exhibits (McKay and Monteverde, 2003). The giver

is explicitly invited to make an interpretation as if they were a curator. The recipient then experiences an interpretation that has clearly been made for them. Moreover, it has been made by a 'peer' and so is perhaps more inherently open to challenge. Second, this staged process provides multiple opportunities for reflection, discussion and reassessment of interpretations. The partners can discuss each exhibit as they experience the designed content and may also have opportunities for further discussion later on, perhaps in the café afterwards or in the weeks ahead. The giver also re-experiences their own interpretation, both directly and through the eyes of their partner. Interestingly, it is perhaps the giver more than the recipient who benefits most from this overall process as they are involved at all stages. It has been noted how gifts are for the giver as well as the recipient (Sherry, 1983) and this would appear to be especially true in this case.

The study presented in Chapter 4 reveals how this structure led to complex and varied interpretations. Some were relatively traditional didactic interpretations giving information about the artist or the artwork (P1a, P3a, P6a and P7a), but then enhanced with personal relevance and significance. Others, however, were far more personal, with the artworks providing an inspiration for visitors to reflect on their own lives and relationships (P2a, P4a and P5a). The research suggests that this latter kind of interpretation – getting visitors to derive deeply personal meanings for artworks – is especially challenging for museums and that gifting interpretations is a potentially powerful mechanism for achieving this.

As a further note, the final study interviews were also a powerful mechanism for getting pairs to discuss and compare their different interpretations and so it would be interesting to explore how such a mechanism might be incorporated into the gift experience, for example by ensuring that couples sit down and relax together afterwards, or perhaps by engaging them in collaboratively constructing a souvenir of their visit.

The studies presented in Chapter 4 and 5 extended the audience of the visitor-generated, gifted interpretations beyond just the person they had been designed for to the rest of the visiting group. There is a growing but divisive trend for museums and galleries to encourage visitors to share their interpretations, perhaps incorporating these into the official exhibit interpretation. This can raise questions around the

accuracy of visitors' own interpretations versus those provided by museum curators and experts. A general rule for incorporating visitors' content within an exhibition is to make the distinction between this content and the museum's 'official' content clear through its display and presentation (Whitehead 2012). There is an argument, however, that all interpretations are subjective, and that the notion of having just one 'official' way of thinking about an exhibit or one authoritative and accurate narrative behind an exhibit is misleading. Variations on both reception theory and reader response theory place emphasis on the reader in determining the meaning of literary texts, and that meaning is socially and culturally decoded by audiences rather than set by the author (e.g. Hall, 1993). The theory has been extended to the interpretation of objects. In the literary theorist Iser's view, objects are both active and passive, with meaning developing as an interactive process between the object and the viewer (Iser, 1974). Objects have undeniable properties that are available to viewers through their senses, however, each viewer brings aspects of their own experience, outlook or disposition to construct an understanding of the object, therefore no two viewers' understandings of the object can ever be identical. Other philosophers have argued for a form of critical monism: that there is only one correct interpretation of any art object, made by joining all true interpretive statements about a work (Stecker, 1994). This is not wholly incompatible with the semiotic view of multiple interpretations; it gives each interpretation a truth value and combines all interpretations with a truth value 'true' into the whole truth that is known about the object. There are clearly differing views on the correctness or otherwise of multiple and conflicting interpretations, many of which can be traced back to epistemic debates on knowledge and truth, a thorough examination of which is beyond the scope of this thesis. To bring the debate back to the interpretation of museum and gallery artefacts, the studies presented in this thesis have shown how interpretation can be highly personal to visitors and the relationships between them, so that interpreting an object in the 'correct' way – which might be to provide a scholarly take on the artefact's historical or cultural background – was often of less value than the personal meaning that visitors were able to derive and share from the artefacts.

The research presented in this thesis sheds light on the ongoing debates concerning the role of interpretation in museums and galleries. The research through Studies 1-3 shows how experiences that expose visitors to a range of carefully structured and

locally orchestrated content can allow these visitors to engage with multiple interpretations, without any claims to truth or authority, perhaps even inviting disagreement in a way that supports but does not dictate the development of their own. The generation of visitors' own interpretations for others introduces a highly personal level of interpretation that sees visitors using museum content to reflect on their own lives and relationships, a type of interpretation that the research has shown to be highly enjoyable and valuable within a museum visit.

6.4 Personalisation

Each visitor to a museum or exhibition brings a unique set of characteristics, motivations, preferences, knowledge and opinions to their visit experience. The growing use of modern digital technology to support the visit gives visitors access to large volumes of online content and the ability to look up diverse information about exhibits. Without any filtering of this information, visitors may find themselves overwhelmed with more information than they can process while visiting, which is why it has become increasingly common to turn to automated personalisation: filtering or adapting content to meet the needs of individual visitors.

Personalising the museum experience can be a uniquely challenging task on two key levels: firstly, a system might need to provide personalised exhibit recommendations, filtering large collections to support the visitor in engaging with exhibits that are of particular interest or relevance. A second level of personalisation can be applied to the interpretative content presented about those exhibits: the information or resources that visitors can engage with to support their understanding or meaning making. In the context of this thesis, these two levels are represented by the global and local trajectories. Tailoring interpretation (content along the local trajectory) to the visitor could involve a simple change of language for international visitors, or, at a more complex level, could relate to the visitor's goals or interests, such as to learn about a particular topic or to have a good day out with friends. The ways in which the experiences developed in this research supported and delivered personalisation will now be discussed.

6.4.1 Supporting Personal Interpretations

The initial experience designed and studied in this thesis was a visiting guide for pairs of visitors at Rufford sculpture garden. Each pair of visitors using this guide was presented with identical content to the next pair, both in terms of the exhibits recommended and the interpretation resources that accompanied them. The experience was therefore not explicitly personalised to the visitors, however, careful thought was given in the design stage to incorporating moments of personal reflection and engagement during the visit. The experience trajectory was designed to include moments where headphones and audio content were exploited to effectively cut off visitors from social engagement and encourage them to enter into a period of personal engagement with the sculpture. Additionally, the interpretation resources presented during this period – music and an instruction to engage – were intentionally open (Whitehead, 2012). That is, they did not express a particular viewpoint or way of looking, but rather created a space for visitors to relate what they were hearing and doing to the sculpture in their own ways, in order to arrive at an interpretation that may or may not have been confirmed by the text that was presented slightly later in the local trajectory. It is in this sense that the experience supported visitors in engaging with the experience and the sculpture garden in their own unique ways, without any tailoring of the content delivered.

While the study results did show evidence of visitors using this space to develop their own interpretations, it was also the case that not all visitors enjoyed all of the exhibit recommendations, or even agreed with the interpretations that were presented. It reinforced the next challenge for the thesis: to deliver personalisation of exhibits and interpretation, therefore an approach was developed and studied to deliver personalised exhibit recommendations and interpretation through gifting. The gifting approach is now discussed as a personalisation method.

6.4.2 Reflections on Gifting as a Design Concept

The experiences designed in Chapters 4 and 5 are ‘gifts’, made by one person expressly for another, and then experienced together. The sociological literature reports that gift giving is an important and complex social activity involving a gift giver, a gift recipient and possibly others too. Especially important aspects of gift giving are that: gift exchanges are social occasions; gifting involves social obligation

and reciprocity; and gift assessment can be a tricky social moment involving saving face. Mauss argues that gifts are about human solidarity and that gift giving practices are motivated by reciprocity and obligation (Mauss, 1993). Sherry's model of gifting proposes that the gift giver is primarily concerned with response induction (Sherry, 1983). The recipient responds in two concurrent ways, decoding the "instrumental and affective content of the gift" and also responding to the giver, "inferring intent and conferring judgment". The giver then evaluates this dual response, and each partner experiences an affective outcome ranging from satisfaction to disappointment. Robles also considers the troublesome matter of how the "assessment" of gifts needs to be smoothly managed between gift giver and recipient so as to ensure a smooth social occasion, noting that "occasions for gift exchange are organized and orderly, yet fraught with assumptions and face demands" (Robles, 2012).

Previous HCI research has drawn on this literature to help explain various social practices surrounding digital technologies. In a widely cited study, Taylor and Harper discuss teenagers' text messaging as ritualistic gift giving with messages carrying symbolic meaning that is "expressly manifest for the recipient", being exchanged in an "occasioned ceremony", and compelling recipients to accept and reciprocate (Taylor and Harper, 2002). Salovaara notes various problems that arose in gifting MMS-based comic strips, including recipients feeling uncomfortable with unannounced gifts arriving in their inboxes and feeling socially obliged to reply (Salovaara, 2008). In discussing gift giving as one strategy to create relatedness among couples living apart, Hassenzahl et al. note that the gift giver may draw on intimate knowledge of the other person: that an appropriate gift signals intimacy, that the effort of gift giving can signal the importance of a relationship, and that gift giving often features a moment of surprise when the actual gift is revealed (Hassenzahl, 2008). Skageby has turned to gift giving as a framework to describe social behaviour in online networks, observing that "gifts are often as much about the giver as recipient" and arguing that gift giving combines elements of both other-orientation and self-orientation (Skageby, 2010). Finally, Frohlich and Murphy have described how a technology probe comprising a box of physical objects associated with pr-erecorded audio stories generated excitement about the potential to create personalised gifts for others from shared memorabilia (Flohlich and Murphy, 2000).

The experiences reported in Chapters 4 and 5 bear many of the hallmarks of gift giving. They are made by a gifter for a chosen recipient. They are tailored to this recipient through the choice of exhibits they will find interesting or personally meaningful, music that they may know and like and personally significant actions such as a special dance move. The gifter may even attach a personal message or explanation mirroring the attachment of gift labels to material gifts. And yet, they also bear the imprint of their maker, carrying their own interpretation. The exchange of these gifts is strongly socially occasioned, even ceremonial, through an extended and structured gallery visit during which they are 'unwrapped' and experienced in the presence of the giver. This provides many opportunities for 'assessment' and also raises complex issues of 'face' as evidenced in Chapter 4's study, where the apparent nervousness of gift givers and the need for frequent reassurance (touching, kissing and spoken) were evident. There appears to be a strong obligation on the recipient to see the experience through to the end (even the couple in Example 3 completed their experience). In Study 3, there was no opportunity for direct reciprocity (recipients were not able to make a similar gift in return), however the giving of the recipient's time and their compliance with public action might be seen as a form of reciprocation. While evidently gifts, the experiences differ from the kinds of gifts that have been previously studied in HCI. Whereas previous studies have primarily focused on the exchange of digital media (Salovaara, 2008; Taylor and Harper, 2002) or material gifts (Frohlich and Murphy, 2000) by remote partners, this thesis focuses on the design of an extended 'gift experience', a transient 'in the moment' experience rather than a persistent artefact, something that, despite the shift towards user experience, has not been widely considered in HCI. A second distinctive feature is the way in which these gifts are jointly experienced; the giver also experiencing the gift while closely observing the recipient. This lends them a powerful and distinctive dynamic that fundamentally shapes personalisation.

6.4.3 Gifting as a Personalisation Method

There is an extensive body of work on personalisation within museums and galleries, much of it concerned with the idea of adapting the selection or presentation of information to a visitor's interests or learning style. Much of this is driven by a desire for automated adaptation, with the system doing the work, possibly without being overtly visible to the visitor. Framing the visit as a personalised gift, however,

suggests a quite different approach, considering personalisation as a social matter that may be achieved between a giver and receiver. This type of person-to-person design extends to written communication in the case of Postcrossing, an online system for sending physical postcards to random recipients. Kelly and Gooch report that the personalisation of postcards to the recipient's tastes and interests, through the postcard's design and personal handwritten messages, are rewarding for both the sender and recipient (Kelly and Gooch, 2012). In museums and galleries, however, this type of personalisation to an intended recipient has only been considered in passing, such as in the case of a study of a participatory museum installation where they saw visitors writing personal messages to co-visitors and contributing them to the installation that is then visible to the public (Bartindale et al., 2011). These studies suggest that personalisation is an implicit feature of social interaction and that considering the recipient when designing communications is perhaps a matter of course. While, in Chapters 4 and 5, we did see examples of personalising to general interests, we also saw examples of a 'deep' personalisation that involved making specific connections to particular events and issues (e.g. P2a's planned roadtrip in Chapter 4). Moreover, these experiences were actually personalised to two people with designers drawing on their own interests and knowledge or making privately shared references. Of course, this approach is far from automated, requiring extensive effort by a human designer. This, however, may be of benefit as it is this effort that gives value to the gift and helps ensure that the experience will be taken seriously. Moreover, creating the gift and seeing it experienced by a partner may in itself be an enjoyable experience for the gift giver. It is therefore suggested that a focus on gift giving has the potential to deliver experiences that are simultaneously deeply personalised to two (or possibly more) people at a time, enhancing the experience of both albeit in different ways.

6.4.3 Personalising Interpretations for a Friend or Partner

It will now be discussed how visitors went about designing a personalised interpretation for their chosen recipient. Visitors were able to personalise experiences for one another on a number of levels. Participants in Chapter 4, who designed a tour of five objects for their partner, first identified an overarching type of experience they wanted their partner to have. Three main types of experience were cited: personal experiences that delivered a personal message; educational experiences that were

crafted to give information; and emotional experiences designed to suggest an emotion such as enjoyment. Most participants, in describing the type of experience they wanted to design, used a combination of these types, for example a "personal emotional journey" or "a fun experience that might teach him something new". Participants in both studies then chose objects from the exhibition to form an experience for their friend, family member or partner. Their reasons for choosing particular objects were varied. For participants in Chapter 4, the objects were often related to the overall theme or type of experience they had chosen, but in both studies the choice was also guided by the participants' knowledge of the person they were choosing for. This knowledge could relate to the person's interests, their personality, their background or their beliefs and values. It was often also necessary to draw on their own knowledge and the way they interpreted the objects themselves, choosing something that they found interesting or knew something about, and so were able to offer a useful insight. The selection process therefore involved browsing the exhibition and engaging with objects to draw inspiration, until the participant found a suitable match between their knowledge of the person they were choosing for, their own ideas for a particular theme, the properties of the object itself and how they interpreted the object. Fig. 52 shows how the choice of object, and resources, was influenced.

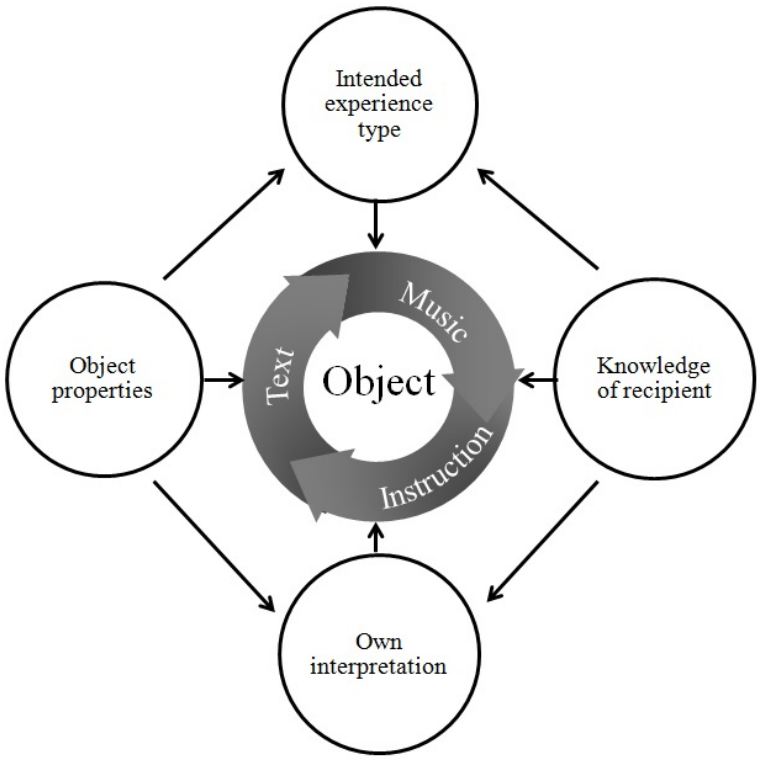


Figure 52: Factors influencing a participant's design of a personalised experience including choosing an object and a piece of music, an instruction and a portion of text

Next, the participants chose the resources that would accompany the object in the experience to provide an interpretation: a piece of music, an instruction for how to engage and a portion of text. The key influences on the participants' choices for these resources were the objects themselves and their knowledge of the person they were designing for, but the resources were also chosen to support one another. For example, a participant might choose a piece of music and an instruction to complement each other to suggest a particular theme or idea, and then a portion of text that expanded on the theme suggested in the music and instruction. The particular reasons for choosing resources were not straightforward, so now each resource will be considered separately in order to understand more about participants' choices.

Music. Music was often used to reflect themes brought up by the object or to set a particular mood or emotional tone. These themes or moods were set by the participants' own interpretations of the object, which in turn were influenced by the participant's knowledge of the recipient – since they were interpreting the objects in relation to the person they were designing for – and their overarching ideas for the theme or type of experience. The music choice tended to be a piece that was known

and liked by both the designer and recipient, and matched the interpretation the designer wanted to get across. For example, in Chapter 5, participant C chose the song *Homeward Bound* by Simon and Garfunkel to accompany a decorative tea pot chosen for her friend D, stating that she thought it was about "home and comfort". Other times participants drew inspiration directly from the object itself, choosing, for example, a traditional piece of music from the era or culture the object belonged to, which was the case for participant E who chose to set a Japanese arrow quiver to a piece of traditional Japanese music.

Instructions. The choice of instruction was also used to set an emotional tone for how the object would be experienced. Participants were given a free choice, but were told that their instruction might involve doing something physical or something thoughtful, or a combination of the two. Generally the participants considered the person they were designing for and how they would respond to the instruction type – some thought the person they were designing for would respond well to a physical engagement while others thought the person would prefer to do something less conspicuous. Again, the inspiration for the specific instruction came from the object's properties, the intended theme or type of experience and the participant's interpretation of the object.

Text. Finally, the text, to be displayed after the music and instruction, was used by participants to wrap up the experience, delivering factual information they had found about the object or explaining their interpretation or reason for choosing it. It tended to follow on from the other resource choices or to deliver personal messages, for example, "I feel this sums up a part of your character and is a nice object to link our friendship…"

The exploration of the novel mechanism of gifting between those who visit together provided evidence that this is a powerful approach for generating personalised experiences within groups. By drawing on not just the visitor's general interests, but also their personal characteristics, shared memories, relationships and issues, visitors were able to construct a "deep" personalisation that connected the museum experience with these aspects of visitors' lives. The approach generated a uniquely different kind of personalised experience than has been seen in previous research. There were instances where the personalised gifts markedly did not match with the recipient's

interests or tastes, but, through provoking interest or revealing the careful thought that had gone into choosing it, were valued nonetheless. The approach also generated gifts that were matched to the person giving, or, in particular, the relationship between the giver and recipient. This allowed visitors to find personal meaning in their interpretations of exhibits, and also to use the museum experience to comment on wider issues in their lives. This is not to say that the focus was shifted entirely from learning about the exhibition content, as the studies provide evidence that visitors were able to embed educational content within personally engaging experiences. The findings show that visitors were generally able to design experiences for one another by drawing inspiration from the exhibits themselves and their knowledge of and feelings towards the person they designed for.

6.4.4 Receiving a Personalised Experience

One of the goals of personalisation is to match content onto a model of the user, therefore it is important to consider how the designs that visitors came up with met the tastes and requirements of the visitors they were designed for, and what the experience of receiving a personalised gift was like. In the interviews that followed the visits, the recipient of each exhibit experience was asked to comment generally on how they found it, and particularly whether they felt the personalisation towards them was successful.

On some occasions, visitors noted how the object chosen for them was particularly in line with their tastes or interests, for example because “the colours were right, the patterns were right and everything fitted with things that I do like”. The approach also generated objects that were not to the recipients’ tastes, and this came about for a number of reasons. First, it was often the designer’s own knowledge and tastes that guided their choice of object, rather than just the recipient’s (e.g. one participant had recently read about the history of an artwork and wanted to share the story with her partner). Recipients were generally able to pick up on when this had happened, and find value in these objects for that reason. For example, one visitor commented: “It was nice to sort of have an insight into how somebody else has viewed a thing, what they've thought about.” Other times, the choice of object was intended to raise a personal issue rather than simply satisfy the recipient’s tastes, and recipients were often surprised to find out the reasons they were chosen. For example, a seven year old boy chose a sword in response to a memory he had of his father’s time in the military. The father commented that upon learning the reason: “I felt special that it

was chosen for me, and that it wasn't just chosen at random. It was a thought-through choice and it had a link to his understanding about my interests". These objects tended to provoke recipients to reflect on the deep interpretations gifted to them in light of their relationships with those who had designed them.

This thesis has explored an innovative way of achieving personalisation in group visiting through supporting visitors in designing experiences for those they are visiting with. Studying the approach revealed a novel character to personalisation that tailors not just to visitors' backgrounds and interests but to their personal characteristics and relationships. Through studies of couples, close friends, colleagues and families, it has emerged that these types of experiences around museum artefacts have the potential to create intensely evocative experiences that can combine traditional informative interpretations with deeply personal meaning. The personalisation achieved through the research relies heavily on the social dynamic inherent to gift-giving, which as a personalisation method is inherently social, drawing on the interpersonal knowledge that exists between individuals. The effects of invoking this gifting dynamic extend into the resulting experience, supporting the group visit in a number of ways, which will be discussed in the following section.

6.5 Socialisation

To recap Chapter 2's review of the literature on social visiting, it has been well documented that when most people visit museums, they do so as part of a group of friends, family or loved ones, and the social experience can be a key motivation for visiting in the first place (Falk & Dierking, 1992). In response, there has been a shift from technology for personal use, to those that support collaborative interaction between visitors (e.g. Grinter et al., 2002; Cosley et al., 2008; Geller, 2006). Other research has considered how groups of visitors behave (e.g. Kuflik & Dim, 2013) and the types of interactions that occur (e.g. Hope et al., 2009; McManus, 1987). From the very outset, this thesis has set out to consider visitors not individually, but within the social context of a group visit. That is not to say that individual visiting does not happen, or that groups of visitors remain together throughout their visit, but research into personalised museum experiences has yet to solve the problem of how to support visitors in groups. This section discusses how the research rather takes groups as its

focus for the design of a visiting experience for pairs, before moving on to develop an approach to personalisation that puts social relationships to the fore.

6.5.1 Delivering an Experience to Pairs

The experience at Rufford sculpture garden was designed to be used by pairs of visitors as a shared visiting experience. Of the thirteen pairs of visitors who took part in the study, only one pair separated to view sculptures in different orders. The layout of the sculptures within the garden, and how they were presented in the app's interface, may have encouraged visitors to follow this order together.

As discussed above, the experience at Rufford was designed to take visitors through moments of social encounter as well as isolation. The study showed that most conversations between the pairs of participants took place after the audio content had finished, when headphones had been removed, or when they were moving between sculptures. Generally, they did not attempt to converse while the audio was underway, beyond short comments which often were not heard by the partner. Putting headphones on and off is a visible cue to each other, raising awareness of each other's engagement with the digital content, in a similar way to being able to eavesdrop (Aoki et al., 2001).

There were, however, many examples of tacit coordination in synchronising engagement with sculptures. It was observed that pairs generally tried to begin their engagement together, despite the two devices not being technically synchronised, so there was often a few seconds delay between the two devices. It was often observed that pairs of visitors exchanged glances and smiles to confirm that they had heard the instructions before both had followed them.

Overall, the observations of visitors at Rufford sculpture garden suggest that the experience worked well for pairs. It was decided that the structure of the experience would be reused for the experience in the second and third studies, where it was used as a template for participants to design and gift their own interpretations. The nature of how the experience changed when it was personalised and gifted between pairs will be discussed below.

6.5.2 The Effects of Gift-giving on the Social Visit

As discussed, the study presented in Chapter 4 aimed to deliver personalisation in a way that supports rather than inhibits social engagement. The study employed an approach derived from gift-giving. Gift giving is a social practice and so it should be no surprise that it appears to shape the social aspects of visiting. While previously studied systems (e.g. Cosley et al., 2008; Laaksolahti et al., 2011) have allowed users to share general responses to art, the responses produced were not personalised or gifted to a particular recipient. It is the gifting of experiences that are specifically crafted for the recipient that makes the approach explored in this thesis, and the interactions it produced, innovative and unique.

Experiencing the gift together creates a strong mutual obligation between pairs. The recipient is obliged to complete the experience and comply with instructions as was seen in all experiences (even the unsuccessful one in Chapter 4 involved completion and partial compliance). For their part, the giver has a vested interest in ensuring that the recipient is able to complete the experience, at least by not interrupting them, but also by actively supporting them, joining in with the actions and often leading the way.

The study also uncovered a less expected social dynamic where some visitors appeared to take the opportunity to raise difficult or controversial issues with their partners, for example confronting them with their fear as we saw in Example 2 (Chapter 4). While an earlier study of gift giving between remote couples revealed the role of gifts in creating 'relatedness' (Hassenzahl et al., 2012), it appears that something subtly different may be taking place here with partners taking the opportunity to surface challenging issues. This suggests that gifting personalised interpretations of artworks might provide opportunities to raise personal or relationship issues that are difficult to confront in everyday life. The findings also suggest there can be an element of social discomfort involved in negotiating such personal territory, however it is not unusual for experiences with contemporary art to be challenging. This is reflected in Benford et al.'s discussion of the use of discomfort to frame enlightening engagements with difficult themes in cultural experiences (Benford et al., 2012).

The study presented in Chapter 4 looked only at pairs of visitors and did not involve reciprocity in the gift exchange. It was next of interest to see how the approach scaled the small groups of friends and family, and if adding reciprocity might be a way to resolve the intensity observed when gifts were given between pairs.

6.5.3 Supporting Group Coherence

In spite of a growing body of work (e.g. Hope et al., 2009; Kuflik and Dim, 2013), there is recent evidence that supporting group visiting remains a challenge. A recent ethnographic study of two very different museums uncovered a phenomenon that appeared to span across many types of small groups (Tolmie et al., 2014). Tolmie et al. repeatedly observed visitors' engagement with exhibits and information being prematurely interrupted because of a need to maintain a physical coherence within the group. Tolmie et al.'s work suggests that groups of visitors struggle to simultaneously manage engaging with museum content on the one hand, while 'sticking with' or otherwise tending to the needs of fellow group members on the other, often being 'dragged away' from exhibits and information because of a desire to catch up with group members who are moving on at a faster pace.

A proposed solution was to reconfigure the social dynamic of visiting, perhaps by designing for more collaborative experiences or increasing visitors' awareness of each other's activities (Tolmie et al., 2014). Chapter 5 presented an extension of the gifting approach to accommodate small groups, and to directly address the challenges of group visiting identified by Tolmie et al. in the design of a group visit. The aim was to enable small groups, typical of those that visit many museums, to be able to share an experience in which they can enjoy focused engagement with artefacts and interpretation while also paying attention to and meeting the needs of different group members.

The findings presented in Chapter 5 paint a picture of a shared visiting experience in which small groups of family and friends, including those with young children, systematically engaged with museum content. The sense of tension and embarrassment reported in Chapter 4's study of the *asymmetric* gifting of experiences among adults was absent, with fewer intensely personal or provocative interpretations gifted between the friends and family who took part in the study. This seemed appropriate for an experience that was shared between small groups of friends, and those with young children present, rather than couples. Visitors reported enjoying the

experience and playfully engaging with and appreciating others' designs. The findings also reveal an experience that accommodated diverse group behaviours from sticking together throughout to splitting up and rejoining and from pre-formulated strategies to ad-hoc coordination. These observations stand in marked contrast to Tolmie et al.'s study of group museum visiting that highlighted the ongoing tension of balancing engagement with content with paying attention to fellow group members.

6.5.4 Making Objects Social

In discussing participatory museum visiting, Simon defines *social objects* as those that are "transactional, facilitating exchanges among those who encounter them" (Simon, 2010). Such exchanges include discussions of an event or story the object brought to mind or cooperation around an object that invites play or touch. The approach explored in this thesis directly embeds social transactions into the visiting experience by having visitors design structured experiences around individual artefacts from instructions, music and information. This enables visitors to directly embed such transactions into the visit through the content they design for others – using music that represents a theme or memory, drawing attention to particular aspects of an artefact or taking it as inspiration for telling a story. At the very least, it allows visitors to draw their group members' attention to an object. Visitors were observed to draw on their knowledge of each other and their inter-personal relationships to create social objects. When visitors experienced artefacts together, they often built upon the experience by responding or exchanging remarks, as in Examples 1 and 2 of Chapter 5. Even those visitors who split up to visit individually were able to discuss the experiences when they crossed paths or sought each other out (Example 3, Chapter 5).

Moreover, the approach draws on an especially powerful form of social transaction – the gift. Framing the design of experiences as gift-giving created a strong social obligation for the recipient of the gift to complete the experience (Mauss, 1990) and to respond appropriately (Sherry, 1983). In this thesis, it was seen how the hallmarks of gift-giving played out amongst the visitors, who recognized and appreciated when a gift had been tailored towards them, and who often commented on who the gift had been intended for, offering thanks and assessments.

There was a risk of potential anxiety and even embarrassment that arose when such gifts were given asymmetrically between pairs of visitors. This led to the extension of

the approach in three ways, both of which appeared to have alleviated such tensions. The first was to make them reciprocal. The extended approach involved each member of a group designing for each other member. Each group member gave and received, sharing the inherent risk of giving while also providing all concerned with opportunities for acknowledging and appreciating. The second was to scale up beyond pairs. Mauss describes how gift-giving is socially occasioned and how gifts are 'opened' and appreciated in front of others who in turn play a role in appreciating them, an idea that is directly reflected in my approach. The third was to make them mutually pseudonymous, that is not directly associated with identified gift givers or giftees. By only revealing who each interpretation had been designed for and by at the end of each experience at an artefact, visitors may have been committed to see through the experience to find out if it had been intended for them. Participants were also observed trying all the designs, rather than just those made for themselves or by specific people, perhaps motivated to find out if it had been intended for them. This meant all visitors in the group engaged with the same content. In addition, visitors who weren't sticking together were aware of what everyone else was experiencing, allowing for discussion when they did come into contact.

6.5.5 Scaffolding Experiences

Previous studies of museum visitors have uncovered a range of different visiting styles and have attempted to categorise visitors into different types that may change throughout the visit (Sparacino, 2002; Veron and Levasseur, 1989). Early categorisations focused on individual visitors, but the idea of classification has since been extended to pairs of visitors based on their engagement and orientation towards each other and exhibits (Kuflik and Dim, 2013). The dynamics of visiting as a family group have also been well documented, with studies revealing the extreme prevalence of playful behaviour with interactives and long conversations among the group (McManus, 1987), and the impact of parents' shaping and supporting of children's interactions on learning (Crowley et al., 2001). Previous responses to such observations have aimed to augment social interaction in museum visiting by promoting connection with others (Cosley et al., 2008) and engaging group members in a coordinated narrative to induce group conversation (Callaway et al., 2001), the latter being unusual in narrative-driven directed experiences in that it required collaboration for the story to unfold.

The study of groups' engagement with the gifting approach suggests that an open and flexible structure can accommodate a range of different visiting styles. While each bite-sized experience of an individual artefact was highly directed through instructions, music and information, there was no overarching narrative that needed to be followed to connect them altogether. While visitors chose experiences from an ordered list, the order was not enforced or strongly narrativised, nor were there any requirements to collaborate in order to progress, as in Callaway et al.'s experience (2001). Visitors were therefore free to manage the overall global trajectory of their visit as they saw fit, splitting and joining according to local needs and circumstances. It was found that sticking together generally involved joint decision making, waiting for one another, and discussing interpretations in the moment: what might be thought of as an ideal social visit. However, it was also possible to observe behaviours in those who split up, suggesting a level of social engagement despite group members not visiting objects synchronously. This took the form of visitors finding themselves coinciding at the same object and sharing a more spontaneous engagement, seeking one another out to give feedback and seek assessment, or monitoring one another from afar.

Another notable feature of the approach is its technical simplicity. There are no location-based technologies at play here, no recommender systems or triggering of content and no attempt to technically synchronise content between people. Rather, visitors must author and then select experiences for themselves, find the artefacts involved using conventional means and then manually trigger the 'content' (manually synchronised if they so wish). The approach balances the orchestration of the experience with visitors' own agency; by scaffolding rather than directing, visitors are encouraged to carve their own trajectories through the experience, rather than using an experience designed for a canonical way of visiting (Benford et al., 2009). This is a common approach in visiting experiences with mediascapes (Hazzard et al., 2015) and participatory performance (Taylor et al., 2014). This manual approach to scaffolding rather than directing experiences even extends to the use of headphones (traditionally a thorny issue in mobile collaborative systems (Aoki et al., 2002; Martin, 2002)) with visitors manually putting them on and taking them off as required. While clearly demanding more work of visitors, this largely manual

approach does not appear to have caused difficulties or frustration and does appear to have afforded great flexibility for adapting to different visiting styles.

This scaffolding approach was perhaps most evident in enabling adults to support children when managing the family experience. Children were able to engage in the making and doing of experiences with support from their parents, listening to the music, dancing and repeating experiences they had enjoyed. They sometimes surprised parents with thoughtful designs and questions. And yet, it was also possible to mix in moments of experience for adults in the group too.

In light of these observations, this thesis recommends that experience designers recognise that sometimes 'less is more' and that approaches which scaffold interactions without heavily directing them (e.g., through strong narratives, collaborative mechanics, location-based wayfinding and triggers) have a valuable role to play in visiting experiences.

It is important to consider how the gifting approach changed the visiting experience in addition to the ways directly related to the thesis themes. Falk wrote about the five key types of museum visitors, based upon their motivations for visiting: explorer, experience seeker, recharger, professional/hobbyist, and facilitator (Falk, 2009). The experience seeker is motivated by seeing icons or objects; the recharger is focused on having a relaxing experience; the professional/hobbyist is seeking to further their education or interest in a particular area; and the facilitator is interested in their friends and family having a good time. While these identities are not strictly mutually exclusive, the gifting approach explored in this thesis may combine elements of many of these, and may involve a 'facilitator' (the gifter) in effect assigning an identity to their recipient which may or may not align with their own motivations – for example designing an experience focused on experiencing iconic objects (experience seeker) when the recipient is more interested in relaxing (recharger). At the same time, both the designer and recipient are facilitating each other's experience in the ways noted above, in 6.5.2. The experience might add a new category of motivation or identity, that could be thought of as a 'sharer' or 'relationship builder', which might involve wanting to share aspects of their lives or experiences of objects with friends and family in order to develop their relationships, using the museum content as a catalyst. Furthermore, the experience adds new types of interpretive content in comparison to the exhibitions prior to the design intervention.

6.5.6 Rethinking Group Coherence

Considering the nature of groups is both fundamental and challenging for designing social experiences. One common approach is to consider physical collocation, drawing on notions of proxemics from anthropology (Hall, 1966) and employing location-based technologies to detect collocated formations (Rijurekha, 2014), sometimes in combination with the strength of social-network connections (Purushotham et al., 2014). Another key idea is that of the cohesiveness of groups working together on tasks, that is, on the strength of social relationships between those working together and the effects of this on the quality of their work (Schwanda et al., 2011).

Groups in leisure activities, such as museum visiting, are likely to already have strong social relationships and therefore to exhibit physical cohesiveness as a group. Indeed, this very cohesiveness may be a major challenge for museum experience designers as they seek to engage tightly-knit groups with their content rather than with each other. This tension between group cohesion and external content lies at the heart of Tolmie's previous observations of museum studies, leading him to discuss the notion of *group coherence* that involves maintaining a level of togetherness through staying within line of sight (Tolmie et al., 2014). This, and other forms of awareness of group members' activities, has been shown to be important in collocated collaboration (Yuill and Rogers, 2012).

Study 3 revealed how some visitors intentionally avoided being in physical proximity to each other, using their awareness of others' location to avoid going in the same direction. Others appear to drift in and out of awareness without any noticeable detriment or premature disengagement with exhibits in order to maintain an overall coherence. It seems, then, that these visitors were unfazed by the potential incoherence of their group visit in a way that the groups in Tolmie et al.'s study went to some lengths to avoid. When they did engage with one another – sporadically, inadvertently or intentionally – they were able to discuss the experience and engage with each other, before possibly splitting up again.

The findings suggest that perhaps group cohesion and coherence in museum visiting are not as straightforward as previously thought. Groups were able to engage fully with the experience despite not always being physically proximate or within line of sight. Having a shared set of content, that was generated through reflecting on the

group's social relationships and knowing the experience was limited to the list of objects they all shared, appeared to break down the need to be constantly aware of each other's whereabouts. Coherence might then be better thought of as a more esoteric property that comes about as a result of tight social cohesiveness (the groups were existing friends or family), being focused on the same task (all group members were engaging with, and invested in, the visiting experience), and some kind of spoken or unspoken agreement about how closely they would stay together during the visit (some visitors announced their plans to visit separately while others did not). Furthermore, the notion of coherence might be extended to encompass the entire experience rather than the state of the participants at any one moment. It may not matter if visitors temporarily split up if the wider nature of their experience is sufficiently coherent that they are comfortable that they will soon be able to re-join.

6.6 Conclusion

These discussions reveal the significant ways in which the digital technologies introduced into three cultural heritage settings addressed and influenced the personal and social aspects of the visit, including how interpretations were made by individuals and within groups. The research has highlighted the distinct challenges that arise for designers of mobile guides for many cultural settings: supporting visitors in making interpretations, providing personalised access to vast amounts of information, while also factoring in the need to pay considerable attention to maintaining the social coherence of the visit.

In light of the thematic discussions, this thesis recommends the general approach of 'socialising' museum artefacts by getting visitors to craft and gift interpretations for one another. The three studies suggest that trajectory-based gift experiences are a powerful way of delivering personalisation in museum and gallery visiting technologies, and that such gifts should be reciprocal, exchanged incognito and exchanged among small groups. The approach is directly and easily implementable in software, with the gift-giving transactions being realized in simple templates derived from carefully structured trajectories.

The research in this thesis is important and innovative. The application of gift-giving to the personalisation of user experiences is a powerful mechanism for creating deeply personal visit experiences that are embedded with meaning that comes from the relationships and shared memories that inform them. The mechanism has potential for

many other domains, from health and fitness, to leisure activities such as cinema-going, and to novels ways of communicating about difficult topics to create empathy.

Chapter Seven: Conclusion

This thesis has investigated how digital technologies for museum and gallery visiting can be designed in a way that supports interpretation, delivers personalised content, and, at the same time, supports social visiting. Three studies have addressed these cumulatively: firstly, developing a trajectory that delivers and supports interpretation; secondly, introducing a method for personalising the trajectory that works with pairs of visitors; and thirdly, extending the method for use with small groups of friends and family.

This final chapter provides a summary of these findings to answer the overarching research questions, before highlighting the contributions of the work, pointing out the limitations and caveats, and identifying areas for future work.

7.1 Answering the Research Questions

How can visitors be supported in making interpretations by digital technologies?

The research reveals that interpretation can be supported through different types of content. Interpretation material that sets an emotional tone or hints towards a theme can shape visitors' interpretations, while instructions that suggest ways to engage physically with an object, or intellectually by thinking about a scenario or answering a question, can invite visitors to view objects from interesting perspectives. The juxtaposition of different types of interpretation material was found to open the space for visitors to make their own interpretations to resolve the experience. The study presented in Chapter 3 reveals that there is significant value for visitors in having the opportunity to reach interpretations on their own, before being given the 'official' interpretation only after the chance to explore their own. The findings suggest that this structure leads visitors through a 'trajectory through interpretation', moving them between openness and closure, giving them the opportunity to explore multiple interpretations before presenting them with the official view, which they can agree or disagree with.

In Studies 2 and 3, visitors were supported in designing their own interpretations to be used by a friend or partner. The findings suggest that visitors can design interpretations for another person using a template structure by reflecting on their own interpretation of an object and their knowledge of the other person. The studies reveal that the interpretations that designed – that drew on interpersonal relationships and shared memories – were meaningful and appropriate for a group visit.

How can personalisation be delivered by digital technologies for museum and gallery visiting?

The research reveals that gift-giving can be a powerful mechanism for delivering personalisation in a way that avoids computational methods in favour of directly embedding personal relationships into the interpretation, by having a friend, family member or partner design it. The types of personalisation that emerged from this approach were sometimes intensely deep and personal, drawing on shared memories and intimate knowledge of one another, going far beyond what a computerised recommender system could produce. The resulting experiences were personalised to the designer as well as the recipient.

The model of gift-giving was extendable from pairs to small groups, and was successful as a family experience. The experience was particularly rewarding for some parents who were touched to see how their children had thought about them when choosing objects and designing content.

How can social visiting be supported by digital technologies for museum and gallery visiting?

The research reveals how the trajectories framework can be used as a design tool to structure an experience for pairs of visitors, to consider when in the experience visitors will interact and when they will be isolated from one another. The framework enabled the careful balance of moments of solitary engagement with exhibits with the social aspect of visiting.

Gift-giving is inherently social and sociality was embedded in the museum visits that were created and gifted by 'socialising' the objects in the exhibition. The gift-giving dynamic created a strong social obligation for gift-givers and recipients to support each other through the experience, by leading the way and demonstrating (for gifters), and going through with unusual actions (for recipients).

The final visit experience, that was shared between small groups of family and friends, revealed that gifting as a personalisation method should be reciprocal, that gifts should be shared anonymously (until revealing the gifter and recipient towards the end), and that groups should have the flexibility to organise themselves. The study showed that gifting in groups accommodates a range of group visiting styles and behaviours. Visitors could share a set of relevant and personally meaningful content built around the social relationships of the group. Putting the social relationships at the heart of the experience and making the content available to all in the group meant that groups could be coherent without the need for physical cohesion and awareness.

7.2 Summary of Contributions

7.2.1 Museum Visiting

The thesis contributes a novel method of personalising visiting experiences and increasing participation for groups of visitors and an insight into how visitors design interpretations as gifts for others. The research was delivered to the museum professional community as a paper at the 2015 Museums and the Web conference.

The gifting approach was presented to a group of museum and cultural heritage curators and managers in August 2015 to present the approach and results back to the heritage community and increase the impact of the research. A workshop was held at the Nottingham Castle Museum with a curator and technologist representing the museum's management. Additionally, curators and managers from local arts and cultural heritage institutions were invited, including representatives from the National Trust and the Galleries of Justice museum. A total of seven participants were involved. The workshop involved a presentation by the author on the gifting approach across studies 2 and 3. Following this, participants were invited to consider how such an approach might be applied to their own institutions. This involved thinking about the types of visiting groups that might be targeted – couples, families or organised group visits – and the types of content that could be delivered along a personalised trajectory, since the music-instruction-text template might not be applicable to all settings. Participants were able to discuss how they might go about integrating such an approach into their institutions, including the barriers involved in relation to funding, technological constraints (how would the design process be supported when delivering the approach at scale?) and institutional interpretation strategies.

7.2.2 HCI

The thesis contributes an understanding of how the trajectories conceptual framework can be applied to the design of novel user experiences in the domain of museum and gallery visiting. This research was presented to the HCI community as a paper at the CHI 2013 conference.

Gift-giving has previously been explored in HCI to explain various communicative practices, however it had not been applied to the design of user experiences. The thesis contributes an understanding of how gift-giving can be applied to the design of personalised user experiences. The approach was delivered to the HCI community at the CHI 2014 conference. The approach is easily transferable to other domains and is currently being developed as a method for creating mobile music listening experiences by researchers at the University of Nottingham.

7.2.3 Trajectories

This thesis has investigated how to use the trajectories framework a a design tool, the first time this has been attempted. In the process, it extended the framework by

separating canonical trajectories into two layers: global and local. It also separated local trajectories for visiting cultural heritage and art objects into five distinct stages.

7.2.4 Social Computing

This thesis has demonstrated how to reconfigure the social dynamic of group museum and gallery visiting by introducing gift-giving between group members. The research contributes an understanding of how groups managed and configured themselves during the resulting visit. The thesis ultimately reframes social coherence in museum and gallery visits as an esoteric property that involves more than simply proximity, setting up future work on how to support and detect this kind of coherence in groups. The research contributed to the social computing community with a 2016 CSCW paper.

7.3 Limitations, Caveats and Future Work

It is important to note several limitations of the studies in this thesis that need to be considered and addressed in future work before it can be fully understood whether this approach can be successful and also how it might best be applied. First, there were no controlled studies to compare the approach with others and so it is not possible to claim success compared to the current visiting experience or other approaches. Having said this, the curators that were consulted at the Castle museum reported that the rooms in which the experience was based were notable as being their most problematic in terms of engagement with exhibits for groups. Tolmie et al.'s study revealed the common challenges of group visiting over many groups in two different museums, albeit ones that were larger in scale and complexity and also more crowded. Moreover, the research participants were clearly taking part in a research study and so may well have behaved more coherently as a result. It will be important to deploy the approach naturally "in the wild" in future work, to continue to observe whether the apparent difference in group dynamic is present when the experience is less constrained. It will also be interesting to allow for different types of group beyond families and close friends, who may well behave differently.

The gifting approach requires participants to engage significant effort at the design stage, raising questions as to whether they will be willing to do this and also how would it scale to large numbers of exhibits and/or visitors. Future work needs to explore how visitors can be supported in readily creating experiences from templates, for example through an online service. Questions for future work in this area include:

- How can the design stage as well as the visit stage be scaffolded?
- Will it be acceptable or useful to share designs more publicly as inspiration to others?

The studies presented in this thesis applied the approach to designing mobile visiting experiences to three different settings and it cannot be completely clear if the effects on the visiting experience would have been observed had the setting remained constant. The research was limited to one specific technological platform due to its focus on the portable visiting guide, therefore the findings are limited to mobile experiences. Future work could compare this to personal and social approaches to other types of visit experience such as static interactives and reactive installations. The gifting strategy deeply affected the visiting experience by introducing new kinds of interpretation content and motivations for visiting, rather than supporting visitors' existing motivations and visiting modes, therefore it is important not to over-claim the extent to which the results can be applied to general museum visiting.

Given these caveats, it is not the aim of this thesis to claim the approach as a panacea for designing group visits to museums. Indeed, although it was positioned as something of an alternative to more directed approaches earlier on, it is possible that it might ultimately be combined with these as part of the curator's armoury of techniques and technologies. Perhaps gifted experiences will form only a part of an overall visit, applying to a few selected artefacts, or perhaps they will be for special visitors or occasions, such as a birthday treat. Gifting may fit repeat visits, with those who have experienced the museum being able to design experiences for family or friends, and gifting templates may need to be combined with other technologies such as recommender systems to help people design their gifts. To conclude, then, the thesis confirms the suitability of the gifting approach as a mechanism for personalised, yet social, experiences, at least to support small-group visits, but that many questions remain open for further exploration.

In addition to the questions above, the thesis points to a number of broader areas for future work.

There is more work to be done to integrate the approach into real visiting environments. The template structure of a trajectory that exposes visitors to music, instructions and text while viewing an exhibit might not be appropriate universally;

curators and exhibition designers may have their own ideas for the types of content that visitors design and incorporate into gifted experiences in other cultural settings. Future work should explore how curators and museum professionals might use or adapt the approach developed by the author with respect to their own organisational and curatorial settings. Furthermore, it remains to be explored how the gifted experience might fit with a naturalistic museum visit that had not been set up as a research study – how might visitors integrate the extended visit experience with the rest of their visit? How might the trajectories framework be further employed to consider the beginnings and endings of the gifting experience?

The thesis explored only one approach to gifting that was informed by traditional gift-giving practices: one person generally giving a gift to another (although some participants in Study 3's family groups paired up to co-design a gift). The work could be developed by exploring alternative gifting configurations, such as having more people collaborate on a gift, perhaps as a birthday surprise for a recipient, or having a 'Secret Santa'-style configuration whereby every member of the group makes a gift for one other person while the identity of the gifters remains hidden. This may introduce different motivations and types of interpretation.

It will also be important to engage further with cultural professionals with both general curatorial expertise and a close understanding of their own institution's collection and interpretation strategies. This could support the development of a template trajectory that is in line with the curators' and exhibition designers' interpretation strategies and may provide ideas and inspiration for visitors when designing a gift experience.

A key consideration for future work is how to scale the approach so it can be used by members of the public to design experiences on their own, without the design workshops described in this thesis, and automatically produce and download the experience, perhaps on their own devices.

Finally, it is important to consider other domains that might benefit from the gift-giving mechanism. This includes other leisure activities such as cinema-going or music-listening, health and fitness and the potential for communicating around difficult issues in a personally significant way.

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