

‘See Me, Feel Me, Touch Me, Hear Me’: Trajectories and Interpretation in a Sculpture Garden

Lesley Fosh¹, Steve Benford², Stuart Reeves², Boriana Koleva², Patrick Brundell²

University of Nottingham

Nottingham, UK

¹psxlf@nottingham.ac.uk, ²[firstname.lastname]@nottingham.ac.uk

ABSTRACT

We apply the HCI concept of trajectories to the design of a sculpture trail. We crafted a trajectory through each sculpture, combining textual and audio instructions to drive directed viewing, movement and touching while listening to accompanying music. We designed key transitions along the way to oscillate between moments of social interaction and isolated personal engagement, and to deliver official interpretation only after visitors had been given the opportunity to make their own. We describe how visitors generally followed our trajectory, engaging with sculptures and making interpretations that sometimes challenged the received interpretation. We relate our findings to discussions of sense-making and design for multiple interpretations, concluding that curators and designers may benefit from considering ‘trajectories of interpretation’.

Author Keywords

Galleries; museums; trajectories; interpretation; art; sculpture; collaboration; audio; instructions.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI).

INTRODUCTION

A ‘Holy Grail’ for galleries and museums is to create a deep personal engagement with exhibits that leads visitors into making interpretations. This is challenging for a combination of deeply-rooted reasons. First, many public visitors are not able to easily make interpretations, lacking either specific knowledge or a general training in how to interpret art works or historical artefacts. Indeed, this is one reason why cultural institutions suggest interpretations through labels, catalogues and interactive technologies. Second, visitors may find it difficult to instantaneously switch into a mode of deep engagement with an exhibit. While films and books are able to engage a viewer or reader over considerable time, a museum exhibit has only a few seconds in which to attract attention and frame engagement. Finally, even when visitors do engage, numerous distractions may interfere, notably the presence of other visitors and the demands of group members.

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Perhaps unsurprisingly then, galleries and museums have proved fertile ground for HCI research. Much of this has focussed on the design of new interactive technologies including mobile guides, especially those exploiting location-based services [1, 2] and augmented reality [23], tangible and tabletop technologies [12], and also more unusual bespoke interactive artworks [8, 14]. There have also been numerous studies of visitor behaviour in both HCI and museum studies, covering issues such as dwell times [20], categorising visitor behaviour [21] and collaborative interaction [13, 14, 24]. In spite of this extensive body of work, the fundamental challenge remains – it is notoriously difficult to create a deep engagement between visitors and exhibits.

In this paper we explore 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 [17], chaining public displays [15], and a general framework for designing extended cultural experiences in terms of canonical, participant and historic trajectories [4, 5]. To date, these concepts have been used to compare existing experiences or to analyse data from studies [10], with a focus on interactive performances [3]. They have not, as yet, been proactively applied to the design of new experiences, reflecting a wider challenge for HCI of putting theory into practice [18].

In response, we describe an attempt to directly apply the concept of trajectories to the design of a visiting experience from the outset. The experience in this case is visiting a sculpture garden. We describe how we designed 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. We describe how pairs of visitors experienced this trajectory, very often following it, but not without some interesting tensions. We conclude by affirming how existing trajectory concepts were helpful in designing the visiting experience, describing our own contributions to the theory, and introduce the broader idea of designing ‘trajectories through interpretation’.

DESIGN OF THE SCULPTURE GARDEN EXPERIENCE

The setting for our experience is Rufford Abbey, a historic country house whose extensive grounds include the sculpture garden that is the focus of our design. It 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. The sculpture garden is home to over 25 works that have been collected and commissioned over a 30 year period. These vary in form, structure and materials (stone, metals, ceramic, etc.). The sculptures are arranged along a path with relatively little additional interpretation; three are accompanied by a plaque giving the name of the sculpture, the artist, and a short thematic description, while the remainder stand unadorned. This provided us with a ‘blank canvas’ against which to explore how to enhance engagement and interpretation. While no formal observations studies were carried out into how visitors experienced the sculpture garden without our intervention, our initial observations were that visitors tended to walk around in groups, sometimes stopped to look at sculptures, but did not on the whole engage very deeply or for very long, touch sculptures or otherwise engage physically with them.

Our overall process was to commission a sound designer and a performance poet to help us compose an extended visiting experience. The sound designer chose a specific piece of music for each of the nine sculptures we had 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. 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 experience was designed to be used by groups of visitors who are visiting the sculpture garden together, interacting with both the sculptures and each other. The whole experience evolved over several months of iterative design and testing.

Our approach was to work with the idea of trajectories from the very outset, broadly following the framework of concepts set out in [4, 5]. To quickly recap these: cultural user experiences may extend over multiple and hybrid spaces, timescales, roles and interfaces and can be expressed using three types of trajectory. The designer’s plan for the experience is expressed by one or more *canonical trajectories* which pass through key *transitions* including *beginnings*, *endings*, *role and interface transitions*, *access to physical resources*, *episodes*, and *seams* in the underlying infrastructure. *Participant trajectories* express what each participant actually does and the designer needs to consider how these may *diverge* and *reconverge* with canonical trajectories, but also how they *interleave* through *encounters*, moments of *isolation* and *pacing*. Finally, *historic trajectories* provide opportunities to reflect on and recount experiences. We now consider how these various concepts informed our design.

Designing the canonical trajectory

We first set about designing our *canonical trajectory* through the experience. 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. We arranged the list to reflect the order in which the sculptures would naturally be encountered when following the highly visible path that runs through the garden. We 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 our design was the structure of local trajectories into and through each sculpture. We divided these into five stages – approach, engage, experience, disengage and reflect – as shown in Figure 1, with each requiring us to consider key *transitions*.

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.

We considered the key transition of *seams*, gaps and inaccuracies in the underlying infrastructure of positioning and communications systems. Early testing revealed that the seams in GPS would cause glitches in the experience. However, we also 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. We therefore dropped GPS (or indeed 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 “*I am 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.

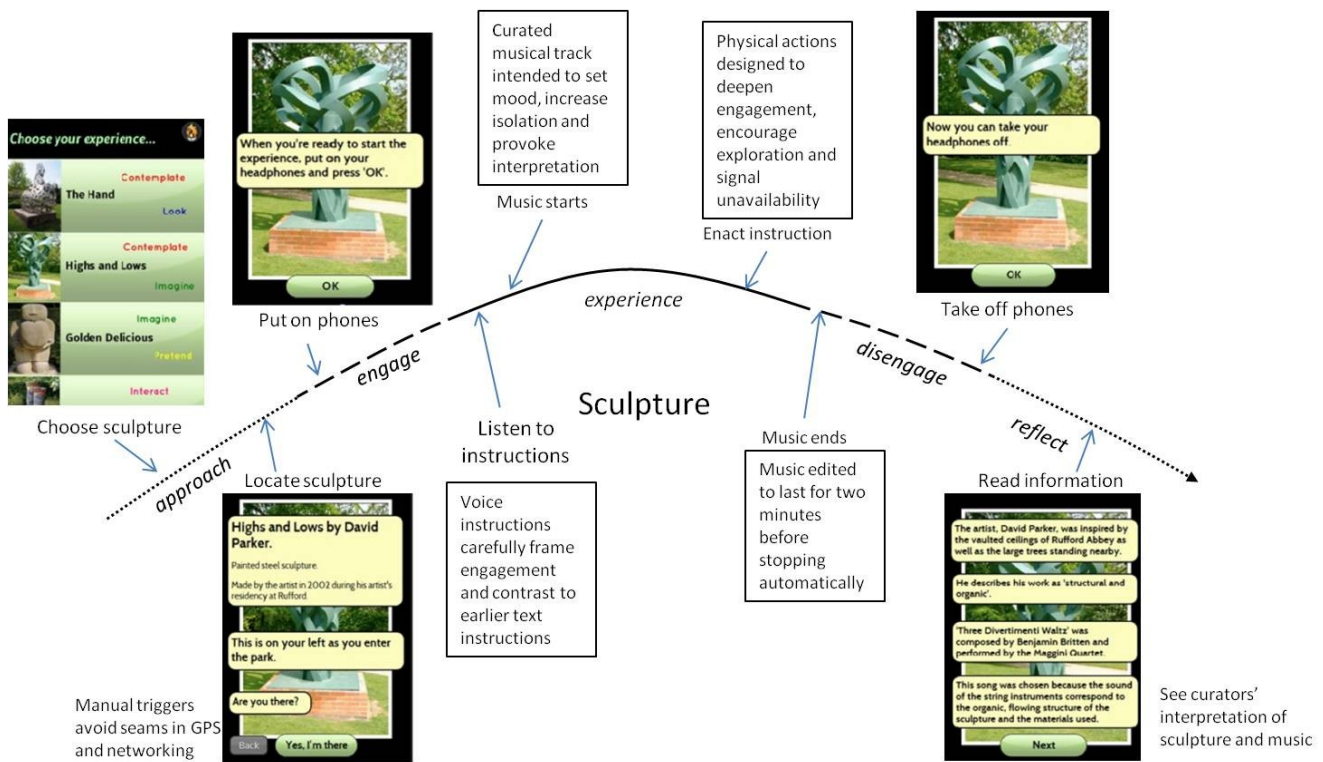


Figure 1. Design of the local trajectory through each sculpture

Sculpture		Musical accompaniment	Physical action
1	The Hand	<i>Music For a Found Harmonium</i> by Penguin Cafe Orchestra	<i>There are words written on this sculpture. How many will you read today? What story do they tell you?</i>
2	Highs and Lows	<i>Three Divertimenti Waltz</i> by Benjamin Britten	<i>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?</i>
3	Golden Delicious	<i>Noah's Ark</i> by CocoRosie	<i>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?</i>
4	Two Vessels	<i>Sonata V</i> by John Cage	<i>Take your hands and move them down the pillar to feel the texture. How did it get like that?</i>
5	Young Girl	<i>Girl</i> by PJ Harvey	<i>Why don't you take a closer look at this girl? Who is she? What does she look like?</i>
6	Chimney Stacks and Iron Bridge Archway	<i>Allegro Maestoso (Water Music Suite 2)</i> by George Frideric Handel	<i>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?</i>
7	Fruit Gatherers	<i>Heartbeat Drum Song</i> by Robbie Robertson and the Red Road Ensemble	<i>Choose a place in the group and stand there, still as a statue. Who are the others in your group? What is your story?</i>
8	The Shrine at Nemi	<i>Dovehouse Pavan</i> by Alfonso Ferrabusco	<i>Diana might be watching you, but climb up the steps and peer into the tiny temple. What do you see?</i>
9	Pine Cube	<i>Mentiras</i> by John Zorn	<i>Why don't you take a seat? If you close your eyes, count to ten and then open them, have the shapes moved?</i>

Table 1. Musical accompaniment and instruction chosen for each 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. The audio track began with an opening introduction designed to set the tone for subsequent instructions: "Hello, my name is Francesca Beard. I'm a poet, and I'll be your guide on this tour of the sculpture garden ..."

Experience

The experience stage begins as the voice fades out and the selected music track fades in. At this point, we expect the visitor to carry out the suggested action. Table 1 summarises the musical accompaniment and action chosen for each sculpture (numbered 1-9 in the order they would be encountered along the path), while the following paragraphs outline the rationale behind these choices.

Physical actions

We designed a range of actions 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 us to suggest 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 stroking.

Drawing on our performance poet's experience of leading improvisation workshops, we 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. We expanded upon the basic instruction 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.

Music

The selection of music was designed to reflect the actions at a sculpture while gently reinforcing its themes and materials. Our sound artist listed keywords for each sculpture, 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 visual form. The final selection ranges 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 steel sculpture *The Hand* was assessed by studying the sculpture and reading background information, revealing the key themes of communication, inclusivity and positivity with respect to disabled children. *Music for a Found Harmonium* by Penguin Café Orchestra was chosen as its rhythm, tempo and simple structure were deemed to match the sculpture's busy form while the upbeat melody fitted with its themes.

Disengage

Each musical accompaniment was edited to play for up to one and a half minutes before fading out, at which point we anticipated that the visitor would disengage. We had discussed enabling the visitor to control the timing of the track for themselves, ending it when ready or even allowing the full track to play on. However, we eventually decided against any design features that would invite the visitor to look at or interact with the smartphone while engaged with the sculpture. 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. Our intention was to invite visitors to make their own interpretations (encouraged by the physical actions and the music) before explaining ours. We extracted key material about each sculpture 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 that was presented to the visitor shortly after they had been asked to remove the headphones and that they could digest while walking away from the sculpture.

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. 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 [2]. Our solution here is to employ them to create and mark a key transition between isolation and encounter. Our 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.

STUDYING THE SCULPTURE GARDEN EXPERIENCE

While we have described the *intended* trajectory through the experience, we now consider how visitors *actually* experienced it, and how it shaped their experience.

We studied our experience being used at the sculpture garden over a period of two weeks. The application was uploaded onto two Apple iPhone 3GS smartphones that were given out to (mostly) pairs of visitors. 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.

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.

We used video 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 interview followed a semi-structured format, covering their experience of the instructions; physical actions; musical accompaniments; the information they received; and their interactions with partners. They were also asked how their experience of using the system compared to their usual visiting habits and were given opportunities to offer views on topics of their own choosing.

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

Following the 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. Figure 2 provides a summary overview of the extent to which visitors followed our 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 1). 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.

Study ID	Participant ID	Sculpture ID								
		1	2	3	4	5	6	7	8	9
1	1	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	2	Orange	Yellow	Orange	Orange	Orange	Orange	Orange	Orange	Orange
2	3	Yellow	Yellow	Red*	Yellow*	Yellow	Yellow	Yellow	Yellow	Yellow
	4	Yellow	Yellow	Red*	Yellow*	Yellow	Yellow	Yellow	Yellow	Yellow
3	5	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
4	6	Yellow	Yellow	Red	Yellow	Yellow	Red	Red	Red	Red
5	7	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
6	8	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	9	Grey	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
7	10	Yellow	Yellow	Red*	Red*	Red*	Red	Red	Red	Red
	11	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
8	12	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	13	Yellow*	Yellow*	Yellow*	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
9	14	Yellow*	Yellow*	Yellow*	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	15	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
10	16	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	17	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
11	18	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	19	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
12	20	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	21	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
13	22	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	23	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
14	24	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	25	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
15	26	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	27	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
16	28	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	29	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

Figure 2. Table showing visitor behaviour at sculptures

Our 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). We see just a few examples of 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 our 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. We did not see any visitors deliberately starting 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. A small number of visitors kept their headphones on throughout the experience, which caused uncertainty for their partners.

In short, the initial impression from video observations is that visitors followed our 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?

Engaging with sculptures

We now consider how our trajectory led visitors to engage with the sculptures: how they performed the physical actions, and how they coordinated this as pairs.

Performing physical actions

We 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 Figure 3 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 Figure 2.

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 (as shown in Figure 2). 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?*”



Figure 3. Reading the text at *The Hand*

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 (Figure 4), 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.

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* couldn't 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.



Figure 4. Standing back from *Chimney Stacks*

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 behavior 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. We 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. We often observed a quick exchange of glances and smiles between pairs to confirm that they had heard the instructions before both had followed them.



Figure 5. Exchanging glances while engaging

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 we see in Figure 6 where one partner takes photos while the other repeats her experience at *Chimney Stacks*.



Figure 6. One partner waits while the other replays the music

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 like reframes itself, things like that", 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 ... 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, but, 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 our trajectory 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 our own. Some criticized our 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 our 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 our visual interpretation of the statues: *“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 our 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.

DISCUSSION

We now discuss the implications of our work. Practically, how trajectories shaped the design of our experience, what new contributions we have made to the theory, and how these can be used in designing cultural visiting experiences. Theoretically, how might we relate trajectories to wider notions of engagement and interpretation within HCI?

Using trajectories to design visiting experiences

Our experience shows that it can be productive to apply the idea of trajectories to the design of mainstream cultural visiting experiences. Several innovations in our design can be traced back to key concepts from the framework. At the heart of our design is a *canonical trajectory* that follows the existing path through the sculpture garden, passing into and through each sculpture. This led us to consider 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:

- considering *interface and role transitions* led us to consider the moment of putting on and taking off headphones as being critical to a visitor’s engagement with a sculpture. Consequently, we made a sharp distinction between using text and image instructions during the approach and reflect stage versus audio instructions during the experience phase;
- considering *access to physical resources* led us to design a series of distinctive physical actions at each sculpture that would shape how visitors view and engage with them through posing and touching;
- considering *seams* led us to reject the use of location-based content in favour of the manual triggering of interactions by visitors themselves.

Another key aspect of trajectories is considering how each participant trajectory might *diverge* from the canonical trajectory, and how it might be *orchestrated* so as to subsequently *reconverge*. In response, we allowed visitors to choose the order of the sculptures, self-orchestrating their experience to fit with local conditions such as the presence of other visitors. Conversely, we 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 us to consider how visitors’ trajectories might interleave, leading us to design a trajectory that deliberately oscillates between moments of social encounter and isolated personal engagement. Key to our design was the use of instructions that told the visitor how to traverse the global trajectory into each local trajectory, how to experience sculpture within the local trajectory, while preventing the need for any live orchestration. Previous research on instructions has identified four aspects of compliance with instructions: locational, sequential, comportmental and relational [22], however in our experience we separated the locational and sequential aspects, delivered as text, and the comportmental and relational aspects, which were presented as audio. Finally, the concept of *historic trajectories* inspired us to

reconsider at what point visitors should receive ‘official’ information, inspiring the idea that this should be delivered as they walk away.

Extending the trajectories framework

In addition to using existing concepts of the trajectories framework, we found it necessary to extend the framework in a number of ways unique to our design. First, we structured the canonical trajectory at each sculpture into five stages – approach, engage, experience, disengage and reflect. By splitting the trajectory into these stages we were able to judge where best to place interface transitions and switches in media modality in relation to the visitor’s experience. We also found it 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 we were able 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.

Our study suggests that pairs of visitors mostly followed the local trajectories, often leading to a deep engagement with and consequent interpretation of sculptures. We saw a strong tendency for visitors to experience the sculptures together (rather than splitting up to visit different sculptures) which led to various tensions in following the trajectory. The most evident of these was the desire to synchronise the beginning of each engagement with a sculpture, for which there was no technical support. However, engaging in the same physical actions at the same time resulted in some contention for key viewpoints (relating to the seam of *access to physical resources*). Some visitors wanted to repeat the experience at a sculpture, while their partner did not and had to wait for them. This suggests a deeper consideration of the *pacing* of local trajectories at each exhibit.

Finally, we recognise that in designing an experience for pairs of adult visitors at a sculpture garden, we have chosen a relatively easy setting for this initial work. We anticipate further challenges in adapting our trajectory to other more crowded settings or to larger groups, which will heighten the challenges of local pacing and interruptions. Busy museums and galleries will involve greater contention for exhibits, noise and other distractions, as well as the presence of strangers. In addition, it will be important to design accessible trajectories that support varying abilities, an important concern for many cultural institutions.

Trajectories through interpretation

Our final contribution to the theory of trajectories is the broader idea of designing *trajectories through 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 and their content. There is a

sense in which our experience combines multiple interpretations from the sound artist, the performance poet and us ‘curators’, but the openness of our design lies in when interpretations are made and given. Our 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 [11] asks a question – inviting them to make an interpretation in order to resolve the experience. However, a novel twist is that we subsequently offer our ‘received’ interpretation, but only after they may have reached their own. Thus, we move between being open to multiple interpretations at some moments while suggesting specific interpretations at others. In short we establish a *trajectory through interpretation*, establishing mood, engaging the senses and the imagination, openly inviting sense making, before then revealing our own interpretation.

Of particular relevance here is a body of work that emphasizes the importance of embodied experience [9] and the roles of interpretation and reflection in making sense of sensory experiences [16]. In our case, 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 our 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 [6]. Others have called for interfaces that are open to multiple interpretations rather than focussing on a single received interpretation.

We suggest 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. Thus we suggest ways in which we might create richer trajectories of interpretation.

In relation to [11], we could open up the space for interpretation by exposing different visitors in a group to different and contrasting experiences at each exhibit, for example different musical accompaniments or instructions. This relates to the much discussed idea of personalisation and how we can create personalised visiting experiences that adapt to individual’s interests or visiting styles [25]. Our final proposal takes us back to the concept of the historic trajectory, which suggests that participants should be provided with opportunities and resources to tell their own stories from an experience. While our experience invited visitors to reflect between sculptures, we did not

support them in reflecting on the whole experience afterwards or on creating their own accounts of the experience, nor did we follow up the study with further interviews to investigate how interpretations had developed over time. This is currently a popular idea with many museums and galleries who are keen to reflect the visitor's own voice. Carefully designed historic trajectories may allow visitors' interpretations to form another layer in the multiple interpretations that surround cultural experiences, along with those of artists, historians, and curators.

FINAL WORD

We have described a conscious attempt to apply trajectories to the design of a cultural visiting experience. Our experience suggests that thinking in terms of trajectories has purchase for engaging people with exhibits in new ways and provoking interpretation. Whereas discussions of trajectories to date have tended to focus on the structural aspects of experiences, we suggest that it may also be beneficial to also think about 'trajectories through interpretation' in which visitors' own interpretations are mixed with canonical ones, and are fed back into the experience through historical ones.

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