

The Frame of the Game: Blurring the Boundary between Fiction and Reality in Mobile Experiences

**Steve Benford, Andy Crabtree, Stuart Reeves,
Martin Flintham, Adam Drozd**
The Mixed Reality Laboratory
School of Computer Science & IT
University of Nottingham, Jubilee Campus,
Wollaton Road, Nottingham, NG8 1BB, UK.
{ sdb, axc, str, mdf, asd }@cs.nott.ac.uk

**Jennifer Sheridan,
Alan Dix**
Computing Department
Lancaster University
Lancaster
LA1 4YR, UK
{ sheridaj, a.dix }@comp.lancs.ac.uk

ABSTRACT

Mobile experiences that take place in public settings such as on city streets create new opportunities for interweaving the fictional world of a performance or game with the everyday physical world. A study of a touring performance reveals how designers generated excitement and dramatic tension by implicating bystanders and encouraging the (apparent) crossing of normal boundaries of behaviour. The study also shows how designers dealt with associated risks through a process of careful orchestration. Consequently, we extend an existing framework for designing spectator interfaces with the concept of performance frames, enabling us to distinguish audience from bystanders. We conclude that using ambiguity to blur the frame can be a powerful design tactic, empowering players to willingly suspend disbelief, so long as a safety-net of orchestration ensures that they do not stray into genuine difficulty.

Author Keywords

Mobile games, mixed reality performances, frames, ambiguity, risk, orchestration, spectators, awareness.

ACM Classification Keywords

H.5.3 [Information Systems] Group and Organization Interfaces – *Collaborative Computing*.

INTRODUCTION

The phenomenal uptake of mobile technologies means that interaction is increasingly taking place in public settings – in parks, cafes, clubs, bars, and on the city streets. New kinds of experience, variously known as pervasive, mobile, alternate or mixed reality games, are emerging to exploit the exciting possibilities of interacting in public places [4].

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

CHI 2006, April 22–27, 2006, Montréal, Québec, Canada.
Copyright 2006 ACM 1-59593-178-3/06/0004...\$5.00.

A unique feature of these experiences is the way in which they juxtapose the fictional world of a digital game with the physical world that surrounds the player, encouraging participants to explore the relationships between the real and the virtual, drawing on the fabric of the everyday world as material to enhance the digital experience, and exploiting the frisson of carrying out ‘secret’ interactions in public.

The blurring of the boundaries between fictional games and everyday life also introduces new risks, however. There are risks for players as they venture into a strange city armed with valuable and highly visible computing equipment, attending to the digital game rather than the surrounding environment, and also for the public at large who may become “unwittingly” [16] involved in proceedings. It is therefore important that the designers of mobile games and similar experiences understand not only the opportunities afforded by new forms of interaction in public, but also any associated risks [10]. This is especially germane at present when there is considerable press interest in the risks – actual or perhaps merely perceived – associated with mobile phones and youth culture, such as the reported phenomenon of ‘happy slapping’ in which camera phones are used to record and distribute video of bystanders being physically assaulted [2].

We introduce a framework to guide designers in blurring the boundaries between fiction and reality in mobile experiences in order to create new dramatic opportunities, while also managing any consequent risks. Our framework builds on previous discussions of framing performances and everyday social interaction and extends recent work in HCI on spectator interfaces and exploiting ambiguity. It has been inspired and is illustrated by a study of a game called Uncle Roy All Around You (URAY), a mixture of digital game and live performance that deliberately set out to test the boundaries of public game play. URAY was designed by professional artists and at the time of writing has toured to three cities and been played by many hundreds of players. It provides an exemplary case study of how designers can exploit the exciting new opportunities of public interaction while managing the risks arising from players engaging with strangers and crossing boundaries.

INTRODUCING UNCLE ROY

URAY is a game of mystery in which players, equipped with PDAs, undertake a journey through a city in search of a shadowy and mysterious character. These ‘street players’ are introduced to the game through a ritual briefing in which they are asked to hand over all of their personal possessions, bags, phones, money and identification in return for the PDA that they will use to play the game. Thus prepared, they are sent out into the city to follow a series of often ambiguous textual clues that respond to their current location and lead them on a convoluted dance through the city streets in search of this character’s office. Their progress is monitored throughout by remote online players who can track their position and can communicate with them via text messages (street players respond with short audio messages), and who may provide them with additional guidance or hindrance, for example steering them towards or away from the office.



Figure 1. A street player uses their PDA to follow clues.

As they travel through the city’s streets and parks, street players are invited to engage in various activities that increasingly demand interaction with their surroundings and introduce elements of ‘live action’. First, online players ask them to retrieve a postcard from a key location such as the saddlebag of a chained up bicycle (their online experience informs them of the existence of the postcard and that they need to ask a street player to retrieve it). On reaching the office, they are asked to step inside and explore and also to complete the postcard at an empty desk, moving from the public environment of the city streets to the apparently private environment of someone’s personal office.

Having left the office, they are then instructed to wait in a nearby phonebox. The phone rings and they receive a call that asks them to cross the road and get into a waiting car where they experience the climax of the game, an interview with a live actor who questions them about their trust in strangers and whether they would commit to enter a year long contract to help a stranger – another player somewhere in the game – if ever called upon. Online players who have helped guide them to the office receive the payoff of seeing

them inside over a surveillance camera and are asked the same questions about trust and commitment.



Figure 2. Surveillance view of a player in the office.

The game is staged over a period of about ten days in each city it visits, typically being played continuously for six to eight hours each day. Each street player’s experience last for a maximum of one hour and up to twelve street players are active at any one time, with new players being added as current ones complete the experience. Up to twenty online players may be present at a time. The ‘game zone’ consists of around one square kilometre of city streets.



Figure 3. Player enters the car for the climax of the game.

STUDYING UNCLE ROY’S TACTICS

A previous study of URAY focused on its use of self-reported positioning as a location technique [5]. The following study is unique in that it focuses on the deliberate exploitation and management of gameplay in a public setting, which is arguably the defining characteristic of the experience. It is therefore worth explicitly reflecting out some of the design tactics that the game employs.

Following the initial briefing, the general trajectory of the experience moves primarily from the digital domain of text clues and messages delivered alongside a digital map of the city via a PDA to increasing involvement with the surrounding physical environment and introduction of live performance. At its finish, the experience is largely physical, revolving around the final meeting with a live

actor in the car. Indeed, live performers played several significant roles in the experience, ranging from planned and rehearsed performances (the initial briefing, phone call and interview in the car) to more general orchestration duties on the streets, including monitoring players' progress and occasionally improvising interactions with them (e.g., fixing technical problems as we discuss below).

Throughout URAY, various tactics are used to blur the boundaries between the digital and the physical, and the fictional and the real, including implicating otherwise uninvolved members of the public via ambiguous text clues, using physical props and locations and live actors, all of which are set against a backdrop of conspiracy, isolation and surveillance that is deliberately engineered to create dramatic tension and question the boundaries of where the game ends and the everyday world begins.

While these tactics – which we shall discuss in greater detail below – make URAY an extreme form of pervasive game, they also make it an ideal vehicle for studying the opportunities and risks arising from interaction in public. In the manner of other recent accounts of mobile games and performances (e.g., [6]), we have conducted a naturalistic study to uncover the issues and situated practices involved in fielding a professional experience 'in the wild'. We have studied URAY being played in three separate cities over the course of a year, gathering feedback from players and conducting ethnographic, video-based observations of players, actors and control room staff. We begin our discussion with feedback from the players.

HOW PLAYERS' EXPERIENCED THESE TACTICS

A key tactic employed by the designers of URAY was to give players ambiguous clues that appeared to implicate passersby in the game without ever explicitly stating that they were actually involved. As an example, one clue, delivered to players who were near a busy footbridge, instructed them to turn and follow an approaching stranger who was wearing a white T-shirt. By sheer serendipity a bystander might pass by wearing a white T-shirt and if not, players would still believe that there should be such a person nearby. In anecdotal feedback, gathered through a short exit questionnaire which probed players' general attitudes to the game, especially features they liked and disliked, some street players noted that this tactic could lead to a powerful experience, especially when the game was played in busy environments such as central London:

"I liked the instructions to follow people"

"The area it was played in gave you the feeling of everyone in London passing being involved"

"Not knowing who at first was a performer and who was not a performer – everyone is a performer"

"I don't think I saw any mad people in the street as I was expecting – although I suspected everyone"

A second tactic was the ritualized briefing at the host venue through which players entered the game. This heightened their sense of isolation and anxiety:

"My initial feelings were of slight paranoia because you knew you were probably being watched and certainly monitored. I felt very much on my own with no one to confer with or discuss how to do it, or if it was the right way. This was accentuated by the thought that people may be watching you 'doing it wrong'. I couldn't help but look around me to see whom else might be in on it"

"The bit of anxiety that accrued during the hour-long wait for my turn was minor compared to the state I found myself in next: stripped of all belongings, on my own in central London, with 45 minutes and counting to complete a task whose magnitude I could only imagine."

"Players were asked to leave all possessions at the ICA so I had no watch, mobile or map. This worried me because I didn't know the area and when directed to Pall Mall or other places, I had no idea where these were and unfortunately, the people I asked for directions got it wrong resulting in me heading in the wrong direction. This, however, didn't detract from the experience."

This final quote shows that players' actions occasionally extended to actually involving, rather than just implicating, bystanders, in this case through the common practice of asking for directions. On other occasions, these interactions more directly sought to involve bystanders in the fictional world of the game:

"I asked a bunch of strangers if they were Uncle Roy."

The later stages of the performance required street players to cross the usual boundaries of public behaviour by 'stealing' postcards, entering a deserted office and finally, getting into a waiting car to be driven off into the city as described previously. All of these objects and spaces were controlled by the performers (i.e., were props within the performance) and these moments also involved contact with professional actors (e.g., the car driver and its occupant). Perhaps unsurprisingly, street players reported that this led to a powerful and exciting experience:

"Loved seeing someone approach the car."

"Enjoyed going into the building"

The combined effect of these various tactics was to generate a powerful sense of excitement, leading to an experience that players described using terms such as 'scary', 'anxiety', 'suspicion', 'mistrust' and 'paranoia' – all complimentary references within this particular context.

However, one must be careful here. Players were of course aware, at least at some level, that these seemingly bizarre interactions were in fact part of a carefully contrived game. They therefore judged appropriate and inappropriate actions according to context in which the game was staged and the specific sequence of events leading up to each key decision:

"At one point near the end you were directed to get into a car. I felt uneasy about this because you 'never get in a

car with a stranger' but you assume it must be part of the game because of the sequence of events that lead you to that point. I probably wouldn't have got in the car if there weren't this sequence of events leading up to it."

In other words, players understand that they are taking part in a game/performance and are able to exercise sound judgment as to what is appropriate and safe conduct. As two commented after the experience:

"You're given enough to feel safe, but not too safe. Great sense of anticipation."

"The last bit was very odd – but u didn't feel too uncomfortable. The set up is lightly connected - it is not blind trust as I have some institutional trust in Blast Theory and the Institute of Contemporary Arts."

It seems that being able to enjoy the thrill of URAY requires a high degree of trust in the designers and hosts of the game. Given that the stage for the game is now the public setting of the city streets (not the controlled environment of a conventional theatre) in which all manner of events might conceivably occur, this places a great responsibility on the shoulders of the designers to manage any associated risks and it is to this issue that we now turn.

ORCHESTRATING UNCLE ROY ALL AROUND YOU

As a live performance, URAY requires extensive and careful orchestration. This is achieved by a team of performers and technical crew who are distributed across the game zone and who coordinate their activities and those of players using specialized game management interfaces. Two performers work front-of-house, admitting players into the experience, briefing them and entering their details into a player database. Two more performers work the office, phone box and car to coordinate and deliver the final stage of the experience. Three further performers are deployed on the streets to deal with players who may be in difficulty. Finally, a game operator ('control'), housed in a central control room, monitors players' interactions with the game and the software in general and is able to intervene virtually, changing players' game state and sending them improvised text messages. These parties all communicate over a shared walk-talkie channel.

We now unpack the socially organized or collaborative ways in which play was orchestrated, especially with regard to handling and ensuring the safety of street players. In order to appreciate the critical character of the collaborative work of behind-the-scenes staff it is first useful for us to first consider how interaction proceeds from the point of view of playing the game on the streets, and in particular the kinds of problems that players routinely encounter.

Ordinary troubles: getting lost and disconnected

Having left front of house and finding themselves on the street, the player must first *take a bearing* to establish relevant coordinates and determine which direction to proceed in. This relatively simple task consists of finding reference points on the map (streets, buildings, and other

landmarks) and of aligning the map with those reference points in the real world. The aim is to make the digital map correspond with the real city streets in order that relevant directions from 'here' may be determined. It is notable that more than one reference point is required to do this effectively and even with two reference points it was not uncommon for players to set off in the wrong direction, sometimes being 180° out and heading the wrong way.

The use of ordinary map reading practices continues as players make their way along the streets in a projected direction that 'follows the clue'. Nevertheless, ordinary map reading practices are not infallible. Simply put, players presume that the clues provided by the game provide instructions as to how to get to the destination. Instructions of all kinds are 'essentially incomplete' however [17], and so establishing just what, for example, "take the first right when you see the Conference Suite" means is not at all clear. Is that right at the Conference Suite or first right after the Conference Suite? The instruction does not say and there is no way for a player to clarify the ambiguity other than by *trawling the streets* to establish a sense of their physical topography and their relation to one another.

Players can also think that that they are at a prescribed location when in fact they are somewhere else. This, in turn, leads them to misreport their position, which often went unnoticed by players themselves as they received another clue from the game in response which for all practical purposes appeared to confirm that they were on the right track, even when they were not. Indeed, the ordinary process of following clues, realized through practices such as 'taking a bearing' and 'trawling the streets', is fraught with practical difficulties that may lead players astray and result in them being lost.

Then there is always the possibility of technical trouble, most notably that of disconnection. Disconnection is a fact-of-life for most, if not all, mobile experiences. URAY used the GPRS protocol for communication between players' PDAs and the central game server. This was subject to frequent disconnections which led to street players losing contact with online players and control. Consequently, they would no longer receive live information from the game (although they would still receive clues from a local copy of the map and clue trail on their PDA), and control would be unaware of where they might be or even whether they were still trying to play.

While users may quickly adapt to disconnection in many mobile experiences, for example, quickly learning to try again at a different location or at a later time, the situation is different in URAY. Players are in a time-limited experience and so waiting until later is not an option. The novelty of the technology means that players are perhaps less able to distinguish routine disconnections from other possible technical failures. Finally, and highly significantly, their personal possessions were removed at the start of the experience and so players are compelled to rely on the technology to 'find their way home' as it were. While

getting lost and becoming disconnected may be routine in many situations, in URAY this leaves players in a highly vulnerable position. Having taken their ticket money and removed all other useful means of support, a primary concern of the game designers and operators is to deal with these problems, ideally without rupturing the experience.

Recognizing Players

The management of ordinary troubles relies on the collaborative work of behind-the-scenes staff. Three actors or performers distributed around the city streets are in the front line and the major challenge they face in the first instance is that of *recognizing players*. This may seem a relatively mundane and straightforward matter of ‘seeing a person carrying a PDA’. Recognizing a player is more complicated than that however, as the game takes place on busy city streets and it is not at all uncommon for people to be walking around with mobile devices in hand, such as phones, MP3 players and PDAs. While mundane then, recognizing players is anything but straightforward.

There are several interrelated ways in which recognition is achieved, first of which is through *instructed looking*. In the course of induction into the game, front of house broadcast that new players are entering the game via walkie-talkie. While front of house’s talk is usually directed to staff in the office or control room, it also serves to instruct the street performers that new players will soon be emerging:

Front of house: Front of house, we have 3 players in the game – Katherine, Kate and Paula.

Control: All 3 PDAs are connected front of house.

By overhearing these messages, and sometimes requesting them, performers know that players are connected and that they should start *scanning the streets* for them.

It may be the case, of course, that in scanning the streets, performers recognize player’s at-a-glance. ‘Recognizing players at-a-glance’ consists of seeing people doing such actions as carrying a PDA and a stylus, interacting with the PDA via the stylus, talking into the PDA, and aligning the PDA with their surroundings, visibly navigating the streets around them as described previously. To the attuned eye players may be recognized hundreds of feet away on busy streets and not only when they are “in your face”. However, it is not always possible to recognize player’s at-a-glance, whether at a distance or up close as the following reveals:

John is watching a woman as she walks down Whitworth Street. She turns right down Princess Street, which will take her out of the gameplay area if she is playing the game.

John (not on walkie-talkie): I don’t think she’s one of ours – it didn’t look like a PDA she had there. Might have to just check.

John: John to control.

Control: Go ahead.

John: Can you just confirm whether one of the girls was Asian, over?

Front of house: Front of house to control, none of the women was Asian.

John: It’s OK. Don’t worry, over.

This vignette shows that recognizing a player, or someone who might be a player but turns out not be, exploits an arrangement of collaboration between the street performer,

control, and front of house, mediated by walkie-talkie communication and exploiting player descriptions that are assembled during induction and stored in a database.

It is also the case on occasion that players are simply not recognized on the streets. They do not pass unnoticed, however, even though they have not been seen.

John is scanning Whitworth Street, looking for a player whose release was announced some time ago. He broadcasts the news on his walkie-talkie that he has not seen David come past him yet and then walks down the street searching for him.

Sarah (a performer): John, did you find him?

John: No, but he’s not on Whitworth Street. I’m just wondering whether he’s gone out the wrong way on Whitworth Street or Oxford Street, over.

Sarah: Yep, I’m going to go that way. I’m on Portland Street now. Do you want to stay in the game and I’ll walk down those two streets.

The vignette shows how street performers have a sense of how long it should take a player to come into their zone and failure to comply with this expectation triggers an unfolding course of work, including various collaborations, that transforms the player into *a lost object to be found*.

In the first instance, failure to recognize a player leads the performer to *notify* other performers and behind-the-scenes staff of the situation via walkie-talkie. Performers then move beyond scanning the street from a particular vantage point to *trace the player’s expected path* through the game zone. This entails walking and scanning the streets the player is expected to be on. This notion of an expected path partly arose from performers’ repeated experience of the game during which they would build up knowledge of players’ typical trajectories. However, it was also explicitly built into the structure of the game through the clue trial. During the three initial implementations of the game in different cities, the designers evolved an approach to creating the clue trial that began with them identifying a few ideal routes from the host organization to the office and designing a clue trail to funnel players along these routes.

If it is established that the player is not where he or she should be then *potential pathways* the player might have taken are considered and the performers concert their actions via walkie-talkie to execute the search.

Sarah (to another street performer): I want you to check around G8, around that area, for a guy called David. He’s the only male player with a PDA in the game. Can you just go up there, he may be up there, I might have missed him.

Street performer: Head down to Portland Street, that area?

Sarah: Don’t come down onto the southside. Stay on the north, ‘cause we’re down south.

The vignette shows that in addition to the walkie-talkies street performers employ *grid references* (e.g., G8), which are detailed on a small card that each performer carries and are also displayed on the gameplay interface in the control room, and which are used to concert the search for lost players. G8 is in the middle of the gameplay area and a location that provides “good views” across large sectors of that area. Performers often go there to look for lost players.

Exploiting digital trails in the control room

The concerted search for lost players does not always run smoothly, as the following vignette indicates when a player (Yasmeen) is still not found following the scanning of pathways and trawling the streets.

John: Can you just reconfirm her description?
Control: Yasmeen is female, middle-aged, long black hair, brown blazer, blue jeans.
 John walks back to his vantage point looking out for Yasmeen on the way.
John: John to Sarah. Are you sure she's not going down Whitworth Street West and still playing the game as if she's was in the area, over?
Sarah: Sarah to Martin (control), can you give me an update on Yasmeen please?
Control: She's in K11. I don't think we need to find her.
Sarah: I don't think so either John, I think she's fine.
John: She's not in K11. I'm standing there now. She's nowhere near that area. It's the car park area K11 and there's no one of that description.
Sarah: She's still connected and she's still playing - I think she's fine.
Control: She's getting clues.

Yasmeen did not get lost as it happens, but the experience of trying to find her shows more of the collaborative arrangements and social practices through which 'losing a player' is handled. In situations where players have not been recognized on the streets, then they may be *recognized virtually* through digital traces on the game server showing possible location, connectivity status and their access to the clue trail. Digital traces are made available on a game map interface in the control room (Figure 4), supplemented by a summary of each player's connection status (inset).

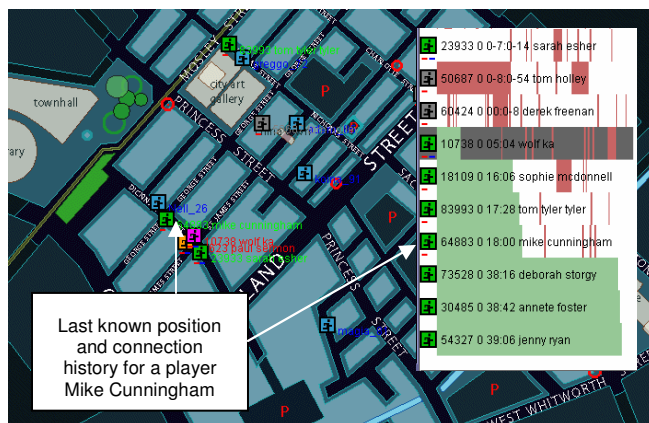


Figure 4. Part of the control interface showing last reported position and connection status and history.

A green player icon indicates that a player is connected whereas an orange icon indicates disconnection (further gradations of colour indicate the temporal character of connections and disconnections). Icons are labeled with the player's ID and name. The horizontal bar alongside each player icon shows their connection history over the course of the game. The solid green bar shows time remaining for this player, white bars show lapsed time during which this player was connected and red shows lapsed time during which they were disconnected. In this way control can see at a glance how far this player is through their game,

whether any current disconnection has been long-term and whether this player has a history of long or short disconnections. Beyond these, control has access to further displays of the history of clues accessed, player descriptions and photos and finally, two video surveillance views looking at the entrance to the office building and directly into the office. In our example sequence we see that control uses digital traces showing that the player is currently connected and still accessing clues to decide that this player is probably not in the kind of trouble that requires immediate action.

Recognizing "Confused" Players

Recognition practices are central to managing errors and attendant risks. Recognition is not simply a matter of seeing in various ways that players are playing the game or that they are lost, but also, of *recognizing that they are "confused"*, as the following extract elaborates:

John (not on walkie-talkie): There's one now, heading towards us in green. Looks like she's a bit confused.
 The player is standing in street, looking at the PDA and at her surroundings. John is about 50 metres away, monitoring her actions. The player turns and starts walking towards him. She stops again, turning around and looking at her PDA and her surroundings.
John (not on walkie-talkie): Right, I'm going to - oh no, she's off.
 She sets off back in the direction she has come.

This extract shows that while consulting the PDA and her surroundings, the player's accompanying actions, particularly her changing orientation to the streets, suggests to the street performer that she is encountering some kind of practical trouble that is "confusing" her. The extract also shows us that recognizing "confusion" is not as straightforward as it might first appear. That the player looks confused because of her changing orientation to the streets – particularly her changing bodily orientation (from left to right, back to front, etc.) and constant consultations with the PDA that accompany these bodily orientations to the street – does not mean that she is confused. Or rather, and more to the point, that such *outward signs of confusion* do not mean that the player is encountering an obdurate trouble that is likely to effect the playing of the game.

The nature of confusion only becomes apparent to performers *after* watching an unfolding series of player actions on the street and it is with this knowledge in mind that street performers often exploit a practice of *shadowing* players, monitoring them from a distance and following them around if needs be, to establish the state of confusion being encountered. Shadowing a player is a covert activity that involves collaboration with control and other behind-the-scenes staff. The primary purpose of this collaboration is to find out if the player is experiencing any obvious technical difficulties or whether the state of confusion is *interpretive* in character: that the player has taken an incorrect bearing, aligned the map wrongly, misinterpreted the clue, is trawling the streets to develop enough knowledge to make sense of the clue's instructions, or is

quite simply and utterly lost. These collaborations allow performers to rule in or out technical sources of confusion and to *elaborate candidate sources* of trouble.

Intervening

Recognizing confused players is essential to gameplay – in the absence of such recognition, play would breakdown, players would get lost and find themselves stranded and alone in the city. Recognizing confusion not only warrants investigation then but *intervention* as well:

John is looking for a street player who passed by a minute or two ago looking “mighty confused”.

John (to control): Can you just confirm her last location for me please, over?

Control: She’s in L8 at the moment, she’s connected and she’s has found her red spot.

John makes his way to that location, scanning the surrounding streets as he goes along.

John: (not on walkie-talkie): Found her, there she is (K10).

The player is making her way along Canal Street towards John. He retreats around the corner out of sight and watches the player as she makes her way along the street. The player turns around and heads towards John, who walks away. The player proceeds down the street then crosses the road. John turns around and carries on monitoring her progress. The player stops outside the park and John starts making his way back up the street until he is adjacent to her. The player is standing outside the park looking at her PDA and at her surroundings, looking very confused. John walks across the road to her and intervenes.

John (to player): I’ll give you some helpful directions, OK.

He turns to his left and orients the player to the street by raising his arm to point in a direction.

John: Head towards Portland Tower.

Player: Yeah.

John turns and walks away.

Player: Thank you.

The player walks off in the indicated direction.

Intervening in gameplay is done for three main reasons: as above, to keep or put the players back on track, to remedy technical faults, or to address contraventions to the “rules of the game”, typically where two or more players collaborate having purchased only one ticket and share one PDA without prior consent (consent would be given to parents with children, for example, but rarely for adults). Interventions are performed in such a way so as to cause minimal disruption to the experience. For example, rather than announcing that there is a technical problem, a performer may authoritatively ask for a player’s PDA, turn around, reset it, hand it back and walk off, giving the impression that this is a normal part of the experience. During this time the performer is in role, carefully trying to maintain the player’s engagement and sometimes this even became a positive feature for players. One reported enjoying: “*The feelings of uncertainty and mistrust I experienced when facing your street actors*”.

In summary, the designers and operators of URAY established a system of street performers, technical crew and front-of-house staff, supported by various interfaces and a walkie-talkie channel, to carefully orchestrate the experience. While the main concern of this system was on dealing with routine, even mundane, problems such as

getting lost or disconnected, we suggest that the net result was to establish a safety harness within which players were steered through the game, rather than being left to get into serious difficulties. In other words, through a strategy of careful orchestration of the mundane details, designers and operators were able to mitigate any major risks and avoid more serious problems. Consequently, players could willingly and safely suspend disbelief and enjoy the thrill of apparently crossing the boundaries of normal behaviour without actually doing so.

IMPLICATIONS FOR DESIGNING PUBLIC EXPERIENCES

Inspired by our study of URAY, we now introduce a design framework that is intended to guide designers as to how apply similar tactics when creating their own mobile experiences. This framework also aims to inform and extend recent proposals that relate HCI to art and games, most notably approaches to designing the spectator experience, the role of ambiguity in interface design and the importance of and support for orchestration.

Designing the spectator experience

Recent work in HCI has begun to focus on the design of the spectator experience of public interaction, proposing a framework of design concepts and strategies for public interfaces. This framework defines the *performer* as the primary user of an interface and *spectators* as secondary users who experience their interactions, either as part of a deliberate performance or accidentally as a side effect of being present in the same environment [12]. The framework identifies four general design strategies for the spectator experience that it calls *expressive*, *secretive*, *magical* and *suspenseful*. These differ according to the extent to which they *hide*, *transform*, *reveal* or even *amplify* different combinations of the performers’ *manipulations* of the interface and their subsequent *effects*. The framework also notes, but does not fully discuss, support for *orchestration* and *transitions* between being a spectator and a performer.

Based on our observations, we propose extending this framework with further concepts and strategies. The first is the concept of the *performance frame*. Gregory Bateson first introduced the concept of a performance frame in an essay titled A Theory of Play and Fantasy [3]. He describes the performance frame as a cognitive context where all the rules of behavior, symbols, and their interpretations are bound within a particular activity within its own structure. Frames have specific beginning and endings and so are temporal. The concept has since been used in many contexts, including face to face encounters in the everyday [9] and theatrical and ritual events [14]. We use it here to extend our understanding of designing technology mediated experiences that take place in public settings.

In our terms, the performance frame is a set of conventions and supporting structures, physical arrangements, rituals and technologies, through which performers and spectators come to understand that a performance is taking place and that sets their expectations of how it works, especially what

action is part of the part of the performance and how they should behave. The frame essentially defines a contract between performers and spectators; an understanding of the principles and conventions by which both are able to take part in the performance and interpret what is happening.

Theatrical performances are usually explicitly and very carefully framed by the performer: the setting is deliberately chosen and various techniques are used to introduce the audience to the performance. For example, conventional western theatre employs all manner of rituals (ticketing, calls and so forth), a complex spatial structure (the foyer, auditorium, stage, proscenium arch, wings and backstage), and other technical effects (sound and lighting) to frame a performance. More impromptu forms of performance such as street theatre also have their own rituals and structures with performance framings that may be more dynamic and involve ongoing feedback between performer and spectator in the establishment of the frame.

Explicit framing has also been discussed in the context of games in the form of the ‘magic circle’, the set of conventions, structures and rituals that delimit what is part of the game and what is not and enable players to understand and play by the rules [13]. Indeed, it could be argued that all social interaction is framed by the participants. For example, Goffman explains that “definitions of a situation are built up in accordance with principals of organization which govern events [...] and our subjective involvement in them” ([9], page 10). However, in art, performance and games, framing is a far more explicit process.

The frame serves to delimit what is part of the performance and what is not, and critically, enables spectators to ‘willingly suspend disbelief’ and enter a fictional world in which they can allow themselves to experience the emotions of reacting to events on stage with the knowledge that they are not actually real. Thus, the careful framing of a play enables an audience to react in shock or horror to a murder on stage while knowing that it is not real. We see this at work in URAY, where the performers carefully establish a frame, in large part through the initial briefing ritual, that enables street players to enjoy the thrill of apparently crossing the boundaries of normally acceptable behaviour, but without actually doing so, as we see reflected in players’ comments about ‘institutional trust’ in the performers and host institutions.

The concept of a frame leads us to extend the definitions of performers and spectators. Performers can be seen as frame constructors, whereas spectators are frame interpreters. Furthermore, we can distinguish two types of spectator:

Audience – are those spectators who are within the frame of the performance. They are aware that a performance is taking place and are able to (try to) interpret the performer’s actions as performance.

Bystanders – on the other hand, are spectators who are outside of the frame. Although they may observe the

performer’s interactions, they are not able to interpret them as a performance. Indeed, they may not even be aware that a performance is taking place. We might say that they are ‘unwitting’, drawing in particular on recent interactive artworks that play with the idea that some participants are unaware of public interactions that effect them, for example *Schizophrenic Cyborg*, a performance staged in a nightclub in which one participant wore, but could not see, a public display to which another beamed messages [15].

This distinction can be a subtle one. Spectators may have varying knowledge of different aspects of the performance frame. Some may be aware that a performance is happening but may not be able to interpret the subtle intended meanings of the performer’s actions, whereas others may have a detailed appreciation of how the performer has set up the frame (perhaps even as a reference or reaction to previous performances), leading them to different interpretations. In any case, the distinction between ‘witting’ audience and ‘unwitting’ bystanders is an important one, especially as the spread of mobile technologies leads to an increasing number of performances taking place in public settings that are shared by many different activities and where performers can no longer rely on the traditional mechanisms that are used to separate audience from bystanders. Instead they have to recognize that bystanders are likely to be present and have to address their needs as well as those of the intended audience.

However, they can also engineer new possibilities by manipulating the performance frame. Much of the excitement of URAY derives from the way in which it blurs the performance frame, deliberately introducing ambiguities between the fictional world of the performance and the particular real world setting within which it occurs. Drawing on URAY, we propose that there are two broad strategies for achieving this, as shown in figure 5.

The first strategy is to apparently extend the fictional world of the performance outside of its actual frame by implicating or even involving bystanders, essentially making the fictional world seem more extensive than it really is. We identify several specific tactics for achieving this. The performer may directly draw on unwitting bystanders as content for the performance, a strategy occasionally exploited by street performers such as mime artists who mimic passersby. In such cases, the audience is aware of what the performer is doing and that the bystanders are unwitting. There is, however, a risk of upsetting bystanders who may feel humiliated if they eventually become witting audience members, or of violating their privacy by tracking them and displaying this information publicly.

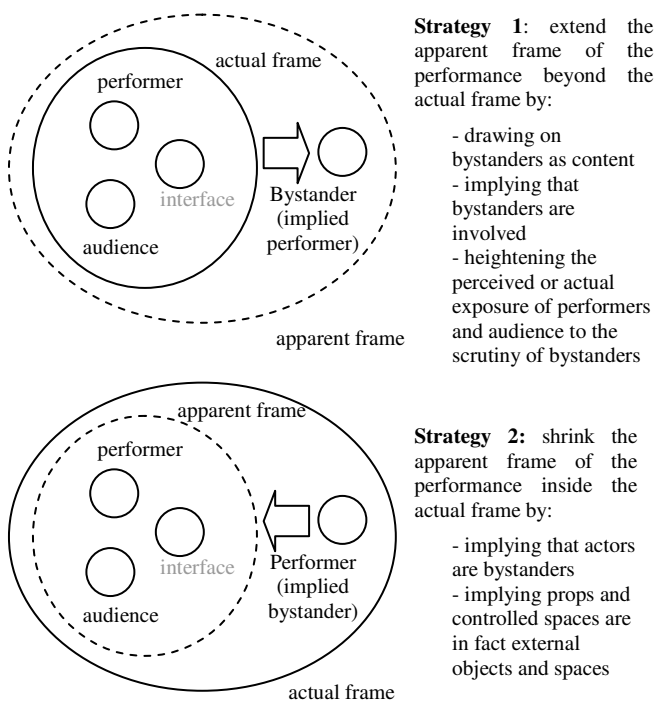


Figure 5: Strategies for blurring the performance frame

The performer may create a structure that implicates bystanders, either as fellow performers or as witting audience members, as we see with some of the clues in URAY. In this case, the audience member is using the interface which is delivering sufficiently ambiguous information so as to implicate bystanders. The risk here is that implication may spill over into involvement in which audience members interact inappropriately and unaccountably with bystanders as they assume that they are part of the performance.

The performer can create a situation in which they appear to be, or audience members themselves feel, exceptionally exposed to the scrutiny of bystanders. This may involve the use of novel or valuable technologies in unusual contexts (the heightened tension felt when using an unusual interface on the streets) or where using the technologies involves a noticeable behavior such as the distinctive alignment and trawling movements of street players in URAY. This heightened feeling of exposure to bystanders may generate excitement and heighten dramatic tension. However, there is a risk that audience members may be exposed to real risks, and it becomes the performer's responsibility to manage these. This tactic provides an example of revealing or even amplifying manipulations of an interface in order to attract spectators' (in this case bystanders') attention. It is also interesting to note that the key manipulations here are whole body movements (distinctive to and fro movements or standing still for relatively long periods) rather than the details of particular key presses and that they become significant because they are unusual.

Our second general strategy is the reverse – to make the real world appear to be more extensive than it actually is (or put another way, appearing to shrink the frame of the performance to be smaller than it actually is). Specific tactics for achieving this include: employing performers to act the part of bystanders and become involved in the performance, or suggesting that controlled props and places may in fact belong to other people. These tactics can be seen in URAY in the form of the postcards left in the chained up bicycle, and the use of the office and the car, all of which are controlled props and spaces planted by the performers, but whose status may be more ambiguous for the audience. These tactics generate excitement by encouraging an audience member to apparently cross the normal boundaries of behaviour in a given setting. We suggest that technology mediated communication can be especially powerful for this as the audience member can be placed in a position to make the decision on their own, without the performer being present, which might otherwise imply tacit approval (at least if they didn't step in to stop them). The risk here is that audience members may cross other boundaries that weren't intended by the performer, potentially getting themselves into trouble.

Exploiting ambiguity in interface design

Recently, there has been a growing interest in the role of ambiguity in interface design. Gaver et al identify three broad types of ambiguity that might be exploited by interface designers [8]: ambiguity of information, meaning deliberately presenting information in a blurred or even overly precise manner so as to invite interpretation; ambiguity of context, meaning deliberately placing interfaces in unusual contexts or juxtaposing forms and genres in unusual ways; and ambiguity of relationship, that is creating an ambiguous relationship between the user and the content leading the user to question their role in the experience. Building on this, Akoi et al discuss how ambiguity might usefully be used to support 'face saving' as part of the social negotiation involved in personal communications [1].

Our two strategies for blurring the frame of a performance or game, made concrete in URAY, provide further examples of deliberately exploiting ambiguity in interface design in order to engage and even provoke users. These strategies use mobile interfaces to play with the relationships between performers, audience and bystanders to the content of the performance and also to one another, providing examples of exploiting ambiguity of relationship. They also sometimes achieve this by exploiting ambiguity of information, providing imprecise information – such as the clues in URAY – that requires interpretation.

Orchestration

The orchestration of interactive experiences has also been discussed in the CHI literature. Orchestration covers many aspects of an experience including admission and initial engagement, managing flow and timing, and dealing with unforeseen events including technical difficulties and other

problems that may compromise the experience. The orchestration of live performances involving interactive technologies can be an especially complex business, interweaving multiple processes and technologies.

A previous study of a static artistic performance highlighted the general practices that are involved and classified them as: *monitoring* players, *intervening* to shape their experiences, and *communicating* in order to plan and manage interventions [11]. As a mobile experience, URAY extends these practices. Control room staff monitors the digital state of the system using specialized interfaces, while street performers monitor players' physical actions on the ground. Similarly, interventions involve a combination of digital actions (e.g., sending messages to players and changing system state) and improvised face-to-face interactions. Finally, these are supported by extended communication facilities, including walkie-talkies and agreed systems of map references and other conventions.

Orchestration raises a further issue for our framework. The orchestrators of an experience are situated within its frame, (i.e, they are aware that a performance is taking place) but are usually invisible to the audience and possibly to performers too. This suggests subdividing the performance frame into a 'frontstage' that is occupied by performers who are visible to the audience and a 'backstage' which is home to invisible orchestrators. In URAY, our street performers step between these roles, sometimes monitoring from behind the scenes and sometimes stepping out to directly engage with street players face-to-face.

CONCLUSION

In conclusion, we have seen how the spread of mobile and personal technologies into public settings opens up new possibilities for performances, games and interactive artworks. A study of a touring experience called URAY has shown how designers can employ various strategies to interweave the fictional world of a digital game with the everyday physical world in new and interesting ways. We have identified different ways in which they can exploit ambiguity to blur the frame of an experience so as to generate excitement and dramatic tension for players. At the same time, we have identified some of the risks – actual or perceived – associated with such strategies, and have seen how careful orchestration is required to manage them. At their heart, experiences such as URAY are all about subtly blurring the 'frame of the game' in public settings. In turn, this requires establishing and maintaining a 'contract' with players in which they are able to willingly and safely suspend disbelief and apparently cross the boundaries of normal behaviour in a public setting, while in fact being supported by the safety-harness of careful orchestration.

ACKNOWLEDGEMENTS

We gratefully acknowledge the support of the Engineering and Physical Sciences Research Council (EPSRC) through

the Equator project (www.equator.ac.uk) and the European Union through the iPerG project (www.pervasive-gaming.org). We also thank Matt Adams, Ju Row Farr and Nick Tandavanitj of Blast Theory for their collaboration.

REFERENCES

1. Akoi, P and Woodruff, A., Making Space for Stories: ambiguity in the design of personal communication systems, *CHI 2005*, 181-191, Portland, April 2005.
2. Akwagyiram, A., Does 'Happy Slapping' Exist?, <http://news.bbc.co.uk/1/hi/uk/4539913.stm>, verified 23rd September 2005
3. Bateson, G., *A Theory of Play and Fantasy*, A.P.A Psychiatric Research 1-105, 1955.
4. Benford, S., Magerkurth, C. and Ljungstrand, Bridging the Physical and Digital in pervasive Gaming, *CACM*, 48(3), 54-57, March 2005, ACM.
5. Benford, S., Seagar, W., Flintham, et al., The Error of Our Ways: The Experience of Self-Reported Positioning in a Location-based game, *Proceedings of Ubicomp 2004*, Nottingham, September, 2004, Springer-Verlag.
6. Crabtree, A. et al., Orchestrating a mixed reality game 'on the ground', *CHI '04*, 391-398, Vienna, 2004.
7. Garfinkel, H. (1996) Ethnomethodology's program, *Social Psychology Quarterly*, vol. 59 (1), pp. 5-21.
8. Gaver, W., Beaver, J. & Benford, S., Ambiguity as a resource for design. *CHI 2003*, 233-240, ACM.
9. Goffman, E. (1974) *Frame Analysis*, NY:Harper Colophon
10. Graham-Rowe, D., Gamers turn cities into a battleground, *New Scientist*, June 12 2005, online at: www.newscientist.com/article.ns?id=dn7498&feedId=online-news_rss20
11. Koleva, B., Taylor, I., et al. Orchestrating a Mixed Reality Performance. *CHI 2001*, 38-45, ACM, 2001.
12. Reeves, S. et al., Designing the spectator experience, *CHI '05*, 741-750, Portland, Oregon, ACM, 2005.
13. Salen, K. And Zimmerman, E., *Rules of Play: Game Design Fundamentals*, pp91-98, The MIT Press, 2004,
14. Schechner, R., *The Future of Ritual*, Routledge, 1993
15. Sheridan, J., Dix, A., et al. Understanding Interaction in Ubiquitous Guerrilla Performances, *Proc. HCI 2004*, London: Springer-Verlag, pp 3-18.
16. Sheridan, J. G., [*PhD Thesis*]. Computing Department, Lancaster University, 2006
17. Suchman, L., *Plans and Situated Actions: The Problem of Human-Machine Communication*, Cambridge: Cambridge University Press, 1987.