

Practices Surrounding Social Use of the Nintendo DS Handheld Gaming System

by

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Abstract

Ad-hoc wireless networking has recently become a standard feature of handheld video gaming systems. This capability, along with the portability of the devices, increases the number of places where people can easily engage in multiplayer games.

The Nintendo DS, a handheld gaming system with ad-hoc wireless networking, has sold 64 million units worldwide. Its feature set, combined with its ubiquity, enable new forms of multiplayer gaming to emerge. Understanding how people adopt this technology is important for proposing how future handheld gaming systems could be better designed.

This thesis reports findings from a qualitative study investigating the collocated multiplayer gaming practices of Nintendo DS users. Through interviews with fifteen DS owners and observations of seven organized public gaming events we examined why, where, and who participants played with, as well as the details of how games were formed, carried out, and experienced as social activities. With this data it is possible to describe how the DS's unique characteristics impact multiplayer gaming practices and the social gaming experience.

From our data, we identified three major themes surrounding the social, multiplayer gaming practices of DS users: *renegade gaming*, or the notion that users reappropriate locations and contexts for multiplayer gaming, and social boundaries on multiplayer gaming contexts; practical and social barriers to the formation of *pick-up games*; and *private gaming spheres*, or the individualized gaming contexts that the handheld device's form factor creates within larger social contexts. These findings lead us to propose a set of design implications for future handheld gaming systems in order to better support pick-up gaming and sharing experiences with groups and crowds.

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Chapter 1

Introduction

Since its inception, video gaming has been a group activity. From arcade gaming's start in the 1970's with simple two-player games such as *Pong*, to the networked multiplayer games of the 1990's such as *Doom*, to the 2000's massively-multiplayer online games such as *EverQuest*, playing with others has been a key factor in video games' appeal.

Today, video gaming is increasingly moving off stationary arcade cabinets, personal computers and home console systems and on to portable devices. Players can take their games with them on dedicated handheld gaming systems such as the Nintendo DS and Sony PlayStation Portable, as well as a range of other handheld devices such as cellular phones, personal digital assistants, portable music players, and even programmable calculators.

The most popular of the current generation of handheld gaming systems is the Nintendo DS. In addition to its portability and novel features such as dual screens, touch input and a microphone, the DS has two additional attributes that make it a unique platform for multiplayer gaming: wireless communication and wide adoption. Its wireless networking features allow players to connect directly and play together from anywhere within a 30 to 100 foot range, or to connect to other systems worldwide over the Internet. Download play makes local multiplayer gaming even easier by permitting a game to be temporarily uploaded to other nearby players' systems, allowing large groups to play together with only one copy of a game. Finally, the DS's immense market penetration, with over 64 million units sold worldwide as of December 2007, means that players have a large pool of other DS owners as potential multiplayer gaming partners.

On their own, these attributes of the DS are not unique. However, their combination has interesting implications for multiplayer gaming. The portability of the DS, combined with the freedom of wireless connections, allows colocated multiplayer games to be played in a wider range of physical locations and contexts than previously possible. They also allow games to be played with a wider range of partners, including the possibility for unplanned "pick-up" games to be played between strangers who happen to be in the same place with the same systems. However,

while such a situation is possible, an investigation of players' actual experiences is required to reveal whether it ever occurs in practice.

1.1 Research Questions

As handheld gaming continues to evolve, it is important to understand how new advances are being adopted by real users. This understanding is crucial if future handheld gaming systems are to better support users' actual and desired practices. The purpose of this thesis is to describe the practices of users of the Nintendo DS and to suggest improvements to the system based on these practices. In particular, we are concerned with whether and how the DS's unique combination of attributes affect users' practices. These attributes have distinct relevance to physically-located multiplayer gaming; thus, we focus in particular on users' local multiplayer gaming practices.

This thesis presents the results from a qualitative study of collocated multiplayer gaming practices surrounding the Nintendo DS. Through interviews with players and observations of group gaming events, the study aimed to describe the multiplayer gaming practices within this culture. Specifically, the study explored these practices through a series of questions:

- Why do people play multiplayer games?
- Where are multiplayer games played?
- Who are multiplayer games played with?
- How are multiplayer games formed?
- How are multiplayer games experienced?

1.2 Study

In order to answer these questions, the appropriate research techniques must be chosen. In human-computer interaction research, many methods are used to gain insight into users' interactions with computer systems, including both quantitative and qualitative techniques. When attempting to answer a particular question, the appropriate method must be chosen. As Greenberg and Buxton argue in a recent paper, the methodology selected "must arise from and be appropriate for the actual problem or research question under consideration." [12] While they are referring specifically to usability evaluation, their statement applies equally well to all areas of human-computer interaction, and indeed to computer science research in general.

The question at the core of this thesis is how people use the Nintendo DS for collocated multiplayer gaming. To describe gaming on the DS, an in-depth understanding of users' practices must be gained, requiring a qualitative approach. Since the range of answers to our questions were not known in advance, open-ended, descriptive techniques were more appropriate than tightly-focused, experimental methods. It would be premature to attempt to quantify or form hypotheses about users' practices before having an understanding of what those practices were. Therefore, we chose two methods of studying collocated multiplayer gaming on the DS: interviews with players and observations of multiplayer gaming events. The two methods were chosen to complement each other, with the observations allowing direct viewing of games, while the interviews recorded players' practices in their own words. All together, we interviewed fifteen DS owners, four of whom were female, and observed seven public gaming events over a period of seven months.

1.3 Findings

Through analysis of the study data, a rich picture of the participants' DS gaming practices emerged. This included participants' motivations for gaming, the environments they played in, the partners they played with, how games were coordinated, and how gaming experiences were shared. In addition, deeper interpretations could be drawn from these basic findings, such as the limitations on gaming contexts and the effects of the DS's form factor on social play.

In interviews, participants were asked about their motivations for DS gaming in general, and multiplayer gaming in particular. Three primary motivations emerged: playing to pass time, playing as a social activity, and playing to engage in competition. Passing time was the most common reason for general, single-player use. The DS was noted to be particularly well suited for this use due to its portability and its ability to quickly suspend and resume games, allowing play to fit nicely into the empty spaces in players' lives. For multiplayer gaming, social interaction and competition were the strongest motivations. The value placed on social play with human partners reflects the crucial importance of social play, and supports the conclusion that players strongly desire local, physically-located multiplayer gaming on the DS.

The form factor of the DS imposes very few physical preconditions on play, mainly that players must be able to hold the device and focus on its screens. Given this freedom, participants were asked where they played their DSes, and their answers confirmed that play took place in a wide range of locations and contexts. An interesting observation regarding this data is that players created multiplayer gaming contexts within contexts that were normally inaccessible or hostile towards gaming, a phenomenon we have called *renegade gaming*. In addition to where participants did play, they were also asked about where they would not play and what they would consider appropriate or inappropriate environments for DS gaming. It emerged that participants' play was constrained by personal and social limits, not

physical or environmental ones. The DS also emerged as something of an anti-social device, in that it is not appropriate to play when one is expected to be interacting with others, for example at a party, unless all can participate.

Multiplayer games require other people to play, and so participants' descriptions of their multiplayer gaming experiences also shed light on the partners they played with. Some participants had difficulty finding gaming partners among their friends and colleagues because their social circles lacked a critical mass of DS players. Notably, those players who had multiplayer games regularly would ensure the availability of gaming partners by planning their sessions in advance, through explicitly organized events or implicit routines. A few participants also reported experiences playing with strangers. However, these ad-hoc pick-up games, or spontaneous multiplayer games with chance-met strangers, turned out to be rare. A number of barriers to initiating ad-hoc games emerged, both practical, primarily in finding other DS players, and social, in making contact with those players, ensuring that pick-up games are a rare occurrence.

With the elements for a multiplayer DS game in place, several decisions may still be required when starting a session, such as selecting a group from a larger pool of players, picking a game to play, and choosing game options. Participants had strategies for simplifying these decisions, but they still required direct, face-to-face coordination. The social burden and increased time required for this coordination are particularly problematic when playing with strangers, contributing to the barriers to ad-hoc gaming. Coordination between players is also required when actually connecting and disconnecting systems for multiplayer games. In typical games where one player hosts, a host must first be chosen, then the other players join during a fixed window. Groups could have trouble coordinating this process, and with players leaving games in progress, often ending the game for all players. Overall, these additional coordination requirements greatly contribute to players' views of multiplayer games as requiring large commitments, which impacts their pick-up gaming practices.

Multiplayer games are a social activity, and are experienced along with other players. When asked to compare their experiences with DS and console gaming, participants reported that the factors with the most impact on the social experience were the console's shared display versus the DS's individual displays, and their differing support for spectators. The shared context provided by the console display and the DS's poorer support for spectators lead most players to feel that multiplayer gaming is a more social activity on a console than on the DS. The observations about how the DS's form factor affects player-to-player and spectator interactions suggest an overarching theme of the device as isolator. Overall, these observations suggest a phenomenon that we have termed the *private gaming sphere*. The private gaming sphere refers to the personal space that DS gaming takes place in, and the isolating effect that occurs due to that confined space.

1.4 Design Implications

In studying players' current practices with the DS, as well as their desired practices, a few emerged as being poorly supported by the system's current hardware and games, in particular, pick-up gaming and use in large groups. Pick-up gaming was generally desired, but occurred rarely due to the barriers against it. A number of ways exist in which future systems could lower these barriers. One suggestion is to make potential gaming partners discoverable by broadcasting their availability to other nearby systems. By being able to know when other players are nearby, more opportunities for pick-up games would occur. As an extension to this feature, an additional suggestion is for the system to broadcast player profiles, which could be used to determine if a nearby player was a suitable partner. As well as these practical barriers, social barriers could be reduced by allowing games to be formed entirely through the system, without requiring face-to-face contact. This feature could reduce players' feelings of social awkwardness when initiating games, as well as making them easier to coordinate in settings such as a crowded, noisy subway. Finally, the heavyweight connection process used by most games could be changed to allow more fluid entry and exit from sessions. This could make it easier to form quick, impromptu games and reduce the perceived commitment required, encouraging ad-hoc play.

Another use of the DS that was not fully supported was play in large group situations. Players engaged in this practice because it provided social experiences that were enjoyable, but they were also somewhat lacking due to the system's limited support for spectators and shared awareness. To overcome this limitation, the system could provide some external, shared display of the game state available to the entire group. A basic example of this would be a large screen showing some view of the game for all to see, such as one player's personal view or an overview displaying the locations of all players. Another possibility is for a "cameraperson" or "commentator" role to be assumed by a non-player who could choose interesting views for the shared screen and perhaps even provide audio narration. These suggestions offer the possibility of providing a richer shared experience, closer to those seen on consoles, while retaining benefits of the DS such as its ability to gracefully scale to accommodate many players.

1.5 Contributions

This thesis presents findings from a study of the collocated multiplayer gaming practices of Nintendo DS owners. The results of this study uncover qualitatively different gaming practices compared to other gaming platforms, and describe the multiplayer gaming culture that is emerging around this platform. The DS's unique combination of portability, wireless connectivity, and wide adoption has clearly impacted multiplayer gaming practices surrounding the system, and this work represents the first analysis of how mobile gamers have appropriated these combined

properties in real-world contexts. As well, this thesis highlights two areas of group play that the DS does not fully support and provides suggestions for how those types of play could be better supported in future systems.

When envisioning the design of future handheld gaming systems, an understanding of the practices of users of existing systems is essential. Prominent uses of a system can suggest strong features that should be preserved in future designs. Conversely, desired but difficult uses can reveal missing features that could be incorporated into future designs. Overall, as handheld gaming technologies, and as computer technologies in general, continue to advance, an ever-increasing range of features can be included in our devices. The challenge in designing such devices is not necessarily in designing new technologies, but in selecting which technologies to use. Research in computer science, including human-computer interaction, is often focused on the development of the new: new algorithms, new technologies, new interaction techniques. However, there is also value in studying the old. In their discussion of usability evaluation methods mentioned earlier, Greenberg and Buxton noted the difficulties in evaluating culturally-significant systems before cultures are formed around them [12]. By describing the culture that has formed around the DS, we can meaningfully evaluate its strengths and weakness and inform the design of future handheld gaming technologies.

1.6 Organization

The remainder of this thesis is organized as follows. Chapters 2 and 3 provide background information required to understand the system being studied and its place in within the research landscape. Chapter 2 describes the history of handheld gaming platforms and gives an overview of past research in social and mobile gaming. Chapter 3 describes the features of the Nintendo DS and, in particular, details its multiplayer gaming capabilities, with descriptions of how the different styles of multiplayer coordination are carried out in the game software.

Chapter 4 describes the study we undertook in order to learn about players' gaming practices. It includes the questions we aimed to answer, the interviews and observations that were conducted, and the methods used to analyze and extract themes from the gathered data.

Chapters 5 through 9 present findings from the study, each focused on one of the questions introduced earlier. Chapter 5 describes why people play the DS, and discusses the importance of single-player gaming as a pass-time and multiplayer gaming as a social experience. Chapter 6 describes where people play, including the hostile locations reappropriated for renegade gaming and the social limitations on where play occurs. Chapter 7 describes who people play with, and discusses the regular planning that facilitates playing with friends, and the difficulties of unplanned ad-hoc pick-up games with strangers. Chapter 8 describes how multiplayer games are formed on the DS, highlighting the heavyweight coordination and connection processes required when starting most games. Lastly, Chapter 9 describes

how multiplayer games are experienced and how their experience is shared with other players and with spectators, where the phenomenon of the private gaming sphere disconnects and isolates players.

Chapters 9 and 10 conclude the thesis. Chapter 10 discusses some implications of the study findings that could be applied to the design of future multiplayer handheld gaming devices. We propose ways of increasing the system's support for ad-hoc pick-up games and for playing in groups and crowds. Finally, Chapter 11 restates the key conclusions from this research and describes areas for future work.

Chapter 2

Background

As a modern handheld game system, the Nintendo DS follows from a long line of earlier devices. Handheld gaming has evolved from early dedicated, single-game devices to multi-game systems with ever more features. The current generation of handheld game systems, consisting of the DS and the Sony PlayStation Portable (PSP), continues to introduce new features, particularly in peer-to-peer and Internet wireless connectivity. Similarly, the research presented in this thesis also falls within a history of work in social and mobile gaming, looking at areas such as virtual worlds, mobile phone gaming and location-based gaming.

This chapter first presents a brief history of handheld gaming, from early devices to the current generation of advanced, multifunction gaming systems, including the Nintendo DS. Positioning the DS within this space, the unique combination of characteristics that differentiate the DS from other systems—portability, wireless, and adoption—are discussed. (A complete description of the DS’s features is presented in Chapter 3.) The remainder of the chapter describes related research in social and mobile computer gaming. From the social computer gaming literature, studies of social play in online game worlds show the importance and appeal of the social aspects of multiplayer gaming. Mobile computer gaming research, chiefly in mobile phone gaming, highlights some important characteristics of mobile play, particularly related to fragmented, on-the-go play. Studies of location-based games and other systems that merge mobile and social gaming reinforce these mobile gaming characteristics, and also demonstrate how social play can evolve over long-term adoption. These findings reveal potential areas of interest for study on the DS, and also demonstrate the unique opportunities that studying existing DS players provides.

2.1 Handheld Gaming Hardware

Handheld video games have been in existence since at least the 1970’s and have continued to increase in popularity as their hardware capabilities have advanced.

	Game Boy	Game Boy Advance	Nintendo DS	PlayStation Portable
Screen Size	2.6"	2.9"	3" × 2 screens	4.3"
Screen Resolution	160 × 144	240 × 160	256 × 192 × 2 screens	480 × 272
Screen Colors	4	32,000	260,000	16.77 Million
Processor Type	8-bit x80	32-bit ARM	32-bit ARM9 & ARM7	32-bit MIPS32
Processor Speed	4.19 MHz	16.8 MHz	67 & 33 MHz	2×333 MHz
Multiplayer	Link Cable	Link Cable, Wireless (Local)	Wireless (Local & Internet)	Wireless (Local & Internet)

Table 2.1: Hardware characteristics of popular handheld game systems.

Early units played only a single game and had basic displays. Still, games like Mattel’s Auto Race (1976) and Football (1977), with single LED dots representing characters, cars, obstacles and other game elements, would spawn a wave of handheld electronic games. These units were eventually followed by more advanced handheld game systems with individual games stored on cartridges, allowing many games to be played. Key hardware characteristics of the most popular systems are compared in Table 2.1.

The Nintendo Game Boy, released in 1989, was the first modern handheld game system to achieve large-scale success. With a monochrome LCD screen only capable of displaying four shades of green, the Game Boy appeared to lag behind competitors such as the Atari Lynx and the Sega Game Gear, which offered backlit colour screens; however, their advances came at the cost of higher prices and shorter battery life. All of these systems featured multiplayer capabilities through the use of link cables. As well, the Game Boy’s 4.19 MHz processor was still more powerful than the original Nintendo Entertainment System home game console released in 1983, making it quite capable of running compelling games.

In the end, the Game Boy would completely dominate the handheld gaming market. Its eventual successor, the Game Boy Color, released in 1998, featured colour graphics and an infrared port for wireless multiplayer, and still played all of the original games. The Game Boy and Game Boy Color remain the best-selling handheld game systems to date, with combined sales of 118 million units worldwide [19]. Nintendo’s next addition to the Game Boy line, the Game Boy Advance, was released in 2001. It featured a much more powerful processor and a higher resolution screen capable of displaying 32,000 colours. However, the Game Boy Color’s infrared port was removed, with cables once again providing multiplayer connectivity. A wireless adapter was eventually released in 2004, but it was only supported by a small number of games. Overall, the Game Boy Advance and its updated models again saw tremendous sales, with 80 million units sold worldwide as of December 2007 [21].

2.1.1 The Nintendo DS & Sony PlayStation Portable

The current generation of handheld game systems is dominated by the Nintendo DS and the Sony PSP, both released in 2004. The DS (Figure 2.1, left) departs from the design of the Game Boy line and other previous systems by featuring dual screens in a folding clamshell case. It also supports two novel input modalities in addition to the standard buttons: touch input on the bottom screen and a microphone for



Figure 2.1: The Nintendo DS (left) and the Sony PSP (right).

voice input. The PSP (Figure 2.1, right) has a single, higher resolution screen, and features only typical button input, with the addition of a small analog control stick. Their hardware characteristics are compared in Table 2.1, which shows the PSP’s greater display quality and processing power.

Notably, a central feature of both the DS and the PSP is their built-in wireless networking capability. The systems each support up to 16 local players in peer-to-peer wireless games, as well as wireless Internet play. Both systems also feature an option, called *download play* on the DS and *game sharing* on the PSP, where for certain multiplayer games, one copy of the game allows an entire group to play together by wirelessly downloading a temporary copy of the game data from the host. These features suggest the importance of multiplayer connectivity in both devices, and, indeed, the systems’ advanced multiplayer capabilities are their chief commonality.

Despite some similarities, however, the DS and the PSP have many differences, beyond the basic technical differences noted earlier. Not least of these are the very different positions the two systems occupy within the handheld gaming market, and their levels of sales. Marketed as a multi-function entertainment device, the PSP plays videos, photos and music, and features a built-in web browser and other Internet applications. In contrast, the DS has been positioned solely as a gaming device, although a few non-game accessories, such as web browser software, are available. The DS has also seen much wider adoption, with 40 million units sold worldwide as of March 2007 [20], compared to the PSP, which had shipped 25 million units in that same time [26]. The most recent sales figures for the DS, from December 2007, place sales at 67 million units [21].

2.1.2 Position in Handheld Gaming Space

Today, games can be found on a multitude of portable devices, from pocket computers to mobile phones to portable music players. These devices vary in their support

for gaming, with a wide range in display characteristics, processing power, graphics capabilities and input options. Support for wireless communication is now a common feature, seen in handheld game systems, mobile phones, and personal digital assistants, and game developers for these systems are increasingly focusing their efforts on multiplayer games. However, the types of multiplayer games available vary significantly between these devices.

While the DS shares features with each of these systems, its unique combination of features position it in a space separate from home consoles and PC gaming, from mobile phones and PDAs, and from the Sony PSP. While laptop computers can make wireless PC gaming portable, they still do not approach the portability of the DS, which can be slipped in a pocket and requires only one's hands to support; the DS can be played in a wide range of environments, extending the reach of video gaming into locations and contexts inaccessible to bulky systems with external displays. Mobile phones are portable and feature online multiplayer games played over cellular networks, as well as some games allowing players to connect to each other directly, but these peer-to-peer games are rare; the DS is one of the first popular systems to make the capability to fluidly form games with other nearby players over ad-hoc wireless connections commonly available. Most games, including mobile phone games, also require all players to have copies of a game to play together, while the DS eliminates this requirement.

Finally, Sony's PSP offers both portability and peer-to-peer networking, however, the DS is distinguished from it by virtue of its tremendous popularity. In his work studying groupware, Jonathan Grudin pointed to achieving a critical mass of users as one of the key challenges faced in the adoption of a group collaborative system [13]. Without available players, multiplayer gaming capabilities are useless. The DS has been uniquely successful on this front, as its sales figures demonstrate. A large selection of multiplayer games and the convenience of ad-hoc wireless and single-card download play have made local multiplayer gaming on the DS particularly prevalent. The PSP, in contrast, is less common, and has fewer games that offer game sharing, dramatically reducing opportunities for local multiplayer gaming. Given its portability, ad-hoc connections, and critical mass of users, the DS is particularly well-suited to support co-located multiplayer gaming in a variety of environments.

2.2 Research on Social and Mobile Gaming

Collocated multiplayer gaming on the DS has two defining features: it is multiplayer, and it is handheld. While multiplayer gaming need not necessarily entail any social aspects, the physical proximity of partners in local multiplayer on the DS suggests that it will involve social interaction. The social aspects of multiplayer games have been examined previously in the computer science literature, particularly in the realm of online game communities, and the research in this area highlights the importance of these social aspects to the multiplayer gaming experience.

Of course, gaming on mobile devices is different from personal computers or home game consoles, making the handheld nature of the DS also crucial to understanding the multiplayer experience. Existing research in mobile games, particularly in mobile phone gaming, points to some of the particular characteristics of this space. In addition, researchers have created novel mobile games, such as location-based games, that were explicitly designed to encourage social interaction. Their studies begin to reveal the interplay between social and mobile aspects of gaming, which will be of central importance with the DS. This section now highlights relevant research in social, mobile, and social mobile gaming.

2.2.1 Social Gaming

When considering social gaming on computers, the first examples that likely come to mind are online worlds and communities. The persistent worlds of multi-user dungeons (MUDs) and massively multiplayer online games, particularly massively multiplayer on-line role-playing games (MMORPGs), have provided rich environments for research in online social worlds. MUDs, text-based games where players can adventure, role-play, and chat together, have been studied as collaborative games and also adapted for use as collaboration tools. In the introduction to a special issue of *Computer Supported Cooperative Work* devoted to research on MUDs, Dourish [6] emphasized the value of such games as subjects of study. He noted that the technology used in collaborative fantasy worlds could be readily applied to systems supporting everyday work. That is, insights from the study of social gaming could be transferred to other social computing applications. Muramatsu and Ackerman's [17] field study of a combat-centric MUD, published in this issue, is an example of such work. As expected, cooperation and competition with other players were central to the game experience. However, the authors also noted that game environments could be social without being sociable: in the MUD they studied, many players' only interactions consisted of greeting one another when they logged in. This suggests that play can be social even with relatively shallow interaction.

Continuing on in the study of virtual worlds, the modern descendants of MUDs, 3D graphical MMORPGs, are the subject of much current research. What is notable about the current generation of games is not actually their graphical advances, but the fact that they have expanded to become large-scale, commercial products. The MUD studied by Mutamatsu and Ackerman was run by volunteers and had around 60 to 75 active players log in each week. In contrast, *Star Wars Galaxies*, a commercial MMORPG, was claimed to have approximately 400,000 subscribers when studied Ducheneaut and Moore [7]. They set out to examine in-game interactions in particular virtual locations and found that while some players actively socialized, most of the interactions they logged were instrumental, or conducted only as a means of achieving some game-dictated goal. *World of Warcraft*, another commercial MMORPG, is hugely popular, already having millions of subscribers by the time it was studied by Nardi and Harris [18]. They noted that players

were involved in a range of interactions, from lightweight, one-time interactions with strangers to deep, regular interactions with friends. Also studying this game, Ducheneaut et al. [8] noted that while “the social factor” was generally considered the main reason given for players’ attraction to MMORPGs, players in *World of Warcraft* may have enjoyed the multiplayer environment less for the direct social interactions they could have and more as an audience for their achievements, a spectacle to laugh at, or simply a background social presence. These studies, as well as the earlier studies of MUDs, point both to the appeal of playing with others and to the range of interactions that can create a satisfying social environment. A similar desire for social play could be expected in collocated multiplayer gaming on the DS, and, as illustrated by these studies, such social play could be supported by even basic interactions.

In addition to studying the games themselves, researchers from other domains have also looked at social play and its effects on players, including motivation and enjoyment. In education, Inkpen et al. [14] found that playing together could act as a motivator in learning activities. The authors reported that students playing a puzzle-solving game performed better and were more motivated when playing together than when playing apart. Meanwhile, Ravaja et al. [23] studied presence through the emotional effect of playing a human-controlled opponent versus a computer-controlled one. In a laboratory experiment using the Game Boy Advance, they found that players preferred human opponents. These studies again suggest that DS players would desire social play, and that social factors could motivate play. One other interesting finding in the study by Ravaja et al. was that players also preferred playing against friends to playing against strangers, a finding that may have implications for ad-hoc multiplayer gaming on the DS.

2.2.2 Mobile Gaming

In the area of handheld gaming, the domain that has received the most attention from the research community is that of mobile phone gaming. Studies have explored general practices around mobile phone gaming, mobile phone game usability, and the specific hardware characteristics of mobile phones and the challenges they pose for gaming. Dixon et al. [5] studied current users of mobile phone games and found that many users played on-the-go to relieve boredom. This on-the-go play led the authors to suggest a requirement that games be able to be paused and resumed quickly. In a survey of mobile phone game players, Fritsch et al. [10] also saw that mobile phone games were played in brief bursts, with more than 80% of their respondents reporting playing mobile phone games for no more than 15 minutes at a time.

To aid in the design of games that would fit these use contexts, Korhonen and Koivisto [15] proposed a set of playability heuristics for mobile phone games. Most of their heuristics were related to general game usability, with an additional focus on issues that were more challenging on mobile devices, particularly making efficient use of a small screen. Three heuristics were explicitly related to mobility: that

game sessions can be started quickly; that the game accommodates with the players' surroundings; and that interruptions are handled reasonably. These heuristics reflect the status of mobile phone gaming primarily as an activity done in short bursts, as seen by Fritsch et al., and slotted into players' lives wherever openings happened to occur, as seen by Dixon et al.. They are likely to apply to other mobile gaming platforms such as the DS, which could also be played in similar contexts.

Despite some common characteristics, however, there were many differences between mobile phone gaming and DS gaming, particularly in the types of games available, and hence the types of games that have been studied. Like DS games, mobile phone games can have one or more players; Bendas and Myllyaho [3] suggested three categories: stand-alone (one player), peer-to-peer (two or more players connected directly), and networked (many players connecting through a central server). However, their discussion revolved around stand-alone games, which were noted to be most common, and networked games, with a particular focus on the technical challenges of networking. Peer-to-peer games, while mentioned in their classification, were not discussed further, and, indeed, do not appear to have been a subject of study on mobile phones. (At most such games were mentioned in passing, as in, for example, Fritsch et al.'s [10] study of how input limitations and low screen resolution affected gaming performance. The authors noted that they would have liked to test peer-to-peer game features, but they were not supported by the emulator they were using for comparisons.) In contrast, peer-to-peer or local multiplayer is available on most DS games, while networked or online play is still relatively rare.

2.2.3 Social Mobile Gaming

While the previous sections have discussed social and mobile gaming separately, the DS merges both together into a social mobile gaming platform. Some research has noted the social aspects of mobile phone gaming. Dixon et al. [5] mention players' use of mobile phone games to facilitate social interaction and noted practices such as players' attempting to leave high scores on others' phones. Moving beyond basic mobile phone gaming, one notable type of game that combines handheld and social gaming is the location-based or context-aware game. Played on mobile phones, PDAs, and other networked devices, these games exploit GPS and other location-sensing technologies, combined with a central server for coordination, to build gameplay around physical, real-world locations. Examples such as *Pirates!* [9], *Feeding Yoshi* [2] and *Treasure* [1] encourage players to seek out physical locations, which correspond to locations in the game world, and to interact with the people they find there, both in the game world and the real world, through battle, trade and other activities.

In Falk et al.'s *Pirates!* [9], players took the role of ship captains trying to gain ranks and amass treasure. When two players were close by in the physical world, they were given the option to initiate a battle. The game was designed to

encourage, but not require, social interaction to succeed, and the authors' initial test deployment at a conference reception showed that it was successful in bringing collocated players together into a social game. In Bell et al.'s *Feeding Yoshi* [2], teams of players were tasked with collaborating to collect fruit and feed ever-hungry creatures called Yoshis. Observing use over a week-long trial, the authors emphasized the importance of play fitting into everyday life, in small chunks between or during other activities, as well as life fitting into play through longer planned play sessions. These findings echo the findings for mobile phone gaming discussed previously. Finally, in Barkhuus et al.'s *Treasure* [1], gameplay revolved around collecting coins, possibly from outside the network coverage area, and uploading them to the server when in range. Played in teams of two, the game featured both collaboration with teammates, through bonuses for uploading in pairs, and direct conflict, though the pickpocketing of opponents. One finding of note was that as players in the user study gained experience with the system, with most pairs playing two or three 15-minute games, their social gameplay changed over time. This finding highlights the value of studying long-term use of social game systems by experienced players, something now possible with the DS.

Another interesting approach to social mobile gaming that is more like gaming on the DS is Sanneblad and Holmquist's Collaborative Games [25]: mobile, wireless, ad-hoc multiplayer games for handheld computers that require players to physically share their displays with each other to succeed. Like DS games, they are peer-to-peer and do not require a network connection (unlike games tied to central servers), and are context-free, allowing play anywhere (unlike context-aware games tied to specific physical locations). In addition, they support true spontaneous ad-hoc game formation, with all nearby players displayed and free to join or leave at any time. Without any network infrastructure requirements, evaluation of these games could be carried out in an environment already familiar to the participants, specifically, a local café. Within this environment, the researchers saw many interesting social behaviours emerge, such as how players attempted to share their identities with the group and shows newcomers how to play. However, the evaluation was constrained to this environment, and play encouraged by the act of handing people the devices. In contrast, speaking with existing DS players could uncover novel contexts where play occurs and reveal the real ease and prevalence of ad-hoc game formation with chance-met players.

2.3 Summary of Related Research

The DS sits at the intersection of social and mobile gaming, and findings from both of these areas may have implications for its multiplayer gaming experience. Studies of social gaming have shown the compelling nature of play with other people. The social aspects of play were central to players' attraction to online virtual worlds, and this attraction could be expected to be carried over, perhaps even strengthened, in the physical world of collocated play. As well, a particularly interesting finding

from these studies was that the social aspects of gameplay in online worlds could be lightweight, even relegated to the background, and still provide fulfillment and social engagement. These findings suggest that multiplayer gaming on the DS could be a satisfying social experience simply by providing an audience, even without particularly deep or direct interaction between players. On the other hand, the effort required to physically seek out other DS players contrasts with the ease of logging in to an online world and immediately being surrounded by other players, which could influence players' valuations of their gaming partners. In any case, these previous studies suggest that social aspects could be a key motivator for multiplayer gaming on the DS.

Considering the more technical aspects of the DS multiplayer experience, past research in wireless, multiplayer, handheld gaming can also offer valuable insights. Studies of mobile phone game use suggest some possible motivations for use, such as relieving boredom, and characteristics of use, such as play in short bursts, that could also apply to the DS. Work on location-based games reinforces these findings, and highlights the importance of studying the social practices that evolve over longer-term play. However, while these two types of games share similarities with multiplayer on the DS, they differ in some key areas. Most multiplayer mobile phone games are designed to be played over cellular networks with distant players, whereas most multiplayer DS games are designed for ad-hoc play with physically collocated players. In contrast, location-based or context-aware games encourage interaction with nearby players, but they differ from the DS in that they have multiplayer play as their explicit goal. They alert players to the presence of others and actively encourage interaction. Most DS games, on the other hand, have both single and multiplayer modes, and the onus is on individuals to seek out and connect with other players if they so desire. Location-based games also, by definition, restrict or guide players to certain locations, while ad-hoc DS gaming has no such constraints, opening it up to an even larger variety of locations and contexts. The DS's particular set of characteristics thus uniquely distinguish it from these other gaming systems, offering a window into an area of handheld, multiplayer gaming that has not yet been researched.

Chapter 3

The Nintendo DS

The Nintendo DS, has many novel features for a handheld gaming platform. After a general overview of the DS's features, highlighting its dual-screen form factor and multiple modes of controls, this chapter is devoted to describing the multiplayer capabilities offered by the DS. The practices that emerge around a device like the DS are closely linked to the capabilities and limitations of device. They are also influenced by the characteristics of the game software, such as the steps required to start a game. Thus, an understanding of the multiplayer features supported by the DS and by typical multiplayer games is essential to understanding how the system is used in practice.

Two modes of wireless multiplayer are offered on the DS: local and online. In this chapter we discuss both modes, and give three examples of popular multiplayer games, *Mario Kart DS*, *Tetris DS*, and *Pokémon Diamond and Pearl*. These games illustrate the types of multiplayer experiences available on the DS. Finally, additional details are given about the mechanics of multiplayer game formation, including a thorough breakdown of the steps involved in starting a typical hosted game. A few games that do not require an explicit host-client connection process are also described to illustrate alternative connection techniques.

3.1 DS Overview

The Nintendo DS (Figure 3.1) is the latest in Nintendo's line of handheld gaming systems, originally released in 2004, and updated with a slimmer, lighter redesign, the DS Lite, in 2006. The most noticeable difference between the DS and its Game Boy predecessors is its dual-screen design. The DS sports a flip-open clamshell case, with screens at the top and bottom, and speakers on the sides. The case is also used as a means to suspend the system. When the lid is closed, the current game is typically paused and the system enters a low-powered state. (Some games disable this functionality at certain times, such as when connected to other systems.) When the lid is opened, the game instantly resumes where it was left.



Figure 3.1: The Nintendo DS handheld gaming system.

While the top screen of the DS is a standard LCD screen, the bottom screen is also touch-sensitive, allowing input using the included stylus or a fingertip. In addition to touch input, the DS also features the directional-pad and buttons typical of other handhelds and console controllers. As well, it features a built-in microphone, allowing games to use voice input. Another key feature of the DS is its wireless networking capabilities. These allow both peer-to-peer games, over Nintendo's proprietary protocol, as well as online play over the Nintendo Wi-Fi Connection (WFC) service using the standard 802.11b protocol.

Upon being turned on, the DS displays a home screen showing several available functions including starting one of two possible games, entering *PictoChat*, or searching for a game using download play. Games come on small game cards, with over 500 titles released in the Americas and over 700 released in Japan as of December 2007 [21]. As well, the DS is backwards compatible with games made for the Game Boy Advance. A second slot accommodates these larger game cartridges, and the home screen allows users to choose between the games when two are inserted. The DS also features a built-in wireless chat program, *PictoChat*, and an option to search for downloadable content being offered by nearby systems, which will be described further below.

3.2 Wireless Multiplayer Features

For a study of multiplayer gaming practices on the DS, its wireless multiplayer capabilities are of central importance. These features determine what can be achieved with the DS, and how it must be done.

3.2.1 Multiplayer Game Types

The DS supports two different types of wireless multiplayer gaming: local wireless and Wi-Fi Internet play. An additional form of multiplayer, requiring no hardware support from the DS, is played by passing one DS around among many players. However, this type of multiplayer only works with turn-based gameplay and is supported by few games. One notable example of a game that uses this style of multiplayer is *Advance Wars: Dual Strike*, a turn-based tactical strategy game.

The most widely-supported form of multiplayer on the DS is local wireless, in which players connect their DSes to other nearby systems over an ad-hoc, peer-to-peer wireless network. The range for local wireless communication is 30 to 100 feet, depending on the environment. The number of players who can play together is determined by the game. The system supports a maximum of 16 local players, however in practice most multiplayer games support two to eight players. The DS comes with one local wireless application built-in: the chat program *PictoChat*. With *PictoChat* up to 16 nearby players can enter one of four pre-set chat-rooms. Once in a room, users can see the others in the room and send text and drawings to the group using the stylus and an on-screen keyboard. Local wireless multiplayer also supports download play in games that offer it, described in more detail in the following section.

Finally, for gaming over greater distances, the DS supports Internet play over the Nintendo Wi-Fi Connection. Using its built-in 802.11 Wi-Fi networking capabilities, the DS can connect with other players around the world over the Internet. The number of players who can play together is again determined by the game, with a maximum of eight supported by the system. Most games allow players to either play with their friends or with randomly-selected opponents. To play a friend, both parties are required to enter the other's friend code, a long string of numbers and letters assigned to each player by the system. Friend codes are game-specific, not system-wide, so players must add their friends in each game they wish to play them. Many games support different features when playing with friends versus random players, such as allowing text or even voice chat with friends, but removing chat entirely or restricting it to canned phrases with random players.

3.2.2 Download Play

One of the notable features of the DS's built-in wireless networking is download play. Download play enables local players to play a game that they do not have

in their DSes by downloading the necessary data from another player's system. This type of multiplayer gaming is also called single-card play. Users can select *Download Play* from the DS's home screen to see a list of games being offered nearby. These can include multiplayer games being hosted by other players, who must have the appropriate game cards in their DSes, as well as game demos, which can be offered by other players or by DS Download Stations¹ set up at various retail locations. Download Stations are units that are typically set up at video game stores and offer game demos or other DS content for anyone who walks by to download. For multiplayer games played using download play, the game features offered may be identical to multi-card play (i.e. games where all players have their own game cards) or may be reduced, depending on the game. However, downloaded game data is always temporary; when downloading players' systems are turned off, the downloaded data is erased.

3.2.3 Examples of Multiplayer Games

To illustrate some of the multiplayer gaming options available on the DS, this section briefly describes three popular multiplayer games: *Mario Kart DS*, a racing game; *Tetris DS*, a puzzle game; and *Pokémon Diamond* and *Pearl*, a pair of role-playing games.

Mario Kart DS

Mario Kart DS [16] is a kart-racing game for one to eight players. Each player controls their own racer in a small go-kart, driving around various tracks. Item boxes scattered on the tracks allow players to pick up power-ups by driving over them. These power-ups provide temporary bonuses to the player, such as a speed boost or a period of invulnerability, or cause temporary impairments to other players, such as covering their screens with ink making it harder to see. The most common offensive item is the shell, which is shot at other players' karts; when hit, the player spins out and is unable to move for several seconds. Items are not entirely randomly awarded, however, but rather are given out based on players' positions in the race. When a player in last place drives over an item box, they are more likely to be given one of the most powerful items. This distribution makes it possible for players' standings to change dramatically at any time and keeps gameplay varied and hectic.

Mario Kart features two multiplayer game modes: Vs. and Battle. In Vs. mode, players compete in standard races on a variety of tracks. In Battle mode the racing mechanics are the same, however, instead of just racing laps, players compete directly on special tracks. Two options are offered: Balloon Battle and Shine Runners. In Balloon Battle, players have rings of balloons around their karts. Using items such as shells they must pop other players' balloons while defending

¹<http://www.nintendo.com/ds/downloadstation>

their own. Players who run out of balloons are eliminated and the winner is the last player remaining. Similarly, in Shine Runners, players race to collect the most shine sprites, and can attack each other to steal sprites.

Tetris DS

Tetris DS [28] is a puzzle game for one to ten players. Each player has their own game board, which they must keep from filling up. As the game progresses, different-shaped pieces fall from the top of the screen, which players can move and rotate as they fall. When a complete line of blocks is formed, it disappears from the screen and other blocks move down to take its place. Each player's objective is to keep his stack of blocks from reaching the top of his screen. In a multiplayer game, each player's board is separate, but players' actions do affect each other. First, when a player clears multiple lines at once, line are added to another player's stack. Second, players may earn items by clearing certain blocks. When activated, these items can have various beneficial effects for the player, or detrimental effects for another player. The winner of a multiplayer game is the last player remaining.

Pokémon Diamond and Pearl

Pokémon Diamond and *Pokémon Pearl* [22] are a pair of role-playing games for one to eight players. In the single-player story, players travel throughout a fictional world capturing creatures called pokémon and using them to battle other pokémon. The actual combat is turn-based, with each player selecting the move his pokémon will use before each turn. *Diamond* and *Pearl* are essentially the same game, with the only real difference being the pokémon that are available to capture.

Multiplayer play in *Pokémon* takes two forms: trading and battling, and playing in the underground. Both of these activities are intertwined with the single-player game. In the first form, players travel to special buildings that act as multiplayer lobbies where they can meet other nearby players. Once they have made contact, the players can initiate a trade to exchange some of their pokémon, or start a battle between their pokémon. Trading, in particular, is encouraged by the design of the game, since there are certain pokémon that a player cannot acquire from his version of the game and must be traded from a player with the other version.

The other form of multiplayer offered by *Pokémon* takes place in a game region called the underground. It is an area where players can explore, dig for fossils, and build a secret underground base. When a player enters the underground, their wireless networking is activated and any other players in the underground within communications range appear in each others' games. If no other players are around, the underground can be explored alone. If other players are present, they can engage in a capture-the-flag type game, with players trying to find the others' secret bases and retrieve their flags. Players can also plant various traps along the way, making it more difficult to access their bases. Notably, players cannot trade

or battle pokémon in the underground, and must return to the surface and travel to an appropriate in-game location to access this type of multiplayer game.

3.3 Multiplayer Coordination Styles

In order to play local multiplayer games on the DS, players must establish connections between their systems. How this is done depends on the particular game that they are playing. Most games use a hosted system, where one player, the host, starts up a game, which other players then join. A few games, however, use a more transparent system where players can simply appear in each other's game worlds without forming a game first. This section illustrates the mechanics of these processes by describing how hosted games are formed, with a detailed example of forming a game in *Mario Kart*, how they are controlled, and how they respond when players disconnect. This is followed by a description of how these processes are handled in some “fluid” games that support smooth connections and disconnections.

3.3.1 Mechanics of Hosted Game Coordination

The most common connection format for multiplayer games involves one player acting as the host, with the other players connecting to the host's system. This process typically involves several phases. First, the host sets any initial options and creates a game. After creating a game, other players can search for games to join and find the game the host just created. Once the game has reached the maximum number of supported players or the host has all the players he or she wants, the host accepts the current players, any remaining game-wide or player-specific options are set, and the game begins. No new players can be added to the game after the initial joining phase, instead players would have to exit and re-form.

The initiation process for a local, multi-card game in *Mario Kart DS* is detailed in Table 3.1. It involves several steps, both on the part of the host and the other players.

The process of starting a game of *Mario Kart*, from power-on to the start of the first race, can take as little as 40 seconds for multi-card play, but in practice more time will be required for setting options and communicating and coordinating between the players. Download play also lengthens this process, often by a minute or more, as the host transmits the game software to the download players' units.

In hosted games, the host player's system acts as the central server coordinating gameplay amongst its clients. The host controls the initial options set when the game is created, such as the game mode in *Mario Kart*, which can be either normal, the default, which does not allow download players to join, or simple, which supports download play at the cost of reduced features. The host also continues to control game-wide options once other players have joined, such as what course to

Host	Other Players
1. Power on DS and select <i>Mario Kart DS</i> from the home screen 2. Select <i>Multiplayer</i> from the game's root menu	
3. Select <i>Create Group</i> 4. Choose <i>Normal</i> mode 6. Click <i>Cut Off</i> to accept players 7. Select game type of <i>Vs.</i>	5. Select group named after host
8. Select character and kart within 30-second time limit	
9. Select game settings: <ul style="list-style-type: none"> • Class: 50cc, 100cc, 150cc, Mirror • CPU Kart: Off, Easy, Normal, Hard • Course: Choose, In Order, Random • Rules: Free, Wins (1–10), Races (1–32) • Team: Off, On (if turned on, all players can choose their teams) 10. Select cup and track 11. Choose OK in confirmation dialog	
12. Game starts	

Table 3.1: The steps required to initiate a local, multi-card multiplayer race in *Mario Kart DS*.

race on, while players can set options that affect only them individually, such as what character they will play as. The host also has the ability to end the game or change the options set earlier, and sometimes the ability to pause the game for all players.

Since the host is essential to running the game, the game will end when the host ends or disconnects from the game. The game's behaviour when a player other than the host disconnects varies. In *Mario Kart*, for example, if three or more people are playing, and one of them other than the host turns off their system, they are simply removed from the current race, and replaced by a game-controlled character in subsequent races. However, in *Tetris DS*, if any player turns off or even closes the lid on his or her system, the game is immediately terminated for all players. Thus, if one player wants to leave the game, the remaining players must create a new game and form up again.

3.3.2 Mechanics of Fluid Game Coordination

While less common than hosted setups, a few games allow more transparent, fluid player-to-player connections for multiplayer games. These games allow players to come and go at will, without a heavyweight connection process. One application that uses such a fluid system, *PictoChat*, is built into the DS's firmware. In *Pic-*

toChat, users join one of four pre-set chat rooms. Upon entering they see messages from any other *PictoChat* users in the same chat room that are within range of their systems. Players can enter and leave at any time, as the rooms do not depend on a single host player.

Another pair of games that allow more lightweight connections are *Pokémon Diamond* and *Pearl*. *Pokémon* has several multiplayer features that facilitate making connections with other players, including a multiplayer area, the underground, where nearby players can appear in each others' games without any explicit connections. When a player enters the underground during the single-player game, their wireless networking is automatically activated. Any nearby players in the underground will appear in their appropriate locations in each others' games. When players return to the surface, they simply disappear from other players' games. A shared game world that other players can enter at any time is also seen in *Animal Crossing: Wild World*, a life-simulation game in which players create a town that they can then open up for visitors, allowing nearby players to come and go at will. However, it is notable that the ways in which players interact in these games differ from typical hosted games. In these games with more fluid connections, players interact in fairly unstructured, loosely-coordinated ways, capturing flags from each others' bases in *Pokémon* and chatting and trading in *Animal Crossing*. In comparison, many hosted games require more structured, tightly-coordinated interaction, such as the races in *Mario Kart*, which may make this more heavyweight form of connecting with other players easier to integrate with gameplay.

3.4 Summary

This chapter described the features of the DS and its multiplayer capabilities. While the system's displays and controls are novel, its key feature for the purpose of this study is its wireless networking. Two types of wireless multiplayer gaming are supported: local and online. In local multiplayer, players connect directly to other DSes within range. Download play, a feature of local multiplayer, allows local players to temporarily download game software from a host player, allowing multiplayer games with only one game card. Online play over the Nintendo Wi-Fi Connection allows players to connect to distant friends over the Internet. To illustrate the types of games being played, three popular multiplayer DS games, *Mario Kart DS*, *Tetris DS*, and *Pokémon Diamond* and *Pearl* were described. These games will appear later in the study results as games commonly mentioned by the participants.

The remainder of this chapter was devoted to describing the mechanics of making local multiplayer connections with the DS. Two connection styles were identified, hosted and "fluid". Most games follow a hosted scheme, requiring a complicated connection process where a host player starts and sets up a game that the other players then join. These games are also often inflexible in allowing players to

join and leave existing games at will. In contrast, a few games offer a simplified process where players simply activate their wireless connections and can immediately interact with other nearby players.

Like any piece of technology, the capabilities and limitations of the DS determine how it can be used. In particular, the way players connect to each other has the potential to affect their multiplayer gaming practices in many ways. The characteristics of hosted game sessions, such as the time required to start games, the small windows of opportunity for joining games, and the problems with leaving games in progress, can influence players' perceptions of the game formation process and shape their gaming choices. This influence will appear many times as the results of the study in the next chapter are presented later in the thesis.

Chapter 4

Study

In order to understand multiplayer gaming practices surrounding the Nintendo DS, we chose to conduct a qualitative study of existing DS owners. The purpose of the study was to understand players' social gaming practices, through the who, what, when, where, why, and how of multiplayer gaming. An additional goal was to explore how the DS's unique combination of characteristics, discussed previously, impacted players' practices. As described in Chapter 1, the question of how the DS is being used for collocated multiplayer gaming is broad, and so qualitative methods are best suited to capturing the full range of information desired. Two methods were selected: interviews with individual DS owners and direct observations of multiplayer gaming events. By incorporating both of these sources, multiplayer gaming could be observed directly in one particular context, and players could describe their wider practices.

This chapter begins by restating the overall goals of the study and some of the specific questions the study aimed to answer to address those overall research goals. The two components of the study, the interviews and gaming events, are then described in detail, and the chapter concludes with an explanation of how the gathered data was analyzed.

4.1 Study Objectives

The goal at the core of the study was to describe multiplayer gaming practices on the Nintendo DS, as experienced by the players. To get a complete picture of these practices, we wished to collect as much information as possible about players' specific multiplayer gaming experiences. To characterize these experiences, we sought to learn who games were played with and where they took place, and as many details as possible about the specific events that unfolded during games. In addition, another goal of the study was to explore the relationship between the DS's particular characteristics and players' practices surrounding it. Specifically, we identified the DS's combination of portability, wireless networking and wide adoption as setting

it apart from other systems. Thus, another question this study hoped to answer was whether and how these characteristics impacted gaming practices.

While the study was open-ended, relying on general questions without presupposed answers, one particular type of multiplayer gaming was specifically investigated during the study. One way the DS's combination of characteristics could change the multiplayer gaming experience is by making spontaneous, ad-hoc games with chance-met strangers more accessible than with its predecessors such as the Game Boy Advance. The DS's portability means that it can be taken almost anywhere; its wireless networking offers a convenient way of connecting on-the-go, and its wide adoption suggests that there are many DS owners walking around looking for games. A player could take his DS with him on the bus, meet another DS owner, and initiate a wireless multiplayer game without any additional requirements such as link cables. Therefore, this was one particular type of multiplayer gaming that was specifically probed during the study.

4.2 Methods

To answer the study questions put forward in the previous section, DS players' experiences were collected in two ways. One was through individual interviews with DS owners, who were asked to describe their DS gaming experiences. The second was through field observations of multiplayer DS gaming—as well as console gaming for comparison—at several organized gaming events. These two components are discussed in detail below.

Since the study involved human participants, it was reviewed and approved by the University of Waterloo Office of Research Ethics. For individual interviews, informed consent was obtained from each participant. The consent form asked interviewees if they agreed to take part in the study, whether they consented to audio or video recordings being made of their interviews, and whether they would allow quotations or stills and video clips of themselves to be used in publications. Each option was presented separately, so interviewees could participate in the study without consenting to the recordings or to their use in publications. Following interviews, participants were asked for permission to be contacted again for follow-up interviews. For the group observations, consent was obtained from the president of the club that ran the events. The information-consent letters for individuals and group leaders are reproduced in Appendix B.

4.2.1 Interviews

The primary way data about players' experiences on the DS was collected was through personal interviews. A total of fifteen people were interviewed, all of whom owned a DS and had participated in multiplayer games with it. They were recruited

through a campus gaming club and word-of-mouth, as well as from people seen playing the DS publicly around the campus. There was no payment for participation. The participants consisted of eleven males and four females, aged 18–34, who were undergraduate or graduate students, or working professionals. After the first eight participants (P1–P8) had been interviewed, data analysis began, during which additional questions arose and six of the eight returned for follow-up interviews. The remaining seven participants (P9–P15) were only interviewed once, with the new questions integrated into the original interview topics. All participants were interviewed individually except for P12 and P13, two friends and regular gaming partners who were interviewed jointly in a single, longer session.

The interviews themselves were semi-structured; the interviewer had a list of themes with general questions to ask each participant, but interviews were unscripted and followed the participants' answers. Each interview lasted approximately 30 minutes. Participants were asked to discuss their gaming histories and habits with both the DS and other gaming systems. Interviews began generally, with questions such as:

- ‘When did you get your DS?’
- ‘What other game systems do you own?’
- ‘What kinds of games do you like?’

After establishing a dialogue, interviews were focused in on the DS with questions like:

- ‘Where do you play?’
- ‘Do you play with other people?’
- ‘Have you ever played with a stranger?’

Finally, as interesting themes emerged from the initial data analysis, follow-up interviews were updated with new topics in order to gather more data about these themes and to confirm initial findings. For example, as boundaries on DS play and differences in the social experiences in gaming on the DS versus on consoles emerged, participants were asked questions such as:

- ‘Are there places it does not seem right to play?’
- ‘Is the DS more or less social than console multiplayer?’

To aid participants' recall, they were asked to walk through specific, recent gaming experiences, such as their last multiplayer game. Responses were recorded by the interviewer in handwritten notes, as well as audio recordings (with the exception of one participant who did not consent to the audio recording).

4.2.2 Observations

To complement the interview data, in-situ observations were carried out at a total of seven public gaming events organized by a campus gaming club. Four featured DS and handheld gaming and three focused exclusively on console systems, including two console game tournaments. While organized by a particular club, the events were advertised around campus to the general student body and held in public spaces in the campus student centre, open to anyone who came by. Each event lasted five to seven hours, and the number of participants ranged from fifteen to over sixty, depending on the type of event. The author also participated directly in five of the events in order to gain a first-hand understanding of the experience.

Observations were recorded in three formats: handwritten notes, digital photographs, and video recordings. At all events, handwritten notes and sketches were used to document general information such as the number of participants attending, the games that occurred, and the positions of players around the space. From the fourth event onward, observations were expanded to include digital photographs of events and players. Finally, at the fifth event, short video clips were taken in addition to the photographs. The final two events were videotaped in their entirety, providing the most detail and allowing analysis of specifics such as the timing of games or the exact interactions that took place during them.

With the exception of the tournaments discussed later, play was not structured or pre-planned. Players arrived, left and formed games spontaneously throughout the events. For console-focused events, where consoles and games were supplied by the organizers, the available games were planned in advance. For handheld-focused events, it was up to each attendee to bring his or her own system and games. While all games were welcome, posters promoting the events typically suggested games that could be played, such as *Mario Kart*, *Tetris*, and *Elite Beat Agents*, a popular music game.

Three of the observed events were specifically dedicated to handheld gaming, particularly on the DS. Their attendance ranged from fifteen to approximately thirty participants. Two of these events were held in a study room tucked away on the second floor of the student centre, while one was held in the main hall. Participants playing DS brought their own systems and games, and formed groups amongst themselves. Two of the events also had a single console set up with a television or a projector, with console games played overlapping and interspersed with DS games. Since players each had their own systems and selections of games, the games being played would change frequently as groups formed and split up. Certain players also moved between the console and their DSes, while others played one system exclusively. In essence, the events were unstructured. A group might form when one player asked the others nearby if they would like to play a particular game; those who wanted to play would get their copies of the game out, if they had them, or prepare to join via download play, and form up. The same game might end equally spontaneously when one player had to leave for an evening class.

One event was a general gaming event with approximately thirty participants

that featured both significant DS play as well as play on several available consoles. Held in a larger room in the student centre, it featured four consoles arranged around the edges of the room, with space in the centre where players set up chairs for DS groups. Two consoles had the same games running throughout the event, while the other two changed games frequently. DS games and groups varied, as in the DS-specific events.

The remaining three events were centered around consoles and did not feature significant DS play. One event focused on music games, while two were tournaments for a popular console fighting game. All three were held in the large main hall in the student centre. The tournaments drew the largest crowds, with over sixty attendees, including approximately fifty contestants, at the largest event. At all three events, the games played were essentially fixed. The tournaments were particularly structured, as participants had to register and were then assigned to play a series of matches. However, there was still some free play as the tournaments progressed and players were eliminated; when console stations were no longer needed, they were opened up for anyone, contestants to passers-by, to play on.

4.3 Analysis

In analyzing the notes, photographs, audio and video recordings gathered from the interviews and events, our approach was to allow themes to emerge from the data. The tool used for this analysis was the affinity diagram. Affinity diagrams are used to sort and organize large amounts of data. To begin, each data point is written on a separate piece of paper. Then, these notes are added to the diagram. By grouping together notes that appear to be related, themes begin to emerge. Repeating this process for several iterations can generate a hierarchy of themes and sub-themes with data organized beneath them. The key feature of this analysis is that themes and labels are derived from the data itself and not presupposed.

For interview data, points were extracted from the interviewer's notes as well as from transcripts of the audio recordings. Any interesting topics or quotations were added to the affinity diagrams. The events were analyzed through notes and sketches taken during observations, as well as photographs and video recordings, when available. For the events with video recordings, the videos were viewed several times, with detailed, time-coded notes made along the way. The points from these notes were then fed into the analysis.

As several interesting themes emerged from the affinity diagrams, the ongoing interviews and observations were tuned towards exploring those themes in greater depth. Interviews were updated with new questions and the focus of observations at events was refined in order to gather more data about emerging themes and to confirm initial findings. Additional data was continuously incorporated into the affinity diagrams, until final themes emerged.

4.4 Summary

This chapter presented the details of the study carried out to explore multiplayer gaming practices on the DS. The aim of the study was to describe players' general motivations and experiences surrounding DS gaming, such as why they play and how multiplayer gaming is experienced. An additional goal of the study was to probe how the DS's unique combination of attributes impacted the multiplayer gaming experience. This chapter also described the two components of the study itself: interviews and in-situ observations. The findings from both of these sources were combined in the analysis, where affinity diagrams were used to derive themes from the data.

The following five chapters of the thesis are organized around the general themes that emerged during our analysis:

- Why multiplayer games are played.
- Where multiplayer games are played.
- Who multiplayer games are played with.
- How multiplayer games are formed.
- How multiplayer games are experienced.

Each chapter explores one of these themes, presenting the basic findings as well as deeper implications of how the DS's characteristics affect this particular facet of the gaming experience.

Chapter 5

Motivations for Multiplayer Gaming

To understand the gaming habits of Nintendo DS owners, an important first question to ask is why they play at all. At any given time, the DS may compete with a number of different activities. It may also compete with other video gaming options. By virtue of its portability, the DS can also be played in situations where few other entertainment options exist. Why players choose the DS over other options, or because it is the only option, can reveal desirable characteristics of the system. As well, why players choose to play multiplayer games is of particular importance to this thesis. A study of multiplayer gaming practices has little value if players are not interested in playing multiplayer games. Fortunately, players do engage in multiplayer games, and have several reasons for doing so. These reasons show the strong appeal of multiplayer gaming on the DS.

This chapter begins with a description of why players use their DSes, focused on single-player gaming, including how they choose between the DS and other available game systems. The DS's portability and capability for quick games are found to allow it to fit into the empty spaces of players' lives, making it a frequent gaming choice for most of the study participants. The second half of the chapter describes the reasons why players engage specifically in multiplayer gaming. The reasons why players are attracted to multiplayer gaming, the differences between competitive and cooperative play, and the tradeoffs between local and online play are discussed. Overall, local multiplayer gaming on the DS emerges as an activity that the study participants strongly desire.

5.1 Motivations for Play

To determine why players choose to use the DS in the first place, interview participants were asked simply, 'Why do you play DS?' Their answers revealed a range of

motivations, including passing time, alleviating boredom, feeling a sense of achievement, learning new things, engaging in a social activity, and engaging in competition. Of these motivations, three emerged as being particularly relevant to the study: passing time in a range of situations, playing as a social activity, and playing to engage in competition. Passing time is explored in more detail in this section, both because it was the most frequently-given reason for playing the DS, and because it appears to arise from some of the DS's characteristics as a handheld gaming device. Playing for socializing and competition are discussed in the next section on multiplayer gaming motivations.

Passing time and alleviating boredom were the most common reasons given by participants for playing the DS. This was particularly the case for solo play, but they were also motivations for multiplayer gaming. P8 summed up this practice:

“... basically any time I have some free time, if I'm sitting down... I'll just take the DS out and just play for a bit.”

Participants gave many examples of situations in which they used the DS to pass time. P4 played to get through a “boring” math class and P9 played in class just to keep awake. P13 played between calls while working as a telemarketer. P5 played DS with his brother on long family drives. Participants also reported using the DS to pass time whenever they needed to wait for things. For example, P8 played with friends while waiting in line to be seated at a restaurant. The DS was even used in very short waits, such as by P10, who played while his computer was starting up in order to feel more productive. Overall, several participants stated that whenever they felt bored or had some time to pass, they would turn to their DSes.

5.1.1 Choosing Between Alternatives

When players want to play a game, whether to pass the time or for any other reason, there is often more than one gaming option available. Games can be played on a range of systems, from mobile phones to large, dedicated arcade machines. The most commonly available game systems are the personal computer, and dedicated gaming consoles such as the Sony PlayStation 2, Microsoft Xbox and Nintendo Wii. In interviews, participants were asked about their gaming habits on these systems and how often they used them compared to the DS. With more powerful hardware, console and PC gaming could be expected to be chosen over the DS whenever available, but that was not the case for the participants. The DS had desirable games, as well as several features that made it a compelling choice in particular contexts:

- The system could be played anywhere in the home, not just from the couch.
- Games could suspend and resume quickly, supporting quick bursts of play.

- Games could be started quickly, allowing play with only a brief time available.

Generally, participants chose what to play based on their desire to play a particular game, not based on the gaming platform. As one example, P7 stated that he chooses what to play “mostly based on games”, and that it “depends on what I want to play,” while P2 said, “it depends on what games I’m working on.” This suggests that participants viewed the DS as a viable alternative to the more powerful gaming systems. The DS was also seen to be a viable alternative to consoles at the organized gaming events that were observed. In particular, at one general console gaming event with four game consoles set up around the room, two of the four were left entirely idle at several times while participants at the event played DS together.

As well as being considered on-par with PC and console game systems by most, some features of the DS made it even more appealing than those systems to several study participants. In particular, the DS’s portability and its support for quickly starting, suspending, resuming and ending games made it a more compelling option, even in the home where mobility would not seem to apply. While portability comes at the price of a small display that P2 mentioned he would not want to watch for too long because of the strain on his eyes, participants described how it allowed them to play in various locations around the home, such as P11, who played in bed before going to sleep, and P3, who played while cooking dinner. Describing how the DS’s portability caused him to choose it over his PC, P3 said:

“I’ve been sort-of trying to get away from sitting at my computer or at my desk and so . . . I’ve been sort-of gravitating more towards things that I can just be on the couch for. . . It’s nice that I can carry my DS around with me if I want to leave my house or if I just want to sit on my chair, like, my couch as opposed to my computer chair.”

As well as portability, another compelling feature of the DS over other systems was its support for quick bursts of gameplay. This feature made it a practical option during other activities as mentioned by P3, who played in “a bunch of small, little two or three minute sessions when I’m cooking dinner” with the DS suspended between activities. The ability to frequently pause during gameplay was mentioned by P14 as an advantage for playing in class, where she could play while taking notes, and the capability for quickly starting short games was alluded to by both P2 and P10, who commented that they played on the DS when they only had a brief time to play. In sum, the DS was often considered equally desirable to playing on a console, based on game selection, and its mobility made it even more desirable when competing against consoles in certain situations, as well as allowing it to be used in many situations where no alternatives are feasible.

5.1.2 Always-At-Hand Gaming: Fitting Play into Life

With the frequent use of the DS as a way of passing time, and the flexibility it allows in location and duration of gameplay, it came as little surprise that many participants had their DSEs with them at almost all times. This “always-at-hand gaming” allowed play to occur at the spur of the moment. The empty spaces in players’ lives, from breaks between classes to waiting for a computer to boot, could be used to do something enjoyable. This ability may have been particularly relevant to the class of players interviewed in this study, most of whom were university students with classes and other commitments at various times and places throughout the day.

The way DS players fit play into their lives is also relevant to the study of multiplayer gaming practices with the system. With DSEs always at the ready, the potential exists for multiplayer games to spring up in these empty spaces as well, particularly when they are shared with others, such as P8’s friends waiting together at the restaurant. The wide range of environments where this characteristic allows multiplayer DS games to occur is described in detail in the following chapter.

5.2 Motivations for Multiplayer Gaming

In addition to why they play at all, it is useful to know why DS players want to participate in multiplayer games. Social play is an important motivator for gaming on the DS, both for providing an enjoyable social activity, and for the practical purposes of adding variability and challenge to game play beyond what computer-controlled opponents can provide. When discussing their multiplayer gaming experiences, many interview participants described instances where playing DS was a social activity with their friends. For instance, two participants, P2 and P3, spoke about going out for coffee with friends once a week at a local coffee shop or café and playing DS together there, while P1 went for out for drinks and gaming after work with colleagues. This social aspect to play was also observed at the organised DS events held by the campus gaming club, which were opportunities to meet, speak with and game with other DS players.

5.2.1 Attraction to Multiplayer Play

In describing their multiplayer experiences, participants spoke of how much they enjoyed multiplayer and the reasons for its appeal. Multiplayer gaming’s strong appeal is emphasized by P5, who even bought his brother a DS so they could play together. Participants described talking, taunting, laughing and yelling together. P14 also spoke of the sense of group achievement that could be gained through cooperative play, and getting to see who’s better in competition. One participant, P6, went as far as to say that “I haven’t played Mario Kart at all unless it’s with

other people, recently.” Despite its many single player gaming options, he wasn’t interested in or challenged by it on its own any more. Regarding the social aspects, P6 said that when playing with other people:

“... there’s more of a social aspect, right? ... the computer’s not going to respond after you do something stupid or you do something great.”

He went on to speak about the unpredictability and varied challenge that other players add to the games. The desire for player-created variability was echoed by P8 who described playing a puzzle game with friends and choosing a game mode based on the players’ ability to affect each others’ games. The game offered several multiplayer modes where players actually played separately; they each had their own game board, and played separately but in parallel, competing for higher scores. However, P8 and his friends chose the mode where “you’re dropping crap on people,” or where players’ actions, while still taking place on separate game boards, could affect each others’ games and add some variation to the action by dropping pieces on each others’ boards.

Another factor participants cited in favour of multiplayer gaming was the added challenge. This challenge was both a product of the unpredictability and variability mentioned above, as well as skilled human players’ ability to outperform computer-controlled opponents, offering a higher level of competition. P7 emphasized the ongoing challenge that human opponents add to games once the single-player game had been mastered, stating that he “won’t buy games unless they have a good multiplayer aspect to them, so they have better replay value.”

5.2.2 Competitive versus Cooperative Play

One aspect of multiplayer gaming that appealed to many participants was that of competitive play. This was particularly noticeable at the organized events held by the gaming club. Players fought hard for the top spot and often engaged in “trash talk”, playfully boasting about their performance or insulting others’ abilities. This competitive desire was reflected in the choice of games at the events. From racing in *Mario Kart* to duelling in *Pokémon*, competitive play was the main form of multiplayer gaming observed at DS events.

In more personal gaming environments, such as playing one-on-one with friends, the competitive element appeared to be reduced, but not absent. One player’s desire for besting the opposition may be diminished by a greater concern for the other’s enjoyment of the game, or simply a selfish desire for feeling challenged, resulting in a strong preference for equally-matched play over unbalanced supremacy. As several participants pointed out, “multiplayer isn’t much fun with very different skill levels” (P14) since the same people will tend to win and lose each time, particularly in the absence of a large group adding more variability to the outcome of each game. As P15 stated, she might like competition with equal skill, but “not just being owned,”

or completely dominated by her friends, nor did she enjoy repeatedly “killing” her friend in a game that she was much better at. P3 had a similar experience with his friend:

“[My friend is] very, very good at *Mario Kart* and I’m very, very good at *Tetris*, relative to each other. . . [Because of the skill disparity] we won’t play those as much. . . I don’t necessarily mind losing at *Mario Kart*, and I don’t think my friend minds losing at *Tetris* that much, but, you know, it’s less rewarding when it’s very one-sided.”

As an alternative to competitive play, a few of the study participants expressed a preference for cooperative play with small groups of friends. P14 preferred cooperative play because “everyone wins and loses together.” She felt that competitive play was too competitive because there were so many good players out there, an opinion echoed by P15. P13 also expressed his enjoyment of cooperative games, but noted that they were rare on the DS. This is perhaps not surprising when considering the characteristics of popular multiplayer DS games. Popular competitive games, with their quick rounds of pick-up-and-play action, are well-suited to quick, spontaneous games, particularly with unfamiliar players, as might be encountered at a gaming event. On the other hand, cooperative games typically involve a higher commitment to playing through a game together, and require more communication and knowledge of partners’ skills. The increased trust and commitment, as well as time, required to enjoy many cooperative games suggest that they may have a niche among regular partners such as P12 and P13, who often had two to four-hour game sessions, but may be less appropriate for more casual gaming partners.

5.2.3 Local versus Online Play

As described in Chapter 3, the DS features two methods for connecting with other systems for multiplayer gaming. Local play allows gaming with nearby players, while online play allows for gaming over the Internet with physically distant players. With players’ strong desire for multiplayer, both are used. However, there are several tradeoffs between the two modes. Online play offers access to a much larger pool of players, but at the cost of both game features and social interaction.

The main benefit of online play over local multiplayer is having access to many players around the world. This makes it easier to find someone else playing at any given time, and also allows players to connect with distant friends, such as P6, who stated, “My friends live pretty far, so most of the time we play Wi-Fi, but when I’m with them I’ll play local.”

In order to play with friends online, the DS requires friend codes to be shared in advance. With friend codes for each individual game, described by P1 as “nonsense”, several participants, such as P2, found sharing the codes hard. However, others, such as P13, noted that they could be easily shared online, either by typing

them out into an email to a small group of friends, or by posting them to a larger group all at once on an online message board. In addition to sharing friend codes in advance, online play with friends also requires advance planning, because the DS does not show if your friends are online in other games the way many console and PC online gaming services do. These two factors make pre-planning almost essential to playing with friends online, similar to local multiplayer.

While online play has benefits in its ease of finding opponents, it also has several disadvantages compared to local play. One of these is simply a loss of features. Some features appear to be lost due to technical limitations. In *Mario Kart*, for example, online play is restricted to four players, down from eight in local play, and battle mode cannot be played at all. P6 commented on this and stated that he would “take local games because there’s more to do” and he would prefer the larger group. Other features or game modes are sometimes restricted to online players who are already friends, reducing the options available for random matches. For example, in *Pokémon*, players on one’s friend list can be battled normally, even featuring voice chat, while non-friend random battles are not really multiplayer at all, but rather involve playing against sets of pokémon uploaded by other players, but controlled by the computer. As well, anonymous, online play sometimes suffers from hackers, making the game impossible for others to win. Both P7 and P8 complained about this problem in *Tetris*, where players had managed to hack their games to give them only the most useful pieces, making defeating their opponents trivial.

Certainly the biggest loss in online play, however, is the social interactions: the friendly banter, trash talk, and casual conversation that make playing with other people different from playing against the computer. These social interactions were highly valued by the participants, and their absence from online play made the experience much less compelling than local play. In online play, the lack of communication was felt acutely. P5 called Wi-Fi play “faceless and random”, and stated that “even with strangers, it’s a lot more social playing locally”, while P8, P12 and P13 all expressed a preference for local play because they could “trash talk”. P9 thought online play was acceptable, but complained that you did not get to interact and that you could not type. Despite participants’ comments, it should be noted that several games, such as *Pokémon*, do feature voice or text chat capabilities, however these capabilities are always restricted to players one has exchanged friend codes with. This restriction may lead players to believe that these features are not available, or even possible. As P1 described:

“... it still kind of sucks playing those games online, because, you know, you can’t interact very well. There’s no keyboard to type stuff, and the voice chat, I mean, as far as I can tell the system can’t do voice chat while you’re playing a game... so that kind of sucks.”

5.2.4 Playing with People: The Desire for Local Multiplayer

Through interviews and observations of DS players, it is clear that multiplayer gaming is strongly desired by the participants in this study. This is perhaps not surprising, in light of previous research. In particular, a study by Ravaja et al. [23] in which subjects played the Game Boy Advance in a lab setting either alone against the game, against a stranger, or against a friend, showed that the players had more fun playing against another person than alone, and more fun playing against a friend than a stranger. The humans were seen as more challenging opponents, supporting the desire for competitive play, and the preference for playing with friends suggests that social relationships with competitors enhances the gaming experience.

The desire for interaction and play with physically collocated players is expressed particularly clearly by P8, who emphasizes the personal connection between players in local gaming:

“It’s more about the company you’re playing with, because, when you’re playing against someone online you really don’t see them, you don’t know who they are, there’s no real connection between the two of you, whereas if you’re playing with friends or within a close surrounding at least you can see the person and if you, if they beat you or something like that you can at least congratulate them whereas online it’s just like, he wins, you lose, disconnect, the game’s over and you’re on your way finding someone else to play against.”

5.3 Summary

This chapter described players’ motivations for playing the DS, both in general and specifically for multiplayer gaming. For single-player gaming, the most common reason for play was to pass time. Several characteristics of the DS make it ideal for this use, including its portability, its capacity to quickly suspend and resume games just by opening and closing its lid, and its ability to start up and get into games quickly. These features even made the DS a viable, and sometimes preferable, alternative to the powerful home game consoles that may be available. Overall, these findings demonstrate that the DS’s portability has a significant impact on where and why it is played, with its “always-at-hand” nature allowing it to be used to pass time in environments where a full video game console could not go.

This chapter also explored players’ motivations for multiplayer gaming on the DS. Collocated multiplayer gaming turned out to be highly desirable. Two facets of the multiplayer experience made it particularly appealing: the variety and challenge human opponents provided compared to computer-controlled ones, and the social interactions with other players. Competitive play, which was the main form of

multiplayer gaming observed at events, provided both increased challenge, and the satisfaction of being able to trash talk an opponent during a game, or congratulate them after a win. This friendly banter and interaction, however, was generally missing from online play. This social limitation, along with the games' technical limitations, led players to prefer local multiplayer games. It is these local, personal, closely-connected games that are the subject of the remainder of this study.

Chapter 6

Environments for Multiplayer Gaming

Small enough to fit in a pocket, the Nintendo DS may be taken almost anywhere. In the previous chapter, players pointed out how much they valued this portability, and the ability to play on the couch or in the kitchen. Outside the home, the DS can be played in an even larger variety of environments. Thus, the next question we may ask is where is the DS played? As important as this question is the converse: where is the DS not played? The range of environments where DS gaming takes place reveal how players are integrating play into their lives. Meanwhile, the limits players place on gaming highlight the boundaries that still remain.

This chapter begins with a brief discussion of the portability of the DS, followed by a description of the wide range of locations and contexts where it is played, both in single and multiplayer games. Notably, multiplayer gaming in hostile environments such as the classroom or workplace demonstrates how participants are able to repurpose these environments to create contexts for gaming, a phenomenon we call *renegade gaming*. The remainder of the chapter describes players' judgements of the appropriateness or inappropriateness of environments for DS gaming. A surprising finding is that, despite being desired as a social activity, playing DS is considered inappropriate in many social situations.

6.1 Locations and Contexts for Play

The portability of the DS is a key feature distinguishing it from other gaming systems. Home consoles and PCs have limited portability. Their size, weight, external displays, power cables and hosts of other peripherals restrict where they can be set up and how easily they can be moved. In contrast, the DS fits in a knapsack, briefcase, handbag or pocket, as seen in Figure 6.1, and requires no additional peripherals. As P4 stated, “. . . if I'm travelling somewhere, I just kind of throw it in my pocket and I can use it whenever.” The only real remaining physical



Figure 6.1: A Nintendo DS carried in a pocket.

preconditions for play are that users need to be able to hold the DS and focus on its screens. Thus, single-player gaming can be done almost anywhere. For multiplayer gaming, all that is required is a DS for each player, and so it is equally portable and unconstrained. This portability allows the DS to be played in the wide range of environments described by the study participants below.

6.1.1 Locations and Contexts for Single-Player Gaming

As a handheld, wireless device, the DS can be brought to and played in any number of locations. Once in these locations, there also exist many possible contexts for play, with important differences, such as an empty lecture hall versus one where a class is in session. To find out what locations and contexts the interview participants played in, they were asked the general question, “Where do you play?” Most participants listed several different places, and later revealed more when recounting the details of particular gaming sessions. The environments where single-player gaming was reported are presented here, with multiplayer gaming discussed in the following section.

The most common location participants reported for single-player gaming was in the home. They reported playing in their rooms (P5), in bed (P14), and other locations around the home. Outside of the home, participants played in many locations where they would regularly spend time, such as at school or in the work-

place. At work, P8 reported playing for 15 to 20 minutes during his lunch breaks, while P13 played each morning between phone calls. At school, several participants described playing in class, as well as around campus between classes.

Travelling was another common source of DS gaming contexts for participants. Several played on the bus, from shorter rides on city busses (P15) to long trips to other cities on coach busses (P6). P14 played in the car, P8 played on the train, and P10 played at the airport. As well, four participants even reported playing while walking. Playing while walking was challenging; P12 had given it up, P14 preferred not to do it and commented that reading a book while walking was easier, and P15 mentioned that glare was a problem. However, it was possible to work around those challenges, as P8 did by playing “. . . only if I have someone in front of me walking, so at least I can see them walk, so I follow them when I play,” and P15 did by pausing at crosswalks.

Overall, single-player DS gaming took place in many of the places where participants spent their time day-to-day, particularly at home and, since most were students, at school. It also occurred while commuting and traveling, as well as while passing time in general, such as waiting in a mall (P10) or a restaurant (P13). P4 commented that he would play wherever he happened to be waiting for something, such as “[in a] lobby, anything with a chair, basically.” Thus, players utilized the mobility and at-handedness of the DS to take play with them to many different environments.

6.1.2 Locations and Contexts for Multiplayer Gaming

For multiplayer gaming on the DS, the physical constraints on environments are identical; the only additional requirements are multiple people and systems. Correspondingly, when asked where they played multiplayer games, participants reported a wide range of places, comparable to or even broader than that seen in single-player gaming, reinforcing their strong desire for multiplayer experiences.

In addition to the observed organized gaming events, which several participants attended, many multiplayer DS games took the form of regular meetings with a group of friends. Two participants (P2 & P3) played with friends weekly at coffee shops, and another (P4) in a boring class “. . . that was basically a daily planned event, just because we knew what to expect going into that class.” At work, P10 played with a group of co-workers at lunchtime in their cubicles, and P1 and his co-workers often went out to drink and play at the end of the day. Moreover, since leaving that company, P1’s co-workers had expanded the practice:

“Apparently now they actually have this, like, league where they do, there’s like eight people that play every day, two times a day. They just kind of, like, sneak off into the stairwell and play, like, a game. . . .”

Other games with friends arose simply through being somewhere with other DS players. Participants mentioned playing while waiting in line at a restaurant (P8),

sitting in the car on long family drives (P5), and riding on the bus (P1) or the subway (P10) with a friend. One participant, P6, took his DS along while visiting friends abroad who he knew would want to play, "... we all are confident that none of us will actually forget to bring our DSes if we have them." They proceeded to play together in the apartment where they were staying, on trains and busses, outside, and even at the beach:

"...there was one time where we went to the beach and, you know, we were taking a break and we pull out our DSes then, the glare was horrible, but yeah, even in some places where one might, you know, normally find other things to do than play the DS, we played DS." (P6)

Thus, participants played multiplayer games in many contexts, from planned, daily games in class to impromptu games waiting around in lines. They played multiplayer games in even more diverse locations than when playing alone, a phenomenon that may have resulted from taking advantage of multiplayer gaming opportunities wherever they arose, not just where they planned to play. They also pushed multiplayer gaming into definite non-gaming contexts, something that is explored in more detail next.

6.1.3 Renegade Gaming: Play in Hostile Environments

In addition to playing multiplayer games in environments that were physically inaccessible to other gaming systems, participants also played in environments that were socially inaccessible. They created multiplayer gaming subcontexts within larger host contexts—contexts that do not always consider gaming a legitimate activity. This "renegade gaming" took place in workplaces and lecture halls, during times when game playing would be frowned upon. When P1's co-workers would "sneak" off into a stairwell at the office to play, they organized themselves over email to avoid suspicion. In this setting, simply getting together as a group to talk about playing games would have been discouraged, let alone visibly playing together.

"So I guess they just kind of organize themselves through email or what have you. 'Cause it's at work, so you know, they can't really just congregate, 'cause then they'd think you weren't working, so they have to pretend to work by sending emails." (P1)

The DS's features, particularly its mobility, allowed players to reappropriate a multitude of physical locations and sociocultural contexts for multiplayer gaming purposes, from the office, where gaming would be considered inappropriate, to the line-up at a restaurant, where gaming was merely not an option in the past. By manoeuvring around physical and cultural obstacles, players could game in ways not possible with other gaming platforms. With such freedom, however, the players themselves must set some bounds on what are acceptable contexts for play, discussed in the following section.

6.2 Appropriateness of Gaming Environments

With so few physical constraints on when and where the DS can be played, the limits that remain are primarily personal and social ones. At the personal level, players must feel comfortable playing and be able to pay attention to their games. At the social level, players are aware that others, individuals or society, may consider gaming inappropriate at particular times. During the initial interviews, participants were asked where they played and gave some indications of the appropriateness or inappropriateness of those contexts. To further explore these limits, follow-up interviews were conducted with several participants. They were asked to name appropriate and inappropriate environments for DS gaming, as well as give their opinions on whether particular examples were appropriate or not. While a consensus emerged about the appropriateness of certain settings, different participants drew the line at different points, particularly for certain boundary environments.

6.2.1 Appropriate and Inappropriate Environments

One environment that was unanimously agreed to be appropriate was a doctor's waiting room, where one was expected to occupy oneself while waiting, with reading materials even provided. At the other end of the spectrum, a wedding was unanimously considered an inappropriate place to play, with participants remarking that it would be disrespectful (P5), and so they would simply have to "grin and bear it, even if it was boring" (P6). Other settings were not so clear cut, such as at a restaurant, which was generally considered acceptable, however this varied based on the type of restaurant (it was more acceptable at a fast-food restaurant than at a fancy, sit-down restaurant) and who else was present (it was not acceptable if there were others at the table who were expecting conversation).

One particular setting that appeared to be a boundary environment of sorts, with divided opinions on its appropriateness, was playing in class. Most participants said that gaming in a class was inappropriate, but several of those participants also said that they played in classes despite this, and a few felt that it was appropriate. P9 said she did not think it was right to play in class, but that she did anyway, while sitting in the back. One participant (P5) mentioned sometimes playing on a laptop, which he saw as being less conspicuous than a DS, most likely since he could appear to be taking notes with the laptop, which has a legitimate use in the classroom, while using the DS would make it immediately obvious to any observers that he was playing a game. Others who reported playing in class also tried to keep their games private:

"It was a tech class, it was one of those raised, double desks there, so we just kind of had [the DS] underneath and just passing it around. The teacher notices, but he liked us..." (P4)

Another participant illustrated the difficulty in assessing the appropriateness of gaming in the classroom. First, he indicated that a class is not an acceptable time for gaming, but he then went on to relate a recent anecdote of multiplayer gaming in the classroom:

“But, like, not in class, obviously. Actually, there was this one time when I was in CS class and the guy who was sitting behind me had his *Pokémon* open, and so we’re trading back and forth throughout half the class, like, sort of, kind of secretly behind our computers, although I’m sure everybody noticed.” (P7)

In general, participants seemed to decide whether or not a context would be suitable for DS gaming by their judgment of the social appropriateness of gaming in that environment. In a doctor’s waiting room, gaming was a clearly acceptable substitute for reading a magazine or other ways of passing the time. On the other hand, gaming was considered socially inappropriate in contexts such as a wedding or a graduation ceremony, where participants felt playing games would be disrespectful. However, when faced with the desire to play in a socially inappropriate setting, participants sometimes still chose to play, depending on the consequences. At a wedding, they would risk the disapproval of friends and family members, so they did not play. However, in a class the worst likely consequence would be a request from the instructor to put the system away, which was not a sufficient disincentive to play, particularly from the safety of the back row of a crowded classroom.

6.2.2 The DS as an Antisocial Device: Play in Social Settings

While participants were divided about the appropriateness of playing in environments such as the classroom, one setting emerged where play was almost universally considered inappropriate, namely any social situation where one was a part of and expected to interact with the group. Several participants mentioned that they would consider it inappropriate to play by themselves while with a group of friends:

“I guess if I thought it was discourteous, yeah, I would avoid playing, right. If my friends were in a conversation and I pulled out my DS, I would feel kind of silly.” (P6)

P6 said he thought it would be discourteous to get out his DS in the middle of a conversation; this is a situation where he considered gaming socially inappropriate. Similarly, P2 mentioned that in a group he would not play unless others were, and P11 said she would not play in social situations or while talking to others. P14 also mentioned this notion of rudeness when playing DS while out with friends:

“Sometimes when we go to [a local bar] I feel kind of rude to bring it out whenever I’m talking, even though I’m not particularly joining the conversation. But I do remember [my boyfriend] going to a bar once with his friends for someone’s birthday and I was just like, you know what, I’m just going to take my PSP out and play *Lumines*.”

In this case, P14 had gone out with friends of her boyfriend who she did not know. Since she did not think she would talk to them anyway, she decided that it would be acceptable to get out a handheld game system (in this case the PSP). As she was only a peripheral part of the group, and did not expect to interact with them, play was socially acceptable for her, though others’ opinions, such as her boyfriend’s, may have differed.

A particular context that was asked about in the follow-up interviews was playing at a party. The most common response was that this was acceptable only if others were also playing, or if the purpose of the party was specifically to get together and play. P12 and P13 had held parties where all of the guests had DSes with them and large multiplayer games were played. They had also played single-player or two-player games while spending time with small groups of friends. However, in these contexts, all of their friends had DSes available that they simply were not using them at the time. Similarly, players at organized gaming events were observed playing while conversing with groups of non-players, but all were potential players who would not feel left out, and this was a context where people had gathered to play DS, so it was clearly socially acceptable.

Generally, it appears that if one is out with friends and expected to be interacting with them, then, unless those friends are all included, playing DS could serve to exclude people from an otherwise social event. If one friend did not have a DS, it would be difficult for them to “participate” as an observer because of the need to see the small screen over the player’s shoulder. In contrast, console games are played on a shared display, allowing bystanders to observe, making them more appropriate in social settings where not everyone can play. The impact the DS’s form factor has on spectatorship is discussed in more detail in later chapters.

6.3 Summary

This chapter described the locations and contexts where players used the DS, both for single-player and for multiplayer gaming. Single-player gaming took place in many different settings, from inside the home to walking down the street, including many that were inaccessible to console gaming. Multiplayer gaming took place in even more environments, perhaps because while players had flexibility in choosing where to play single-player games, they would take advantage of multiplayer gaming opportunities wherever they arose. This was most notable in contexts that were previously inaccessible or even hostile towards gaming, such as in the workplace.

In this “renegade gaming”, players took back these contexts and made them into settings for games.

Given all the freedom players had to choose their gaming contexts, the second half of this chapter discussed the boundaries players placed on where they would game. While most physical constraints on where games could be played were gone, players were still aware of the social limitations on DS gaming. Thus, it was acceptable to play in a doctor’s waiting room, but not at a graduation ceremony. However, players also disagreed about the appropriateness or inappropriateness of certain settings, such as a class, and those who felt a setting was inappropriate might play anyway if they felt they could get away with it. Another unanimously inappropriate setting, surprisingly, was at a party. Unless the whole group could participate, it was rude to play, as players would not be interacting with others as much as they should be. Here, the social inappropriateness was due, at least in part, to the DS having something of an anti-social or isolating effect, a phenomenon that will reappear later when players’ shared gaming experiences are explored in Chapter 9.

Chapter 7

Partners for Multiplayer Gaming

The previous chapters have demonstrated players' desire for multiplayer gaming on the Nintendo DS and the wide range of environments where it can occur. In order to actually play a multiplayer game, however, one more thing is required: other people to play with. We wished to learn who those people are and how they are found and selected. The availability of gaming partners can influence gaming practices, particularly around how games are planned. Players' relationships with their partners can also influence their practices. One notable case is of gaming partners with no prior relationship. Playing with chance-met strangers is an option that the DS allows, and players' experiences with this type of multiplayer gaming offer an interesting use of the system's features to explore.

This chapter describes who players game with, and the challenges of finding them. Two particular obstacles to finding partners are identified: a lack of any available partners, and a lack of partners with compatible preferences and abilities. One common solution to these challenges is to plan regular games with known players. The remainder of the chapter describes players' experiences of ad-hoc pick-up gaming with strangers. These experiences turn out to be rare, and so we discuss the practical and social barriers that stand in their way.

7.1 Availability and Choice of Partners

The main requirement of a multiplayer game is, of course, multiple players. When interview participants were asked about their multiplayer gaming experiences on the DS, all reported at least some games, but some complained that it was difficult to find partners. While the DS gives players the freedom to game almost anywhere, anytime, this freedom means that they may end up playing in a place where gaming partners are hard to find. As well, even with the DS's ubiquity, players may find themselves without friends or acquaintances who play, or with friends or acquaintances who are not ideal partners.

7.1.1 Finding Other Players

When participants described their multiplayer gaming experiences on the DS, a common complaint was that it could be difficult to find others to play with. Achieving a critical mass of users is one of the main challenges to the adoption of groupware, and it is no different with the DS. While many systems have been sold, their prevalence varied in different groups and settings. Some participants had many friends with the system, and finding a partner to play with was easy, while some knew few other DS owners, making local play a challenge. Online play was also an option when local players were not available, but, as discussed in Chapter 5, local play was more desired.

Several participants reported having trouble finding gaming partners because their friends or co-workers did not have DSes. This was particularly true in the workplace, where P3 commented, “None of my co-workers have a DS. With a couple of exceptions they’re all, like, fifteen years older than me.” P8 had a similar experience at work:

“[I played] by myself; everyone at a bank is way older than I am, so, they don’t have a DS or probably don’t know what a DS is, and even if they do it’s because their kid has one.”

Even among similar-aged peers, some participants reported having difficulty finding gaming partners. P5 commented that not many of his friends at school had DSes, so when he was at school he only played at gaming club events. Timing was also a problem, with participants reporting that they would see others with DSes, but it was never at the right moment. One participant, P10, said he did not play much multiplayer because not too many people he knew had the system and he did not often have it with him. Similarly, P8 commented that whenever he played he did not really see other people playing and P3 said, “It’s very seldom that I’ll actually see someone else who has their DS when I have mine with me as well.”

7.1.2 Finding the Right Partner

Even when other DS players are available for a multiplayer game, they may not be ideal partners. Differing game preferences and skill levels can make the problem of finding someone to play with even harder to surmount. Several participants reported difficulties playing with their friends because they liked different types of games. P13 mentioned that it was hard to find two people who like a certain game, and P15 described wanting to play with a friend, but being unable to because of their different tastes in games:

“...When I see my friend playing, I would see what she’s playing and see if we could play, but then usually I just watch her play or she just

shows me something. Mostly because I don't have the same games she does, we have different tastes, like I don't play Pokmon at all, and she does a lot."

Even with friends who like the same games, some participants had trouble playing with them due to very different skill levels at those games. In Chapter 5, equally-matched players were identified as being crucial to enjoyable competitive games. However, even among close friends who play together often, such as P12 and P13, this was still a problem:

"Another problem is that, for the most part, him and I, it's, um, if one person's good at the game, the other person kind of tends to stink. So, it ends up being that, since most games are competitive anyways, it's not that much fun, one way or another. It's like, 'Oh, let's play to get my ass kicked.'" (P12)

Other participants described having to avoid games where their ability differed significantly from that of their friends: P3 said he and a friend did not play *Mario Kart* or *Tetris* very often due to skill differences, and P8 spoke of choosing to play a new game that he had just bought when playing with some friends to ensure they were all starting from the same level: "...it was fairly new, so we were all about equal level."

Once a partner with similar tastes and ability was found, players were also seen trying to keep their skill levels equal. This was demonstrated by a pair of players at one of the observed DS gaming events who appeared to have implicitly agreed to preserve their equal footing. One remarked that he had not played since their last match together (at the previous DS event) and the other replied that he too had only played that day to relearn the game, thus maintaining the enjoyable level of competition they had found with each other previously.

7.1.3 Arranged Gaming: Creating Critical Mass with Planning

While several study participants had difficulty finding partners for multiplayer gaming, others were able to play quite frequently. Unlike the participants whose friends and co-workers did not play, most frequent multiplayer gamers played regularly with friends or colleagues. This play generally took the form of planned or semi-planned games, where groups either gamed regularly at particular times, or had simply established that they would always have their DSes at hand and ready to play together. As P1 described:

"I think the two distinct situations are you plan ahead of time, like the gaming events here, or you know a bunch of people who already have

their systems and it's basically just a question of did you bring, you know, such-and-such game today?"

This planned gaming was seen at its most explicit at the DS events organized by the campus gaming club. P6 described going to these events as a way to find other players, since he was rarely able to play with his close friends:

"[Playing with people who I'm friends with] doesn't happen all too often, especially using the normal ad-hoc mode, as opposed to the Wi-Fi mode, so sometimes I go to, you know, these gamer gatherings and the like, I see if anyone wants to play there."

Amongst smaller groups of friends, several participants described gaming that was planned ahead of time, often at regular weekly or even daily intervals. P2 went out for coffee with friends once a week who made it habit to bring their DSes, and P3 went to a café on weekends where friends would often show up with their DSes to play. P10 was part of a group at work that played at lunchtime in their cubicles, while P1 played every day at lunchtime with co-workers, and often after work as well, when the group would go out together.

Regular, planned gaming did not need to start out that way, or be explicitly planned either. P4 described how playing in a class became a regular activity:

"Well, one class we just really didn't do anything. . . . That was basically a daily planned event, just because we knew what to expect going into that class. . . . [The first time] I think I had it out during a break, and I just didn't turn it off once the class started, I just started passing it around and people got interested in it, so, it just kind of went from there. . . ."

Other frequent games emerged because participants were with friends who knew implicitly or had planned to always have their DSes with them, making gaming consistently available. P1 described such a situation at work: "...when I was working last summer basically everybody had a DS, it was just a question of, 'Oh, did you bring this game today?' Right?" Similarly, P9 regularly played between classes with one particular friend; they always carried their DSes with them and just she just said, "Let's play," when she wanted to start a game. When planning a trip abroad, P6 noted that his friends made sure of this by reminding everyone to bring their DS:

"Usually, when we're doing these plans, someone will throw in a, you know, 'Bring your DS'... We usually mention that if we're doing email communications or something, although, I think we all are confident that none of us will actually forget to bring our DSes if we have them."

Thus, whether setting explicit times for gaming or just ensuring that friends would always have their DSes at the ready, planned gaming with friends emerged as an ideal way to ensure that multiplayer partners would be in good supply.

7.2 Playing with Strangers

In the previous section, it was noted that participants sometimes had trouble finding partners for multiplayer games. Those who played regularly often did so in places where friends or acquaintances were easily found, such as at work or in the classroom. However, the DS's portability allows play in places where friends would be less likely to be found, such as on the bus or at the airport. When playing in these locations, there may be other DS players present who are not acquainted with each other but could potentially play together. With the support of features such as wireless networking and download play, these games are certainly possible, and so they are an interesting phenomenon to investigate.

7.2.1 Ad-Hoc Gaming

In order to learn about the prevalence of and interest in ad-hoc pick-up games with strangers, interview participants were asked explicitly whether they had ever played games with strangers or, if they had not, whether they would want to do so if the opportunity arose. For a few participants, such a situation had never presented itself. P3 described playing alone on the bus and in other public places, but said that he had never “had that kind of chance encounter,” while P10 said he would ask a stranger to play, but he had not run into people with DSes. P1 appeared cynical about the very idea, stating:

“The advertised idea is that you’ll be riding on the bus, you’ll be like ‘Ooh, let’s play a game,’ right, which never happens.”

However, interviews revealed that some participants had been in situations where this ad-hoc gaming was possible, though few had actually played a game. Nevertheless, they expressed an interest in playing such ad-hoc games if the opportunity would present itself. P6, who regularly played alone on an inter-city bus said:

“No one really seems to strike me up in conversation about it. I don’t know. I have seen other people play on the bus, admittedly, uh, but I haven’t really, I didn’t really talk to them either. I guess it was because they weren’t really right next to me ... but I’d certainly be interested in playing a game.”

On the other hand, several participants reported having played with strangers on one or more occasions. Some initiated the games themselves, such as P6, who saw another student with a DS playing *Mario Kart* between classes and asked if he felt like playing together. P7 was even more proactive, stating:

“Basically wherever I am, if I have my DS with me and I see other people with their DS, I’ll ask them, like, what game they’re playing or whatever. If they’re playing a game that I have with me, then we’ll play multiplayer. Or also...even if I don’t have the games sometimes I’ll, if the game that they’re playing has a download play feature I’ll just strike up a multiplayer game with them.”

Other participants had been approached by others to start games, such as P12, who had been challenged two or three times on long bus rides, and P14, who had been asked to play once at school between classes. Overall, however, while all but one participant were eager or at least open to participating in ad-hoc pick-up games with strangers, they were not common: only five out of fifteen participants said they had played such games.

7.2.2 Talking to Strangers: Barriers to Ad-Hoc Gaming

Given participants’ desire for local multiplayer gaming in general, and the interest most expressed in ad-hoc games with chance-met opponents, it is interesting to examine why these games were relatively rare. There appeared to be several barriers, both practical and social, that prevented more of such games from taking place. The major hurdles were finding other people with DSes and making contact with those people, along with associated problems such as knowing what games people would like to play and whether they would have enough time for a game. P1 summed up his thoughts on the difficulty of surmounting these barriers, particularly within the constraints of a situation such as a bus ride, as follows:

“So, like, there’s two kinds of people in the world, those with DSes and those without them, and you need to find out if they’re one of them. And then you’ve got to figure out what games they have after. I mean, put those two together, and it’s like a mountain, you know, I’m not gonna climb. I’m not gonna climb a mountain on a bus, that’s for sure, because mountains take long. Plus, your trip’s short, I mean, by the time it’s done, that’s it.”

Still, despite these barriers, players desired pick-up games, and so they utilized several workarounds to facilitate ad-hoc gaming. This section describes the two major barriers players faced, finding other DS players and making contact with them, and how they attempted to get around them.

The very first barrier to ad-hoc pick-up gaming that players face is simply finding others to play with. One way to find players could be by meeting at established multiplayer gaming locations. However, with gaming taking place in such varied contexts, there are few such obvious locations that players could seek out for pick-up games in the same way that players seeking a pick-up game of basketball or

soccer could go to a public basketball court or soccer field. As well, a key feature of the DS was its ability to support play almost anywhere, so even if these locations existed, players would still seek partners outside of them. In environments that are not gaming-specific, such as on a bus, it is hard to determine who has a DS and would like to play a game.

Several workarounds have been adopted by players in order to find other DS owners interested in pick-up gaming. Three forms of these workarounds were observed: the use of online communities and forums to advertise and seek out known locales for ad-hoc gaming, making one's DS publicly visible to advertise the possibility of a game, and commercially available "DS Buttons" to advertise one's willingness to play particular multiplayer games.

One approach to finding other players for ad-hoc games was to use online forums and groups in order to discover and promote locations where players seeking pick-up games could congregate. For example, a player about to go on a trip posted the following request on Nintendo's online forums, seeking known locations for DS gaming in a particular city:

"I'm heading off to Toronto, Ontario for a short vacation, and I'm bringing my DS with me. But, since Toronto is a big city, I'm sure there are places to go and play my DS and probably be able to play against other people. I know there's always Nintendo WFC [Wi-Fi Connection], but I found it more challenging and fun to play by DS to DS. (and I still be playing against complete strangers anyways.) So, it's worth a shot... where are good places to play my DS in Toronto?"

To locate other interested gamers who were nearby, many online groups existed for particular areas. On the social networking site Facebook, regional groups such as *Tri-City Hand Held Gamers* helped individuals find other players in a given area, while more tightly focused groups such as *I'm at DC library right now and I have Nintendo DS* seemed to be aimed at creating a known location for pick-up gaming. Study participants also used online forums to facilitate the efficient mass exchange of Wi-Fi Connection friend codes for Internet play.

The simplest approach taken by the study participants to make others aware that they had DSes and were available for games was merely to make their systems publicly visible. It was a tactic suggested by P3: "I can just, you know, carry my DS out and, like, have it out there..." Making one's DS visible could get the attention of other participants like P14, who liked to talk to people who are passionate about games. P6 also explained why seeing another person with a DS would get his attention:

"Even the sight of a DS is kind of interesting. I mean, I guess in a sense, all handhelds are, I mean, because I'm a gamer, it interests me more if someone's holding a handheld, right? I mean, it makes me think, 'Oh,

this person's pretty clearly another gamer, right?' ... One of the biggest gamer friends I made [at a summer program] happened to be playing a DS on the bus rides, and one of the reasons why we started a conversation was because he had a DS. It came up in conversation... 'Oh, you have a DS, what were you playing?'"

Finally, another novel way of making one's availability for multiplayer games more visible that was mentioned by two participants was through "DS Buttons"¹, third-party buttons that feature small logos corresponding to popular multiplayer DS games. By affixing buttons to backpacks, clothes, and so on, players could publicly advertise that they owned DSes, implicitly, and, specifically, that they had certain games. While participants noted the existence of these buttons, none had actually seen any in person.

In addition to the practical challenges, participants also faced social challenges to starting ad-hoc pick-up games. With the heavyweight connection process required by most multiplayer games (described in more detail in Chapter 3) out-of-band communication is essential. This means that players must interact via some means other than through the DS, typically face-to-face. The requirement to walk up to and start a conversation with a stranger proved to be difficult and uncomfortable for many participants. P12, who wanted to see what others were playing before suggesting a game with them, felt uncomfortable just trying to do that, since he had to get so close to watch and he felt awkward himself when someone he did not know was watching him play. Another participant, P3, described feeling weird about "accosting" a stranger, suggesting he did not want to appear to be interrupting the other person and demanding a game:

"I actually don't know what I would do if I actually saw someone else who also had their DS. I think if they were playing the same game as me, I might suggest that we play against each other, but I think if they were playing a different game I probably wouldn't. Um, and I think that's just because I'm not sure how I would approach it. Um, it seems a little weird to sort of, like, accost a stranger about that kind of thing, but I mean, that presumably happens."

For several participants, making contact was a hurdle left to the other player. P8 said that if someone approached and asked him to play, he would be up for it, but he liked to give people their space, and P14 said that she does not usually approach others to play, but she did not mind being asked. Overall, only two participants had actually initiated pick-up games themselves, highlighting the breakdown that was occurring between players' desire for these games and their willingness to ask another player to start one. However, there were some environments that appeared to counter this problem somewhat.

¹<http://www.dsbuttons.com>

Initiating contact with others players appeared to be particularly problematic when it was occurring outside of expected gaming contexts. It is notable that in situations where more DS players gathered and were ready to play, this problem was reduced. P8 pointed out the organized gaming events as examples of these contexts:

“On the subway you’ll see someone playing DS but you’re not even sure who they are or whether or not they’re playing something that you have or anything like that. . . It’s just awkward to process, it’s not like, ‘Hey, I see a DS, you wanna play against me?’ or something like that, it’s kinda awkward, so, usually, like, at [gaming] club games where you know people have the system and it’s the environment where you’re comfortable playing with other people, that’s usually when I actually play multiplayer games.”

P8 also mentioned that at a gaming convention, you would just find someone and ask to start a game, while in a more open environment like a train it is harder to communicate that you want to play with them. P12, P13 and P14 all also mentioned gaming and anime conventions as places where gamers congregate and, therefore, where pick-up DS games are more common. However, a couple of participants were even intimidated by other players at these organised events, such as P14 who went to the gaming events with friends but mostly played on her own, and said she had been interested but scared to ask to join games in the past.

These problems suggest an area where the current hardware and games on the DS are not fully meeting the needs of players seeking semi-anonymous, ad-hoc, pick-up games and inspire several of the design implications to come in Chapter 10.

7.3 Summary

This chapter described the people DS players gamed with, how they were found, and the difficulties in locating appropriate partners. Generally, players gamed with people they already knew, though this was a problem for players whose friends did not have DSeS, were not interested in the same games, or did not play at the same skill level. The players who did play regularly planned multiplayer games with their friends in advance. The organized gaming events that were observed during this study are a prime example of how planned gaming sessions facilitated locating partners for multiplayer gaming.

The freedom that the DS’s features afforded players, however, allowed multiplayer gaming in another situation, perhaps the opposite of planned gaming with existing acquaintances: unplanned, ad-hoc gaming with chance-met strangers. These games turned out to be rare, though generally desired; significant barriers stood in the way of initiating pick-up games. Ironically, the portability that allowed the DS

to be put in a pocket and played anywhere also meant that the systems were easily hidden and players could not find fixed locations for gaming. The system's requirement for out-of-band coordination to start most games also caused a problem by forcing would-be pick-up gamers to approach other players face-to-face, something most players felt awkward doing. However, players' attempts to solve these problems through various workarounds highlight how desirable this type of play is to many DS gamers, suggesting that pick-up gaming is a multiplayer style that future systems should work to support better.

Chapter 8

Coordinating Multiplayer Gaming Sessions

Once all of the required components for a multiplayer game on the Nintendo DS are in place, there are still a number of decisions to be made and steps to be completed before a game actually commences. Games must be formed and wireless connections must be made. The design of the system and its games, described in Chapter 3, have a strong influence on the game formation process and players' experiences of it. These experiences reveal shortcomings of the system and ways in which game formation could be streamlined and improved.

This chapter describes various aspects involved in coordinating multiplayer gaming sessions. The first section focuses on coordinating the formation of gaming sessions. It describes three decisions players face: forming groups of players, choosing games to play, and selecting amongst the various modes and options offered by the games. The second half of the chapter describes coordinating the start and end of games. Overall, the coordination required to begin games adds to the burden of initiating both planned and ad-hoc games, and contributes to players' perception of multiplayer gaming as requiring a large commitment.

8.1 Forming Gaming Sessions

The main requirement for multiplayer gaming is a group of players who wish to play together. In interviews, study participants described two main situations where gaming groups were formed: with friends or at organized events. When playing with friends, the process of forming a group did not really involve selecting players, but rather transforming the existing group into a gaming group. This was generally accomplished by suggesting a game, as P1 described when starting games with his friend on bus rides together: "It was like, 'Hey, did you bring such-and-such?' He's like, 'Yeah, so let's play.'"

In contrast, the organized gaming events that were observed directly and described by participants required more explicit group formation. However, groups were still formed in essentially the same way: by suggesting a game and asking who else wanted to play. A typical exchange from a DS event we recorded is shown below:

S1: “Anyone want to play *Mario Kart*?”

S2: “I’m down to play *Mario Kart*, if we get enough people.”

S3: “I’m up for *Mario Kart*.”

In this case, the three players S1, S2 and S3, were part of a larger gathering at the event. Initially, players were sitting and standing around the room, some playing single-player games. S1 initiated the formation of a group by asking the nearby players if any of them wanted to play a particular game. Two players, S2 and S3, spoke up immediately, with two more joining as the group set up. This formation of groups around a particular game was the typical way that players at events connected, particularly when they did not know each other.

8.1.1 Choosing a Game

Unlike the groups formed around games described above, when playing with friends groups were often formed just with the intention to play together, without a particular game in mind. In this case, a suitable game then had to be chosen by the group. Similar to when forming groups, most often the game was determined simply by whatever the first suggestion was. As P2 described, the first person to suggest playing would often pick the game and the rest would just join in. Sometimes, games were pre-planned, as when P3 met a friend on weekends to play *Animal Crossing*, or selected based on evening-out skill levels, as described in Chapter 7, where P8 gave an example of this when waiting at a restaurant with friends:

“I recently picked up *Planet Puzzle League*. . . and I said, ‘Wanna play?’ . . . It’s a game that [my friend] hasn’t played yet, and it was fairly new, so we were all about equal level, so we just decided, like, it’s a new game, let’s try it out.”

Occasionally, groups appeared to hardly consider their choice of games at all. For instance, P4 wanted to play with a friend and found that they only had one multiplayer game, leaving them without any real choices to make, while P6 described an even more laid back attitude when choosing a game to play with his friends, stating: “It was actually whatever game was. . . inside the system and that we’d played recently.”

One additional thing that was noted, from both the events and interviews, was that there appeared to be a few multiplayer games that were considered default

choices that all players would have or want to play. Two games in particular stood out as commonly suggested multiplayer games: *Mario Kart* and *Tetris*. P13 described them as the “de facto” multiplayer games, and P12 felt that while, in general, it was hard to find two people who liked a certain game, everyone had and knew how to play *Mario Kart* and *Tetris*. Describing why he played multiplayer games on the DS but not another handheld gaming system he owned, P1 explained:

“... Every person on planet Earth owns a DS and they all have *Mario Kart*. So *Mario Kart* is like the current example. I mean, there’s fun mini-games and other things, but, like, it’s basically *Tetris* and *Mario Kart*, as you probably know. Almost everybody always plays.”

8.1.2 Selecting Options

Once a group and game were decided on, one more decision, or, often a set of decisions, still needed to be considered: the choice of game options. Games may feature many options that can be set by the host or players. The options in *Mario Kart* include the game type, class (speed), whether program-controlled karts will fill empty slots, how courses will be chosen, how a winner is determined and whether or not players will compete as teams. With such a large number of options, deciding between them could take minutes, unless some mechanisms, such as defaults and standards, agreement, or expert advice, were used to speed up the process.

In *Mario Kart*, the multiplayer game most commonly seen during the observed gaming events, being a standard multiplayer game seemed to come along with a set of standard options that players at events would assume and set without discussion. One such convention was playing at the 150cc class, i.e. the fastest speed. At events, many hosts set the class to 150cc without discussion, while one asked whether he should select 150cc or Mirror, a variant of 150cc, with no mention of the slower classes. Other standard options were the “free win” condition, where games went on indefinitely, rather than ending after a certain number of races, teams being turned off, and random course selection, instead of courses being chosen by the host after every race. These standards were usually unspoken at events, but were mentioned when hosts did not select them, for example, hosts at two different events were told by players to turn on random course selection.

While many options in *Mario Kart* had standard settings, some were more frequently changed, usually by group agreement. Options such as whether program-controlled racers would be present in *Mario Kart* or whether special items would be turned on in *Tetris* drew differing opinions from players, and tended to be decided on a game-by-game basis. This decision appeared to be done by consensus; however, often only one or two players would speak out when making such decisions at events, with other players simply going along with the suggestions, whether they agreed with them or not. As P4 described, when there was an organized group, the first person to say something usually decided it, barring any major objections.

In interviews, participants explained that they would generally go along with what others suggested, without speaking up, or else just not play:

“I’m pretty laid back. [Playing with non-preferred settings] doesn’t bother me. . . If it got to the point where I just really didn’t like it, I’d probably just quit the game. Everyone else must be enjoying, seems to be enjoying it, so there’s no point trying to change it, everything, for one person. I can just go find another game, probably.” (P4)

More group input was seen in the choice of options when playing with friends or in smaller two or three-player groups. In many of these cases, the host was seen asking the group about most of the options directly, and they were occasionally discussed. However, frequent gaming partners also had established conventions; for example, P5 and his brother always played the 150cc class in *Mario Kart*: “We’ve pretty much just been doing that since [*Mario Kart*] 64. Never even played the other two settings. . .”

Friends may have also chosen not to coordinate explicitly because they were confident that they would choose the appropriate options for playing together. Playing a puzzle game with his friends, P8 described: “We figured that we’re capable of playing this game by ourselves, we don’t have to make sure everyone’s on the same page. If you think it’s too hard on a level you can dumb yourself down to beginner’s, we don’t care.” In this case, the host could select the game’s difficulty and the level, but the group did not discuss it, since players could use personal handicaps to compensate if the hosts’ choice was too hard for them.

Finally, when playing games that were less well-known than the ubiquitous *Mario Kart* and *Tetris*, players would tend to defer to a more expert player of that game who could suggest the best choices. For example, when playing a baseball game at an event with a new player, the owner of the game, S1, told the new player to set it to three innings, since he would be losing and probably would not want to drag out the game. The following example and P8’s mention of personal handicaps suggest that one important aspect of options selection is to maintain an evenly-balanced game that will be fun for all players. As P4 said,

“I’ve seen it in a couple weird cases where it’s some odd game, or some game that’s been played a lot. . . Just some kind of obscure game which not many people have, or some very experienced genre people like to play like *Advance Wars DS*. . . because it’s more of a tactical based game so, there’ll be the general, more advanced players to know which maps are better, which maps are balanced, which maps are unbalanced, how to exploit certain parts of a map, so they’ll try to avoid those, while another player might think this is a fun map.”

8.1.3 Heavyweight Coordination: Negotiating Play

Throughout the processes of forming groups, choosing games and selecting options, it becomes clear that these tasks require heavyweight, out-of-band communication. The DS and its games provide very little support for forming groups and choosing games, and no support for choosing options collaboratively. This means that communication and coordination take place through face-to-face conversations.

Requiring this direct, verbal interaction to coordinate game sessions can make it harder to start a game, particularly an ad-hoc game. The first reason is the need to speak to other players directly, which, like simply making contact with a stranger (as described in the previous chapter) is very uncomfortable for many players. This increases the burden on players wanting to start an ad-hoc game, making them less likely to bother. The large amount of coordination required also increases the time needed to get a game going: at one DS gaming event, a five-player game of *Mario Kart* took over five minutes to start, while a three-player game of *Elite Beat Agents* took almost twelve. This also acts against ad-hoc games, since players often will not be in locations such as on the subway very long and will not play unless they know they have time for a meaningful experience. Thus, the heavyweight coordination requirements appear to have a negative impact on ad-hoc gaming.

8.2 Starting and Ending Games

In addition to the decisions players must make when coordinating the formation of gaming sessions and selecting options, most games require additional coordination in order to actually connect systems. Chapter 3 described the most common connection style used by multiplayer games on the DS: hosted games. In these games, one player, the host, creates a game on their system, which other players can then join. This imposes additional synchronization requirements on players forming and leaving games.

8.2.1 Hosting and Joining

Beginning a hosted game requires that a single host player, with a copy of the game card, start a game that the other players, possibly including ones playing through download play, will then join. During interviews, participants were asked to recount the details of specific recent multiplayer gaming sessions and about their experiences with pick-up gaming, where connection issues were mentioned frequently. This process was also observed directly at gaming events, where coordination issues became more pronounced, likely due to the larger groups of players participating.

The first step in the process of hosted game formation is the selection of a host. Among friends, this decision was usually dispensed with quickly, as P6 described: “Since it wasn’t going to be for a particularly long period of time, uh, it was just

kind of like a mumbling of ‘OK, I’ll host’...we really just went with what was happening...” The specifics of joining games were not recounted in participants’ descriptions of gaming with their friends, suggesting that it was not a step that caused difficulty in those situations.

In contrast, starting games with groups at gaming events posed greater coordination challenges. Most often, the player who suggested a particular game would then host, since he or she typically had the game readily at hand. However, when this was not the case, players sometimes had trouble coordinating who would host. In one game observed at a DS gaming event, the host stopped playing and the other players wished to re-form their group. They sat waiting for some time, and then a player asked who actually had the game and was capable of hosting. A few players offered to host but nothing happened until one player said decisively, “I’ll host,” and created a game. In this case, several players were willing to host, but they were hesitant to start without knowing if another person was about to start a game.

After a host has been selected and has started a game, the other players join the game, which the host can start once all players have joined. This introduced another coordination issue at gaming events, when all players intending to join a game may not have told the host or have been sitting together as a group. In one six-player *Mario Kart* game observed at an event, the host, unsure of exactly who was playing, asked several times whether everyone who wanted to play had joined. After not receiving a response to several questions, he counted the people holding DSes and then proceeded, since they were equal to the number of players in the game. Also, the host sometimes had to coordinate with the group to find out if any players needed to use download play, which required the selection of a different game mode by the host before others joined in certain games, particularly *Mario Kart*.

An important concern, both to the host and the other players, was that all players had joined before the game was started. In all observed hosted games, new players could not be added to the game once it had started, thus, if one player was left out, the entire group would have to exit and re-form the game to add the missed player. This occurred at a game event, where a host started a game of *Mario Kart* in the mode that did not support download play, although one player needed it. As the first race was starting, another player noticed that the player sitting beside him was not in the game. He commented to the host, “Hey, you didn’t get him in. You didn’t do download play, did you?” The game was then ended and re-formed to let the download player join. Thus, due to many hosted games’ inflexibility, coordination during the phase when players were joining was important to starting the game quickly.

8.2.2 Leaving a Game

While coordination was most necessary at the start of hosted games, some need for coordination at the end of hosted games was also observed at gaming events. As described in Chapter 3, hosted games varied in how they handled a player leaving the game. In all cases, if the host left, the game would end, and in some games, such as *Tetris*, the game would end for all players if anyone left. This behaviour caused some interruptions to games when players had to leave the group early.

At DS gaming events, players were observed leaving group games for a number of reasons. Typically, when players decided to quit a game, or were leaving the event, they would stop at appropriate breaks in the action, i.e. between game rounds. Players were only observed dropping out mid-round when their batteries had died. Still, whenever a player had to leave a game, with rare exceptions in *Mario Kart*, the game was ended and would have to re-form. This could cause confusion and delays for the remaining players, as in the incident described in the previous section when players were unsure of who would host after their original host left.

Interestingly, players at events appeared to make some judgements about the validity of different reasons for leaving games. For example, at one event, several people left early to go to classes or exams without comment. However, a player who left to catch a television show was given a hard time by some of the others he had been playing with, one mockingly making an announcement to the room that the show was starting soon. In this case, leaving early and disrupting the group's game for a more frivolous reason may have been looked down upon by the remaining players, suggesting that players needed to justify these disruptions to their partners.

8.2.3 Heavyweight Connections: Inflexibility of Groups

As described above, starting and leaving hosted games, the most common type of multiplayer games, required some coordination due to the limited windows of opportunity in which this could be done without disrupting others. If players missed the initial window to join a game, then the game would have to be ended and restarted in order to add them. Likewise, if players wanted or needed to leave a game before the others did, they would often end the game prematurely for everyone. Both of these situations were observed at gaming events. In addition, these coordination issues came up in interviews when participants discussed their experiences with and thoughts on ad-hoc pick-up gaming.

With the relative inflexibility of gaming groups, particularly in regards to leaving, players seemed to consider multiplayer games to be a relatively large commitment. One participant, P12, who had participated in several pick-up games on long inter-city bus rides, commented that one of the reasons he thought these games were possible was because of the fixed time period the bus trip offered. He and

the other players knew how long they would be there and could plan their games accordingly. Similarly, P1, who had played on a city bus after school with a friend, commented that the reason they could play together was because they knew how far they were going, and that they would be getting off together at the same stop. This contrasts with starting a game with a stranger on the bus; since the other player's final destination would be unknown, the game could come to an abrupt end at any time.

Similarly, the inability of most games to allow players to join games in progress may have contributed to the barriers players faced starting pick-up games. One of the reasons several participants reported for feeling awkward about approaching a stranger to start a game was that they did not want to disturb the other player. In most games, for a player currently involved in a single-player game, starting a multiplayer game would require exiting their current game. Several participants suggested that ways to join another player's existing game would be beneficial. P1, for example, would have liked to see a system like in classic multiplayer arcade games, where other players could just walk up and join:

“So you could do, like, in an arcade where you pop in a quarter and just hit ‘Two Player’ to play. You could almost do that with games, like ad-hoc, which would be really cool. . . It would be really cool to, like, have some guy play a fighting game you could just be like, join in.”

While there are certain games that allow more fluid connections, such as *Pokémon* and *Animal Crossing* (described in Chapter 3), the most common multiplayer games observed in the study were hosted, with strong coordination requirements and inflexible groups that were largely fixed at creation. This appeared to impact participants' willingness to participate in ad-hoc pick-up games, since both joining and leaving games at uncertain times could negatively affect the gaming experience. Like the heavyweight coordination discussed in the last section, these heavyweight connection requirements seem to work against ad-hoc gaming.

8.3 Summary

This chapter described how groups of players made decisions when forming game sessions and coordinated the start and end of individual games. To start game sessions, players had to form groups, choose games and select options in those games. In each case, the most common way this was handled was by simply accepting the first suggestion offered by a player. Even when players disagreed with a suggestion, such as the setting for a particular game option, they would not typically voice their opinions. Standard settings also emerged for popular games, limiting the decisions that had to be made. Players' use of immediate agreement and de-facto standard settings facilitates quick game formation, minimizing time wasted on disagreements. However, when playing with a complete stranger, standards may differ and more

coordination may be required. This demands face-to-face interaction, which players felt uncomfortable with, and increases the time required to start a game, both of which may discourage pick-up play.

In addition to the decisions that had to be made before starting a game, the connection process in most games also demanded tight coordination between players at the start and end of games. Hosted games required all players to join at the same time, without the ability to add players later. This caused difficulties with larger groups at events, which would need to exit and re-form their games if even one player was left out. Similarly, many games would end if one player left, and always if the host left. This limitation meant that players also had to coordinate the end of games. One consequence of this required coordination is that playing a multiplayer game on the DS becomes a fairly large commitment. For example, at gaming events players appeared to have to justify their reasons for leaving a game prematurely. This commitment again discourages pick-up games, since players may not want to commit to a game when they only have a short time to play, or to bother initiating a game without knowing how much time the other player can commit.

Chapter 9

Sharing Multiplayer Gaming Experiences

The previous chapters have described why, where, with whom, and how players engaged in multiplayer games on the Nintendo DS. The final question that the study sought to answer was what is the experience of participating in such a game? In particular, we are interested in the social experience, which is shared with other players in the same game and with spectators. This experience is an aspect of DS gaming that is particularly influenced by the form factor and hardware characteristics of the system, since they determine how both players and spectators can experience games. It is also where two contradictory aspects of the DS meet: social gaming on the DS involves using completely individual devices for a group activity. This contradiction is not present in multiplayer gaming on a shared console. Thus, comparing the two experiences can also yield insights into the social aspects of multiplayer gaming on the DS.

This chapter begins with a description of how multiplayer gaming on the DS is experienced and shared with the rest of the gaming group, including how groups of players physically position themselves and how players interact during games. The shared social experience is also compared with multiplayer gaming on consoles, with the key difference identified by the participants being the system's different types of displays. The DS's personal displays cut off group awareness, while the console's shared display gives players a common focus. The next section describes how the gaming experience is shared with spectators who are not playing the game, including the types of interactions players share with them. Again, the spectator experiences offered by the DS and consoles are compared, with the DS offering much poorer support. The final section synthesizes the previous discussions about sharing games with other players and with spectators and explores the idea of the DS as a personal, individual device. Comparing the DS to another personal device, the Walkman portable audio player, similarities emerge in how these devices can cut off their users from the outside world. In the case of the DS, all gameplay takes place close to the player's body, creating an isolating effect we call the "private gaming sphere".

9.1 Sharing Experiences with Gaming Partners

Collocated multiplayer gaming is typically a group activity. Players are playing with other human beings in close proximity to them. Thus, they experience their games not just as personal events, but also as group encounters. The interactions that take place in-game are augmented with interactions in the physical world. The social gaming experience, therefore, is a combination of these interactions.

9.1.1 Physical Positioning of Groups

The most readily observable aspect of players' interaction in games is how they arrange themselves in space. Since players each have their own systems, and the wireless connections between them have an advertised range of 30–100 feet, groups can arrange themselves in many configurations. Players can sit side-by-side or at opposite ends of a room, facing each other or back-to-back. The DS imposes no constraints on how players position themselves relative to each other, except the requirement to be close enough to maintain wireless communications. However, in observations of gaming events and in participants' descriptions of their experiences, players sat in more regular configurations.

Describing how they sat when playing together, participants did not have a specific standard layout, but they did emphasize sitting close enough together to interact easily. Orientations were varied: P7 said he and his friends usually played face-to-face, while P2 said he sometimes sat facing away from others. Distances, however, were more consistent. Participants emphasized that they wanted to be close enough to interact. For example, P4 said that when playing in groups, they sat close enough to shout at each other, and P5 said:

“[We sit] just mostly in the same room, wherever there's, like, a couch or something. Enough so you can hear them speaking, but not high-fiving range.”

P5's comment emphasizes that players may want to sit close enough to talk, but not necessarily physically interact. That players would want to sit close enough to converse is not surprising, given their desire for social gaming and their preference for local games over online games.

At gaming events, the majority of observed players still sat together when playing in groups, however they were occasionally more spread out. For the most part, players arriving alone spread out across the space, sometimes playing single player games while waiting for a multiplayer game to form. Friends arriving together usually sat in groups. As multiplayer games started, the people forming them moved closer together, getting within conversation range. Groups sat around tables, made circles of chairs, sat side-by-side along walls, or clustered together on the floor.

However, groups could be large, with as many as ten players in a game, and changed over time. Because of this, players in the same game were not always seated within a few feet of each other. As groups got larger, they could begin to spread out, particularly if they were arranged in a row instead of a circular configuration, leaving the players at the ends up to a few metres apart. In addition, as players moved between groups, they did not always physically move to sit with their new groups, sometimes ending up on the other side of the room. Players were also occasionally separated from their groups due to physical constraints, particularly the need to sit close to power outlets when their batteries had died and they needed to plug in their AC adapters in order to keep playing.

Overall, DS players generally reported and were observed playing in close proximity to their gaming groups, around one to three feet from their nearest neighbours. They indicated that sitting within speaking range was important, implying that verbal interaction was a key feature of multiplayer gaming on the DS. The particular types of social interactions that took place during games are described below.

9.1.2 Social Interactions during Games

In Chapter 5, socializing was identified as participants' primary motivation for multiplayer gaming on the DS. Thus, it would be expected that significant social interaction would occur between gaming partners. Indeed, players did interact during games, however the amount of interaction varied both with the personalities of the players and with the type of game being played.

Conversation was the most common form of social interaction between players. At gaming events, most conversation took the form of “trash-talk”. Several participants mentioned it as being a key part of their games, such as P8, who cited it as the reason he preferred local play over online games, as did P12 and P13. P12 enjoyed trash-talking so much that he and his brother used instant messaging on their computers to trash-talk when playing together online. At gaming events, players boasted of their successes—“I love the smell of red shells in the morning”—and complained about defeats—“Oh, oh...I got blowed up”. A typical exchange from a DS event is given below:

S1: “Noooo...Ow!”
S4: “Oh, did I hit someone with that?”
S1: “Yes, you did.”
S4: “Beautiful.”

As well as trash-talk, players also had more practical discussions in-game. Several instances of players helping others by answering questions and providing game information were observed at events. Players asked questions about controlling the games (How do you use items?) or what certain interface elements represented

(What do the stars by people’s names mean?), which were readily answered by other players in the game. Players also used verbal communication for relaying in-game information to the other players in the game. In one instance, a player who had just been eliminated from the round alerted the others that his attacker was hiding in an unusual location and shooting unsuspecting players as they passed by. As well, some players discussed game strategies and outcomes in a non-competitive manner, as opposed to trash-talking. For example, two players in an extended head-to-head game spoke at length about the techniques they had attempted to use each round.

While players regularly bantered and exchanged comments during gameplay, these comments were generally brief and bracketed by longer periods, up to several minutes, of silence. The amount of interaction in a group may also have been affected by the presence or absence of particularly conversational players. In particular, one group observed at a gaming event featured frequent commentary from one player who was narrating his state almost continuously. His comments on his performance prompted the other players to respond with comments on their own. In contrast, later at the event, nearly the same group of players was observed playing the same game together with one difference: the talkative player from the earlier game was not with them. Without his presence, the remaining players did not have these discussions and the breaks between rounds were almost silent.

Another factor that affected the amount of conversation between players during games was the type of game being played. The most commonly observed games at events were *Mario Kart* and *Tetris*, games featuring fast-paced gameplay with real-time interaction between players. These games featured lots of trash-talking, particularly in the breaks between rounds when players’ cumulative standings were shown. Another popular game, played by large groups at two events, was *Pokémon*. In *Pokémon*, players’ in-game interactions were less direct, consisting of trading, turn-based battling, or trying to capture the flag from each other’s bases. Discussions observed between players were more involved than in games such as *Mario Kart*, possibly because of the reduced attentional demands of the game, and the trading component to gameplay, where trades were established and negotiated verbally, with the game merely being used to carry them out. As well, in addition to just discussing the games, players also occasionally shared their screens with each other as another way of exchanging information. Far at the opposite end of the attentional spectrum, the music game *Elite Beat Agents* required intense concentration and players, often donning headphones, were almost never seen speaking during songs, only between them.

Since different styles of games afforded different types and amounts of interaction between players, this suggests that groups could choose games on the basis of how much social interaction they desired. Indeed, players seemed to be aware of the different amounts of interaction encouraged by different types of games, and occasionally factored it into their gaming choices. For one participant, P4, this effect influenced his friends’ choice of game mode, as they specifically chose a mode featuring direct battling between players since they wanted to trash-talk each other:

“We were just yelling at each other throughout the entire process, and you can’t really do that with racing as much as you can with battles.” This also suggests that games could be designed to facilitate out-of-band social interaction, as in *Pokémon*.

9.1.3 Interactions in Console Multiplayer

In addition to games on handhelds such as the DS, the observed gaming events also featured many multiplayer games on video game consoles. These games provided an interesting contrast with the DS games occurring in the same settings. Multiplayer games on these systems, including the Wii, GameCube, and others, had two to four players and were displayed on televisions or on projection screens. The most notable thing about their appearance at events was that players sat much closer together than in DS groups. Specifically, while one pair of players on the DS or on a console might sit equally close together, say, side-by-side on a couch, an overall group of DS players could be much more spread out, with players separated by other people, or even on opposite sides of the room. On the other hand, due to sharing a screen and often having controllers connected with wires, console groups sat close together around their displays. When asked how they sat while playing console games, participants reported that, as on the DS, they sat close enough to talk (P4), but in this case, sat looking in the same direction, facing a common screen (P2), and that this shared display forced them to sit in close proximity (P5).

Social interactions between players in console games were also observed at gaming events, including in the more formally competitive setting of two console game tournaments. During casual games, players often chatted and engaged in longer conversations, such as discussions about the merits of various characters in a fighting game. As on the DS, new players asked questions about gameplay, and more experienced players offered advice. However, during serious games at the tournaments, players were intensely focused and almost silent, with only rare exclamations of success or failure. In all, however, players appeared to engage in more conversations with fellow players when on consoles than on the DS.

9.1.4 Social Experience on DS versus Consoles

The observed differences in physical positioning and social interactions on the DS and consoles suggested the question of how their social experiences would be compared by players. This question was asked specifically in interviews, and participants’ responses indicated that console multiplayer was strongly considered a more social activity.

The DS’s individual displays, compared to the shared screens used with consoles, were the main reason cited for these differences. Due to players all looking at a shared focal point and forced to sit in close proximity, players could see each other’s actions and reactions (P5) and have what P7 called “Did you see that?” moments, which were missing on the DS:

“I find it to be more [interactive] on the console because both of you are sharing the same screen, so both of you can see what’s going on from the same perspective. It’s kind of like the whole, ‘Did you see that?’ thing. Well, no, I didn’t see that because I’m not looking at your screen.” (P7)

In addition to facilitating more social interaction, the console’s displays were also considered more inclusive for other people around who were not playing. On consoles, P3 remarked that other people would watch and make comments, while this was not possible on the DS unless one stared over a player’s shoulder. Several participants, such as P5 and P15, also noted that consoles featured more “social” games: games where players would experience the same things at the same times and progress through levels together, and would have more to talk about.

Overall, differences clearly existed in how social the DS was perceived to be compared to console gaming. While a small minority of participants considered the two experiences equally social, since both featured similar interactions and trash-talk, no participants considered multiplayer gaming more social on the DS than on consoles, and almost all agreed that looking at different screens or a shared screen had an impact on how games were experienced. This led to the majority of participants agreeing that multiplayer gaming on consoles was a more social activity than on the DS.

9.1.5 Disconnected Contexts: Personal versus Shared Displays

When comparing their social experiences on the DS and on consoles, the difference in displays was the feature that participants mentioned most often. The DS features individual displays, with each player having their own view of the game on their own system, while (non-networked) console games are played on shared external displays such as televisions. Both types of display have benefits and drawbacks; this section discusses their effects on social play.

The main benefit of the DS’s individual display is that it easily scales to support many players. On shared console displays, screen space is a limitation. When individualized views are required for each player, as in first-person games, the screen must be split up to allow each player their own view, a technique that is used in practice to support up to four players but becomes impractical beyond that point. In contrast, players at DS events could play eight-player *Mario Kart* and ten-player *Tetris* together because each player who joined brought along their own extra screen space. Individual screens also allowed players to hide information from other players, such as which item they had ready in *Tetris* or which moves their creatures were capable of in *Pokémon*.

However, for social experiences, the shared displays used by consoles had several beneficial effects. They created a shared context in which games occurred, and

brought players closer together, physically and emotionally. In contrast, the DS's individual displays and personalized views of the game world isolated players from shared experiences, such as the "Did you see that?" moments mentioned earlier. The console's shared screens allowed players to see what others were doing, and also allowed non-playing spectators to see and participate in group gaming experiences, an idea discussed in more detail in the next section.

One of the defining features of the DS is its portability, allowing multiplayer gaming to take place in a wide range of environments. The DS's small, individual screens are a key component of this portability, and can be taken many places where a console and television cannot. However, this mobility appears to come at the cost of a lesser social experience. Nevertheless, the DS's advantages, including its portability, scalability to larger groups, and widely-enjoyed games, appear to overcome its weaknesses, leading it to be used often for multiplayer gaming, even in situations, such as the observed gaming events, where consoles are readily available alternatives.

9.2 Sharing Experiences with Spectators

In addition to the other players in a game, multiplayer gaming experiences are shared with another group: nearby people who choose to watch, comment on, or otherwise participate in the shared gaming experience. They may be friends at a party, other people at gaming events, or players sitting out a game. They may be doing something else, even playing their own games, or may be focussed solely on watching the action. We define spectators here as any observers who are not playing with the player or group being watched. In any case, these spectators, when present, are an important part of the shared gaming experience.

9.2.1 Player-Spectator Interactions

The gaming events observed in the study featured many examples of spectators and their interactions with players. Interactions between players and spectators were generally of two different styles, either one-sided, where spectators watched but players did not interact with them, or two-sided, where players talked, shared their screens, and generally interacted with spectators. In one-sided observation, spectators, beside or behind the players, would watch over their shoulders. These instances did not last very long; without interaction between the spectator and the player, the spectator would usually start looking around at other things or leave within one or two minutes.

When spectators and the players they were watching interacted with each other, exchanges could continue much longer and be much more involved. Two ways players actively shared their games with spectators were by conversing with them and by physically reorienting their DSes to allow spectators to see them better.

Similar to groups playing together, players and spectators often spoke together about the games that were being played. Since the spectators were not actively involved in the games, bantering and trash-talking were absent, and discussions were more diverse. Players chatted with spectators and showed them examples of in-game events. For example, one player offered to demonstrate what would happen if he failed a particular objective to some spectators, including another person playing the same game separately. He asked, “You want to see what happens when you fail?” and then showed the group on his screen. Players also described things verbally to others who were not actually watching them, as when two players explained the techniques they were using in a game to another person who was sitting nearby, but not watching their screens.

If players wanted to allow spectators to watch their games, they would move their systems so that they could be seen better. When players showed off their screens while playing, it was usually by angling their systems towards the spectators, who would often lean in closer to see. Several instances of this type of screen sharing were observed at gaming events, both in response to the presence of spectators, as when a spectator came up behind one player who then showed him his screen to explain what he was doing at the time, and also at the initiative of the players, as when a player who was excited about an accomplishment in a game turned his screen to show the people sitting beside him. Occasionally, spectators would even take a player’s DS to see their game. This was observed between friends at a DS event; when one put his system down on the table briefly to do something else, the other picked up his system to look at it. Thus, while the DS’s screens were not easy to see, players and spectators took steps to share them.

9.2.2 Spectator Experience with DS versus Consoles

As when looking at within-group interactions, it is interesting to compare spectator interactions on the DS with those on consoles. The observed console gaming events provided many instances of spectators watching console games, particularly at the tournaments, which were very much geared towards audiences. The differences between spectatorship on the consoles and the DS were pronounced: the consoles supported more simultaneous spectators, who watched longer, and appeared more engaged in the games than spectators for the DS.

The most obvious difference between the DS and consoles, from a spectator’s perspective, is the difference in screen size. The DS’s two screens each measure three inches diagonally, while consoles are connected to external displays, such as televisions, computer monitors and projectors, which are much larger. At events, console games were shown on hardware that ranged from televisions and monitors around twenty inches in size to large projected displays. The physical size of these displays allowed many people to watch at once. At tournaments, crowds were particularly large, even though matches were only played on televisions, not the large projector screen. Crowds of 10–20 spectators were common, with the biggest

matches drawing up to 40 spectators gathered around one television. At regular (non-tournament) gaming events, crowds were smaller, but still formed when interesting games were taking place.

As well as having more spectators, consoles appeared to pull in spectators and hold their attention better; they watched longer and got more caught up in games, compared to the DS. While spectators who merely watched the DS would usually leave after one or two minutes, console spectators would often stay much longer, watching for five to ten minutes or more. The consoles also appeared to pull spectators in and get their attention more. At one DS gaming event where a console was present, it appeared to be drawing players out of DS games to watch it instead; over time, as DS games broke up, players would watch the console games instead of forming new groups for the DS. The console's display also attracted the attention of passers-by, some of whom stopped and watched for extended periods. People who stopped to watch the console games occasionally even participated, as at one gaming event where a Wii was present and two people who were not regular gamers stopped to watch and ended up trying the system for the first times.

Finally, in addition to staying longer, players watching console games even appeared to become more emotionally involved. At tournaments, crowds got caught up in close matches, ooh-ing and ahh-ing as the fights progressed, and applauding at the end of particularly impressive battles. Outside of tournaments, consoles still had the ability to engage crowds emotionally. One compelling example of this occurred at an event featuring a music game called *Donkey Konga*, where players beat out rhythms on special controllers shaped like conga drums. Several players were taking turns playing the music game, while other games were played around the room, then one player decided to play the theme song from the *Pokémon* television series. Soon, most of the room had gathered around the player, and were clapping along to the song together. In this example, the game audio also played a role in attracting spectators; again, the sound from consoles was louder than from the DS, allowing more listeners to hear it.

It should be noted that watching the DS could be engaging, but that was typically only possible when the DS player was actively interacting with the spectator, as described earlier. While players could share their screens and converse with spectators, drawing them into the game experience, this required deliberate effort by the player. Even then, when gameplay became intense, the player might have to angle his screen back toward himself, cutting off the spectator's view at a crucial point. However, most importantly, while the DS could support this type of rich interaction between a player and two or three spectators, it does not scale to crowds of forty or draw in passers-by from across a room.

Overall, the consoles offered better experiences for spectators, particularly in large numbers. The organizers of the gaming events were aware of these issues, as support for spectators was of considerable importance. At tournaments, where players came to show off their skills to others, support for spectators was particularly crucial. Organizers encouraged crowds to form by pointing out interesting

matches to watch, such as battles between well-known or still-undefeated players, or featuring players using unusual or novelty characters. It was such a match, featuring a fight between two unusual characters, that drew a crowd of over forty spectators. The organizers of these events were also aware of the DS's weaknesses in this area: when one was asked about the possibility of a DS tournament, he indicated that the group had considered the option, but that "the lack of ability to observe gameplay" limited the appeal of the tournament to players who were still actively competing. Those eliminated would have little opportunity to watch, comment on, and support players who were still competing, key parts of the shared experience.

9.2.3 Watching over Shoulders: The DS's Poor Support for Spectators

Earlier in this chapter, participants' reasons for finding multiplayer gaming on consoles more social than on the DS were given. One of these reasons was how poorly the DS supported spectators, particularly compared to console games. A number of factors appear to contribute to this problem. One is simply the size of the DS's screens. At three inches across, their small size limits the number of spectators who can watch at once. At one event two spectators were standing behind a player when a third one walked up. When the group shifted to make room for the new one, the person on the other end was pushed away and stopped watching.

In addition, the DS's size forces it to be held close to be seen. This means that players must hold their DSes near their bodies, making them harder for others to see. Player's screens can be almost impossible to see if they are sitting in certain configurations, such as against a wall. It also means that spectators must come closer to players in order to see their screens, which many participants considered problematic. P12 mentioned that to watch someone play DS you had to get close and look at the right angle, which made him feel awkward when someone he did not know was watching him. Players could hold their systems out to spectators so that they could see without getting too close, as observed at gaming events, but this was not possible at all times, particularly during intense play.

Once again, as in the case of in-game social interactions between groups of players, the DS appears to offer a trade-off: it allows more people to play together than with a single game console, but fewer people can watch. Thus, if everyone in a group can play DS, then it is an attractive option. However, if some people cannot, for instance, if they do not all have DSes, then the console may be the more appropriate choice, since those not playing could watch more easily. This reinforces why the DS was considered inappropriate for social situations such as a party (Chapter 6) unless everyone could join in. It also begins to demonstrate how the DS, while used for social gaming, is still very much an individualized device, as discussed in more detail in the next section.

9.3 The DS as a Personal Technology

In the previous two sections' discussions about sharing the DS gaming experience with other players and with spectators, overlapping themes began to emerge around how the experience of playing the DS can be isolating. While multiplayer games are certainly shared, social experiences, even they are individualized, viewed through the filter of the player's personal window into the game world, and experienced separately from others. This section draws parallels between the DS and another personal, privatized device, the Walkman, and concludes with a discussion of the implications of the DS's "private gaming spheres" on the local multiplayer experience.

9.3.1 Personal Devices: The DS and the Walkman

When considering the implications of the DS's nature as a portable, personal device, it is revealing to compare it to another personal device with similar properties, the Walkman. While portable radios had existed for some time, when the Walkman—a portable audio cassette player with headphones for private listening—appeared, it gave users unprecedented freedom to listen to what they wanted to, when they wanted to. With recordable cassette tapes, users had complete control over what they listened to, and with a small form-factor, battery power, and headphones, they could take the Walkman with them almost anywhere and then listen without other people hearing.

A 1998 qualitative study of Walkman use by Chen [4] shows striking similarities between the use of the Walkman and the DS. Both are personal technologies that allow a private activity to be undertaken in a public space. With a Walkman, Chen described how users privatized public spaces, for example, parks, by bringing a private hobby into the open. The DS does the same, bringing the home gaming experience out into the world. However, while the devices bring their users' hobbies into public spaces, they are consumed individually and not shared with others the way a stereo system or an arcade machine would allow.

In particular, Chen observed an isolating effect of Walkman use, where listeners could use headphones to block out sounds and conversation. They described not noticing the outside world and being entirely in their own, what one user called "communication cutoff". This was contrasted with reading a book in public, which, while individualistic, did not actively prevent intrusions. Yet, while Walkman users reported that listening to it in public decreased their likelihood for social interaction, the DS's multiplayer capabilities open up the possibility of connecting with other players. When used without headphones, the DS may be even more open to intrusions than a novel, since it may be seen by other DS players as an invitation to gaming.

Notably, the isolating, own-world effect of both devices had utility when combined their ability to be taken almost anywhere. The Walkman was used to fill the

empty spaces in users' lives, such as long commutes, and make unpleasant activities such as exercising or housework more enjoyable. The DS was frequently used for similar purposes, such as passing time on the bus to school or while cooking. In another similarity, Walkman users also reported pushing against the boundaries of social appropriateness for their listening habits, such as listening surreptitiously at work despite it not being allowed, or, as one user reported, listening while talking to his fiancée.

Overall, the Walkman demonstrates how a personal technology can privatize public spaces and absorb users in their own personal worlds. Some study participants were aware of this effect; P15 stated that the DS is like your own book, you get into it and it is made for personal interaction—even with multiplayer, it is an individual experience.

9.3.2 Private Gaming Spheres: Gaming within Personal Space

The DS is clearly a personal device, and nowhere is this clearer than in the space in which its games take place. The external displays used in console gaming broadcast the game world out into the open. They bring players together, physically and emotionally, and provide a shared context for players and spectators. In contrast, the DS's small, individual screens keep gameplay private. They are held near the body, and can only be seen up-close. In this way, gaming on the DS can be seen to exist within a player's personal space, inside the region that others would not normally intrude upon. For example, it is generally considered rude to read over another's shoulder, but this is precisely what must be done to view a player's DS screen. Even in multiplayer games, the players do not need to look beyond this space, further ensuring an insular experience.

The fact that all play on the DS seems to occur within "private gaming spheres", i.e. isolated from others within players' personal space, may explain many of the characteristics of how the system is used. It was noted, for example, that many participants considered it inappropriate to play in a classroom, and yet several followed this statement by immediately relating stories of playing in just that setting. The privatizing nature of playing on the DS may make their gaming feel more private and less visible, and players may then allow themselves to play. The inappropriateness of playing in many social settings is also clear when the DS is considered as a personal experience. Similarly, the personal nature of the experience may also be a factor in participants' reported discomfort with approaching others they saw playing in order to suggest a multiplayer game; those players would be separated within their own private spheres, making interrupting them more difficult.

9.4 Summary

This chapter described the multiplayer experience on the DS through how it was shared with other players and with spectators. DS players did converse and interact during games, however when players compared DS multiplayer with console multiplayer, they found the DS experience less engaging. The major reason players cited for this was the shared focus of the console's single display, versus the DS's individual displays. It was also possible for spectators to watch games on the DS, however, its form factor essentially required that players actively share their games with spectators. While DS players could interact with and show off their games to a few spectators, they could not support larger crowds, in contrast to consoles. Again, the DS's form factor and screen size limited the awareness possible in large groups.

Following from these observations, the final section of this chapter explored how the DS's nature as a personal device affected the social gaming experience. Comparing the DS with the Walkman portable audio player, similarities emerged in how these devices cut users off from the rest of the world, an effect that users of both devices took advantage of, using them to pass time by distancing themselves from boring or unpleasant situations. Looking specifically at the DS's form factor, with its individual screen held close to the body, we suggested that the DS created a "private gaming sphere" in which gaming took place in isolated within the player's personal space. This effect could explain several characteristics of how the system was used, such as its inappropriateness in social situations and the discomfort players felt approaching someone who was already in a game. However, observing this phenomenon also suggests that breaking players out of their private gaming spheres may be a way to enrich social interactions on the DS and facilitate ad-hoc games. Some suggestions on how this could be accomplished are discussed in the following chapter.

Chapter 10

Design Implications

From the study data, it is clear that the DS is being used in a number of ways that are not well-supported. This chapter presents several design changes that could be incorporated into future handheld gaming systems to help support these practices. The first area that could be improved is the DS's support for ad-hoc gaming. Four implications are discussed: making available gaming partners discoverable by nearby players; collecting and displaying player information to aid in partner selection; supporting in-band, lower-cost game formation and coordination; and allowing games to be entered and exited more fluidly. These changes could help players overcome or work around both the practical and the social barriers to ad-hoc gaming. The second area that could be improved is the DS's support for use in groups and crowds. Adding an external display of the game world is explored as a way to enhance the social gaming experience for large groups and spectators.

10.1 Supporting Ad-Hoc Gaming

One area where the DS suffers from problems is in supporting players participating in ad-hoc games. The previous chapters described several barriers players faced when considering such games, barriers that often dissuaded players from pursuing them at all. However, there are many ways in which the system could be changed in order to better support ad-hoc games. In interviews, players themselves suggested several features that would be beneficial for those purposes. This section describes four potential improvements. In combination, these features could allow ad-hoc gaming to occur much more often, though they would need to be implemented in a way that addressed safety and privacy concerns, as many users of handheld gaming systems are younger children.

10.1.1 Make Gaming Partners Discoverable

The first practical challenge faced by players wanting to engage in ad-hoc games was finding potential gaming partners, discussed in Chapter 7. Unless players were able to see other people's systems, it was hard to know who even had one. Another player, or perhaps many other players, could be sitting a few rows away on the bus and never be noticed, resulting in a lost opportunity for ad-hoc gaming.

One way to solve this problem, at least for the case where the other players have their systems out and on would be for the systems to broadcast their existence to others nearby. This functionality could be also expanded by developing a beacon mode with low power consumption that could be activated when the system was not in use. However, if the system were broadcasting the player's availability from a backpack or pocket, it would not be visible, and thus if another player wanted to make contact they could not do so face-to-face, but would need some way to do so directly through the system. Such a feature would offer many benefits, and is discussed in Section 10.1.3.

With such a capability, a player arriving on the bus could turn on his or her system and immediately be presented with a list of other players nearby and what games they were playing. Several study participants suggested this feature, in combination with others that will be described below. P8 suggested:

“It would be an interesting feature for the DS to at least, like, be able to pick, sense other systems, like, devices when it's not connected, even though it's not broadcasting. . . So, at least when you turn on your DS you can see, like, oh, there are two other people who are currently playing games right now.”

This type of discovery or awareness feature has been implemented in other gaming systems, particularly for online gaming, where services like Microsoft's Xbox Live notify players when their friends come online and what game they are playing. There are also many wireless games, particularly location-based games, where players immediately see others who come near appear on their displays.

On the DS, a few games have already implemented awareness features, but they are severely limited. For example, in *Pokémon Diamond* and *Pearl*, players can activate a “ping” mode while playing the single-player game that will notify them of other nearby *Pokémon* players who have wireless active. Similarly, in *Clubhouse Games*, a multiplayer-focused collection of card and board games, players may activate a mode that will alert them if anyone is speaking in a local *PictoChat* channel. However, these features require other players to be in specific games and using wireless, and do not provide awareness of players in other games. This feature would need to be implemented at the system level to make it truly useful.

10.1.2 Display Player Profiles

With potential partners found, the next question a player might ask is whether they would be a good fit to play together. Players' difficulties with finding appropriate gaming partners are described in Chapter 7. The two main issues that arose were finding partners who liked the same games and played at similar skill levels. With the current difficulties in finding others just to play on the DS with in the first place, players may not be able to choose their partners too carefully, but as it or other devices become ever more ubiquitous, they may be able to become more discriminating.

One potential answer to this desire for finding matched partners would be to broadcast detailed player information to nearby systems. In addition to signalling others that they were available for a game, players could send out a profile with games they would like to play and their skill levels. This information could be specified manually by players, or could be generated automatically by the system based on their history. Such a system could even be imagined performing some rudimentary matchmaking between compatible players, for instance, notifying a player that another player who liked similar games was nearby.

10.1.3 Support In-Band Coordination

The largest barrier players reported to forming ad-hoc games was the social barrier of making face-to-face contact with other players. Players felt uncomfortable approaching strangers for games, as detailed in Chapter 7. Face-to-face contact is required because of the heavyweight coordination requirements of many multi-player games, described in Chapter 8. Players needed to decide who would host, what options to select, and coordinate the start of the game. All of these required out-of-band communication.

As a solution to this problem, several study participants suggested allowing for lightweight, in-band game formation. Specifically, systems should have some means of contacting potential partners and inviting them to games, which should be formed automatically when invitations were accepted. With such a system, options would have to be negotiated in-band as well, but this could be built into the games, perhaps just by letting all players vote on choices, with the host seeing the votes and choosing what to do. One participant described his ideal systems as follows:

“[If] you made it so while you were playing one game, if somebody else turned on their system and they were playing another game... it would send out a broadcast and it would go, hey, look, I'm playing this game, so other people can, like, drop down a little thing and it would be like such-and-such name is playing this game, do you want to join? ... Imagine that. 'Cause you'd just be playing on a bus and it'd just

be like, ‘Do you want to play? Touch the screen,’ you’d be like, ‘Yeah,’ it’d be like, woop, and you’d play the game.” (P1)

Implementing a system like this would make establishing contact with strangers or players on the other end of a crowded subway car much easier. It could also reduce the discomfort associated with approaching other players, as P8 explained:

“...so you can see, like, someone close by has a DS that is on, and at least send them a message saying, like, to start some sort of game up. So you don’t really have to, like in a crowded subway or a crowded bus, you don’t have to find the person and say ‘Do you want to play?’ It’s basically, you’re at the front of the bus, I’m at the back of the bus, I can see your DS, so, let’s play that way... Because then you don’t get into the awkward situation of you standing in front of someone saying, ‘Hey, do you want to play?’ and he says no, whereas if you’re on the DS and you send a message saying, like, ‘There’s a DS nearby who would like to play so-and-so with you, do you accept or reject?’ There is no awkwardness with the rejection...”

Removing the requirements for direct coordination could also help friends connect and form games in environments where coordination was hard, such as in a noisy bar where it was difficult to hear each other, or in a quiet classroom where players could not speak. If all aspects of game formation could be handled in-band, players could even play semi-anonymously, gaining the benefits of playing with someone with whom they felt some association of place, while maintaining their privacy. This semi-anonymous play could also serve as a bridging function, bringing together people who would not have approached each other before playing together. By allowing players to connect without meeting face-to-face, players would feel less self-conscious about approaching strangers and games could be formed quickly and easily.

10.1.4 Allow Fluid Game Entry and Exit

One final barrier to ad-hoc gaming is the heavyweight connection process required by most hosted games. As described in Chapter 8, this process may have discouraged players from interrupting others’ games, which would have to be restarted to add the player, and increased the perceived commitment required of players since, again, they could not leave without interrupting the game for the remaining players.

This problem could be solved by allowing players to join and leave games fluidly. For joining games, it is likely that this would be most practical if done during pauses in the action, such as between races or rounds. For leaving, players could do so at any time, possibly being replaced by a computer-controlled character if their presence was necessary.

Many existing games allow players to come and go as they please, however they are typically connecting to a central server, and not directly to other players. Many popular online games, including first-person shooters and massively-multiplayer online games, have this functionality, since the servers are running at all times, and game instances persist regardless of the players connected to them. Similarly, many location-based games have players appear and disappear from each other's displays based on proximity, however they are again coordinated through a server.

One example of a system with truly fluid, peer-to-peer game formation is Saneblad and Holmquist's Collaborative Games [25], built on their OpenTrek platform. One feature of games built under their paradigm, such as *Pac-Man Must Die*, is that players can join and leave games at any time. When players join or leave, the games automatically adjust; in *Pac-Man Must Die*, for example, when a player leaves, game items that were on the portion of the map represented on that player's display are redistributed across the remaining displays.

Some DS games already have such features, particularly *Pokémon Diamond* and *Pearl*. In *Pokémon*, players can enter an area called the underground, which activates their wireless antennas. Any nearby players who enter the underground appear in the same world and can see and interact with each other. When players leave or disconnect, they simply disappear from the world. *Mario Kart* allows players to leave during races, replacing them with AI-controlled karts when the following race starts. However, if the host leaves, the game ends. Ideally, games with more flexible connections would not have a host or could dynamically switch hosts, and could continue despite the loss of any particular player.

Taken together with the other features suggested in this section, a player seeking an ad-hoc game on the bus could turn on her system, see other players nearby, determine that one was a suitable opponent, send him a message, join his game in progress, and leave his game when she reached her stop. In short, players' desire for ad-hoc games could be met quickly and easily, with minimal practical or social hurdles standing in the way.

10.2 Supporting Groups and Crowds

The second area where the DS showed weakness was in its support for facilitating shared experiences for groups of players and for crowds of spectators. Players sought out multiplayer games on the DS for the social experiences they provided, but also acknowledged that those social experiences were not all that they could be. In particular, playing on the DS could be considered an anti-social activity, and inappropriate for the very social contexts where players might like to start large games. One way to address this issue would be to create some external display of the game state that could be experienced together by the players and spectators. This section explores this idea and its implications for group, handheld gaming.

10.2.1 Provide an External Display of Game State

In Chapter 9, players compared the social experiences on the DS and on consoles and concluded that the DS was less socially engaging. While its scalability allowed more people to actually participate in games as players, its lack of support for spectators and its isolating effects for players resulted in it being inappropriate in any group settings where it was not played by everyone in attendance. Even between players in the same game, the experience was found to be less social and more isolated, due in large part to the DS's individual screens.

The DS's screens are key to its individualized experiences, both in their general positioning and in their small size. In his informal experiences with computers as public artifacts, Greenberg [11] remarked that the personal computer was an isolator: its screen was shielded from spectators by the user's own body, and was somehow considered a private space. The DS inhibits spectators to an even greater degree, since players hold it close to their bodies, likely creating an even more private space. Greenberg also noted that when playing on a gaming console connected to a television, the display was far enough from the players that a group could comfortably gather around. In other words, the positioning of the display can afford or inhibit public interaction.

The size of the DS's screen also affects how it functions as a public artifact. Reeves et al. [24] define a taxonomy that classifies public interfaces by the extent to which they hide or reveal performers' manipulations of the interface and the effects of the manipulations on the system and performers. In their terms, the DS is a secretive interface. The player's manipulations, usually pushing buttons or drawing with the stylus, are largely hidden due to the DS's small size, as are the results of those manipulations on the game state. While the manipulations are not very interesting to watch, a public display that revealed or even amplified the effects of performers' actions on the system state could aid in getting spectators engaged with the game.

In order to enrich the shared social context of both players and spectators, one possibility is for the system to provide some form of external display. In its most basic form, this could be accomplished by having an external screen showing a view of the game for anyone to see, though more complex representations could be imagined. In their discussion of public interfaces, Reeves et al. [24] describe the amplifying effect created by large screens. A large, shared view could enhance the social experience surrounding group gameplay.

A question that may arise in a simple implementation of this idea is what should be shown on such a display? Since games designed for individual screens tend to have personalized views of the game world for each player, what should be shown to everyone on the screen? One solution is to have a "bird's eye view" in games where this is possible. The overhead views of the tracks in *Mario Kart* are an example of such views, where all players can be seen at once. Another possibility is a "cameraperson" or "commentator" role, as in televised sports, in which a non-player could choose the perspectives to be shown on the shared display.

The one notable example of a DS game that features an external display is *Pokémon*. The DS games *Pokémon Diamond* and *Pearl* can be connected with the Nintendo Wii console game *Pokémon Battle Revolution*. This allows two players to battle each other using their DSes as controllers and the Wii to display a graphically-enhanced version of the battles on a larger screen. The game acts as a commentator, shifting the camera with the action and playing audio commentary similar to what is heard in televised sports matches. (Since players' actions are turn-based and unfold in sequence, there is only one action for the camera to focus on at a time, and appropriate commentary is easily generated.) During an observed DS event, the game was able to draw in many spectators to watch the two-player battles and eventually encouraged a large group of *Pokémon* players to get together to trade and battle.

One potential problem that arises when considering this feature is that it seems to eliminate the unique benefits of handheld platforms such as the DS. It seems counterintuitive to reintroduce some of the console's physical portability constraints, as having a large external display would likely do, given that players who wanted such a shared experience could use a console instead. However, handheld systems would still scale to larger groups of players more easily, and thus there may be a viable context for such a system. Another option would be to develop shared representations that do not require additional hardware, such as audio commentary that could be played for all players, though this may be less effective at creating a shared focus than a visual display would be.

By adding an external display, the hope is that creating a shared focal point, outside of the personal space of any one player, could penetrate players' "private gaming spheres" and allow players and spectators to feel more connected to each other. However, it remains to be determined what kinds of displays would be effective in this role.

10.3 Summary

This chapter presented a series of design implications for future handheld gaming systems. The study revealed two types of multiplayer gaming that players desired, but that the DS did not fully support. The first was ad-hoc pick-up gaming, a type of gaming that occurred rarely due to several practical and social barriers. Four suggestions were given: make gaming partners discoverable, display player profiles, support in-band coordination, and allow fluid game entry and exit. These changes could overcome or lower the barriers of knowing who else nearby has a DS, knowing what games they like and how skilled they are at them, needing to approach a stranger face-to-face, and feeling that a multiplayer game is too large a time commitment, thus facilitating pick-up game formation.

Another type of multiplayer gaming that players attempted but that the DS was not ideal for was gaming in large groups and crowds. We suggested providing an

external display of the game state. Such a display could provide a shared context for groups of players, as well as a way for crowds of spectators to experience games, making multiplayer DS gaming more suitable for large-group settings.

Chapter 11

Conclusions

This thesis has presented findings from a qualitative study of the collocated multiplayer gaming practices surrounding the Nintendo DS handheld gaming system. These findings describe players' experiences with DS gaming and the particular multiplayer culture that is emerging around the DS. This chapter will review the study's results and propose future research that could overcome some of its limitations and further extend our understanding of multiplayer gaming practices on the DS and other handheld gaming systems.

11.1 Research Objectives

The Nintendo DS offers a unique opportunity for studying wireless multiplayer gaming on handheld gaming systems. Along with the portability inherent in handheld devices and the ad-hoc wireless networking that is now a standard feature of handheld game systems, the DS has also seen wide adoption, with over 64 million systems sold worldwide. Understanding how this combination of attributes impacts multiplayer gaming practices and how players adopt and co-opt the device for their multiplayer gaming needs can offer insights for the design of future handheld gaming systems.

To understand how players are adopting the DS, we conducted a study to describe the collocated multiplayer gaming practices of a group of DS owners. The questions considered in this study included why they played, where they played, who they played with, how they formed games and how they experienced social gaming shared with other players and spectators. From this basic data, it was possible to discover how the DS's characteristics were affecting the multiplayer gaming experience.

11.2 Findings

The study presented in this thesis drew on interviews and observations to describe the experience of collocated multiplayer gaming on the Nintendo DS. From the study data, several key findings were identified.

Fitting Play into Life Players' primary motivation for using the DS was to pass time. The system's portability let players take it with them nearly everywhere, and in turn they used it to transform situations that were boring or unpleasant into opportunities for entertainment and play. This finding echoed results from studies describing the use of mobile phone games [5] and portable audio players [4], suggesting that passing time is a key application of handheld entertainment devices. Thus, care should be taken to ensure that this type of play continues to be supported in future handheld gaming devices.

Desire for Local Multiplayer Another important motivation for DS use was the desire for social play. Players particularly enjoyed and valued play with physically collocated human partners. Part of the value of these human partners came from the greater challenge and variation they could offer over computer-controlled opponents, which could eventually be replaced by more advanced game programming. However, much of their value came from the social interactions they provided, reinforcing the importance of the social aspects of games and gaming devices.

Renegade Gaming Players engaged in multiplayer DS games in a wide range of physical locations and sociocultural contexts, once again demonstrating their desire for multiplayer experiences. Notably, these environments included ones that have traditionally been hostile to game play. Here, players took advantage of the features of the DS to create gaming subcontexts within these hostile contexts. This phenomenon, which we called renegade gaming, is an example of a new opportunity for gaming created by the DS's feature set.

Social Boundaries on Gaming With so few physical limitations on where the DS can be taken and used, players could game almost anywhere. However, players still considered many situations off limits. Of particular note were group social settings where people were expected to be interacting with each other; in these settings, play could be antisocial, isolating players from the wider group. This example illustrates how the contexts where play is acceptable are now constrained primarily by social appropriateness, and that bringing handheld gaming into these settings will require consideration of the social as well as technical aspects of the systems.

Planned Multiplayer Games While the features of the DS brought players great freedom in where and when they could play and who they could play with, many players did not leave their opportunities for multiplayer gaming to

chance. Instead, those who played multiplayer games most frequently relied on routines and pre-planning to ensure they could play regularly. It is possible that this need for planning is an inherent component of physically collocated group activities. However, new types of multiplayer gaming such as pick-up gaming may offer more opportunities for unplanned play in the future.

Barriers to Ad-Hoc Gaming Ad-hoc pick-up gaming, or unplanned play with chance-met strangers, is an example of a new type of multiplayer gaming enabled by the DS's combination of features. While the DS made this type of gaming easier than its predecessors, and it was desired by players, it rarely occurred. A number of practical and social barriers stood in the way of finding and making contact with other players, which the system and games did little to remedy. As a type of play that is desired but poorly supported, pick-up gaming is a prime area for improvement in future handheld gaming systems.

Heavyweight Coordination One characteristic of many DS games that may discourage pick-up gaming is the requirement for heavyweight, face-to-face coordination to plan games and negotiate options with other players. Currently the system does not offer convenient ways for players to make contact, propose games and jointly select options without going out-of-band. This places both social and time demands on players, particularly when coordinating with strangers. Future handheld gaming systems could better support pick-up play by making coordination less demanding and allowing it to be done entirely through the system.

Heavyweight Connections Another characteristic common among DS games is for multiplayer groups to be inflexible. Since players often could not join or leave games that were in progress without disrupting the other players, multiplayer games were perceived as requiring fairly large commitments. This is another characteristic that discourages pick-up games. In situations where players might desire pick-up games, their time is often short, and the time others have to play is unknown, making games not worth the effort to initiate. Thus, another beneficial feature for future handheld gaming devices would be to support more flexible connections between players.

Personal versus Shared Displays Social experiences were a key motivation for multiplayer gaming on the DS, however, players felt that console gaming was a more social activity. At the heart of this difference was the way games were displayed. The shared screen used by consoles fosters awareness and connection. The individual screens on the DS keep players isolated. However, these same individual screens allow the DS to support larger groups of local players than on consoles, making this an important type of multiplayer gaming for handheld systems to support. Providing additional ways for groups of players to experience shared game contexts is one way that handheld gaming systems could better support play in large groups.

Poor Support for Spectators Another aspect of large-group play that the DS was not well-equipped to handle was the spectator experience. While it allowed many people to play together at once, those who were left out had limited ability to experience the game. In contrast, game consoles supported fewer simultaneous players, but non-players could easily follow the action. Giving spectators ways to get engaged in games is another way that future handheld gaming systems could increase their support for play in large group settings.

Private Gaming Spheres Looking at the overall social experience of DS gaming, it became clear that the device's form factor had a definite effect on players. We called this the private gaming sphere, or the isolating effect of the DS's form factor, with all gameplay taking place close to one's person. This could cut people off from others while playing, and also severely limit the extent to which games could be experienced by spectators. This effect could also explain some of the other findings in the study, such as players risking games in potentially hostile environments, the inappropriateness of playing at parties, and the perceived awkwardness of interrupting another player mid-game.

11.3 Future Work

We believe that the findings reported in this thesis accurately describe the multi-player gaming practices of the study participants. However, there is still much that could be done both to overcome some of the limitations of the study and to further the understanding of multiplayer gaming practices on handheld gaming systems.

The main limitation of the study was that it focussed on a particular demographic of DS users, namely younger adults, aged 18 to 34, with university-level educations, living in North America. The DS is used by a much wider range of people, from young children to the elderly, in countries around the world. It would be beneficial to understand how the DS is used by these other populations, and how their practices differ from those of the study population. In particular, young children, who make up a large number of the DS's owners, likely have markedly different practices that would be interesting to uncover.

Another area for future work is in studying some of the design implications described in Chapter 10, particularly the features for supporting spectators. One suggestion was to provide external displays of the game state for players and spectators to see. A notable set of existing games that provide this feature are the DS games *Pokémon Diamond* and *Pearl*, which can use the Wii game *Pokémon Battle Revolution* to show games on the Wii console's display. From observing it in use at a DS event, it appeared to have a positive effect on the group gaming experience. Thus, it would be ideal for more formal testing of how such external displays could be used and how they affect the DS gaming experience. Custom displays, narration, or commentator functions could also be designed by the researchers to test

the effects of various aspects of these systems in more detail.

Similarly, it would be interesting to observe how changes that facilitated ad-hoc games would change the way people played and the incidence of ad-hoc pick-up games. However, in the absence of these features being incorporated into a popular handheld gaming system such as the DS or the PSP, their evaluation would be limited to small-scale experiments, similar to those that have already been carried out with research systems. Thus, in order to truly see what sort of emergent practices these features might inspire, they would need to be available on a larger scale.

11.4 Summary

This thesis has presented a qualitative study of the collocated multiplayer gaming practices surrounding the Nintendo DS handheld gaming system. The results of this study reveal how players have incorporated the DS's new capabilities into their multiplayer gaming practices and into a distinct multiplayer culture that is emerging around the DS. They also reveal the ways that players' desired practices push beyond the capabilities of the system, leading to a set of implications for the design of future handheld gaming systems.

Modern handheld gaming systems' innovative feature sets and relatively low cost have resulted in the sale of tens of millions of gaming devices. This research is the first analysis of how these new features have been appropriated by mobile gamers in real world gaming contexts. As mobile gaming continues to become more and more a part of many people's everyday lives, the opportunities for study and improvement will only continue, and this work can serve as a basis for future exploration of the mobile multiplayer gaming space.

Appendix A

Terminology

ad-hoc game In this thesis, an unplanned, pick-up multiplayer game. Generally, may also refer to any peer-to-peer game, as these use ad-hoc (as opposed to infrastructure) mode wireless networking.

affinity diagram An analysis tool used to group large sets of data or ideas into themes or topics. A key characteristic of the grouping process is that it is bottom-up, i.e. related items are grouped together, eventually suggesting categories, instead of starting with a set of headings and placing items beneath them.

download play A feature of local multiplayer gaming on the Nintendo DS, supported by some games, where a single host player can upload temporary copies of the game software to other players' systems. This feature allows many people to play using only one physical copy of the game card, though each requires a DS unit.

hosted game A game in which multiplayer connections are achieved through a host-and-client model. A single host player creates a game which client players can join. The host controls the game, and the game ends if the host leaves.

local game A multiplayer game played by connecting directly with physically-located, close-by players.

multi-card game A multiplayer game in which each player uses their own copy of the game card, as opposed to a single-card game.

Nintendo Wi-Fi Connection (WFC) An online service provided by Nintendo and used by games to provide Internet multiplayer capabilities.

online game A multiplayer game played by connecting to other, usually physically-distant, players over the Internet.

pick-up game An impromptu, unplanned game. Specifically, in this thesis, refers to unplanned games with chance-met players.

single-card game A multiplayer game played using only one game card. This is achieved via download play.

trash talk Competitive banter during games, consisting of boasts, taunts and insults. Banter is generally playful or humorous, not genuinely hurtful.

Appendix B

Study Letters and Forms

The study presented in this thesis received approval from the University of Waterloo Office of Research Ethics.

This appendix presents copies of paperwork required by the Office of Research Ethics: the Information-Consent Letter for individuals, the Information-Consent Letter for Organization/Group Leader, and the Thank-You Letter.

B.1 Information-Consent Letter for Individuals

Social Gaming Study, Information-Consent Letter

Professors Edward Lank, Michael Terry
Christine Szentgyorgyi
David R. Cheriton School of Computer Science
University of Waterloo

Overview

You are being asked to volunteer in a study. The purpose of this study is to understand the common conventions and practices surrounding the use of wireless, handheld game consoles. In particular, we are interested in how game sessions get formed, who decides what game to play, how options are chosen, and so on.

In this study, we will observe you as you play games with others in the same physical area as you. We will also interview you for 20–30 minutes to understand more about your gaming practices.

Principle Investigators

This study is being conducted by Professors Edward Lank and Michael Terry, and Christine Szentgyorgyi in the School of Computer Science at the University of Waterloo. Edward Lank can be reached at (519) 888-4567 ext. 35786, Michael Terry can be reached at (519) 888-4567 ext. 34528.

Your Rights as a Study Participant

Participation in this study is completely voluntary, and you may end participation at any time. If you agree to participate, we will conduct one or more interviews and observations of you before, during, and after gaming. To agree, you must be over 18 years of age.

Study Description

We are interested in understanding how current features in wireless, handheld game consoles are used by individuals and groups to play games in the same physical area. This information could be useful for the future design of games.

In this study, we will interview you about your gaming practices and preferences, and observe you as you play games with others. For example, in an interview, we may ask, “How long have you had your game console? Why did you buy it? What games do you most often play on it?” Note that you may decline to answer any question, and that you may cease participating at any time by informing the interviewer.

Importantly, we are interested in learning about your *typical* practices. Watching you as you play games is one of the best ways to obtain this data. You do not have to do anything special at all – just play as you normally play.

Interviews typically last 20–30 minutes. If we gain your permission, we will record the interview and observation using notes, audio, video, and/or image recording devices. Any data collected will be made anonymous in any publication or public presentation. At any time, you may ask us to not use any recording device. In this case, we will simply take notes.

At a later time, with your permission we may contact you to conduct one or more follow-up studies. These will be the same format – interviews and observations. You may decide at that time whether or not you wish to continue to participate in the study.

Compensation

You will not be compensated for participation in the study. However, the information you provide will help us understand current practices of local, wireless gamers. This, in turn, could influence the design of new wireless games.

Confidentiality and Data Retention

All data collected is considered confidential. Codes, rather than names or other identifying information, will be used in notes and/or recordings. Even though we may publicly present our findings or publish our results in papers, only the researchers will have access to the data collected. Names and any other identifying information will not appear in any publication resulting from this study. However, with your permission, anonymous quotations and pictures may be used. Notes, images, and/or recordings collected during this study will be retained indefinitely in a secure location in either the researchers' office(s) and/or research facilities.

Questions

If you have any questions about participation in this study, either during or after the study, please contact Edward Lank at (519) 888-4567 ext. 35786 or Michael Terry at (519) 888-4567 ext. 34528. This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. In the event you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes at (519) 888-4567 ext. 36005.

Consent Form

I agree to participate in this study being conducted by Drs. Lank and Terry, and their student Christine Szentgyorgyi, of the School of Computer Science, University of Waterloo. I have made this decision based on the information I have read in this Information-Consent Letter and have had the opportunity to receive any additional details I wanted about the study. I understand that I may withdraw this consent at any time by telling the researcher(s).

I am aware that I have the option of allowing my interview to be recorded using audio and/or video recording devices to ensure an accurate recording of my responses.

I am aware that excerpts from the interview may be included in any publications to come from this research, with the understanding that the quotations will be anonymous.

I am aware that I have the option of allowing still pictures and video recordings to be taken to complement interviews and observations.

I am aware that I can give permission to allow video and/or digital images in which I appear to be used in teaching, scientific presentations and/or publications with the understanding that identifying characteristics will be made anonymous, and I will not be identified by name. I am aware that I may withdraw this consent at any time without penalty.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher(s).

This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact the Director, Office of Research Ethics at the University of Waterloo at (519) 888-4567 ext. 36005.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

___ YES ___ NO

I agree to have the interview and observation recorded using an *audio* recording device.

___ YES ___ NO

I agree to have the interview and observation recorded using a *video* recording device.

___ YES ___ NO

I agree to the use of anonymous quotations in any presentation or report that comes of this research.

___ YES ___ NO

I agree to allow still pictures and clips from the video recording taken (as I use my game console) for use in teaching, scientific presentations and/or publications. I or others I play with will not be identifiable in the pictures.

___ YES ___ NO

----- (Please print)
Name of participant

Signature of participant

Date

----- (Please print)
Name of witness

Signature of witness

Date

B.2 Information-Consent Letter for Group Leader

Social Gaming Study

David R. Cheriton School of Computer Science

University of Waterloo

Researchers: Professors Edward Lank and Michael Terry, and

Christine Szentgyorgyi

Emails: {lank, mterry, cszentgy}@cs.uwaterloo.ca

Information Letter and Consent Form for Organization/Group Leader

Overview

You are being asked to allow us to conduct a study within your organization as part of a research project at the University of Waterloo. The purpose of this study is to understand the common conventions and practices surrounding the use of wireless, handheld game consoles. In particular, we are interested in how game sessions get formed, who decides what game to play, how options are chosen, and so on.

In this study, we will observe people as they play games with others in the same physical area as you. We will also interview them to understand more about their gaming practices.

If members of your organization have permission to participate and agree to participate in this study, we will interview individuals one or more times and observe them as they game with others in close physical proximity.

Study Details

Participation in this study is completely voluntary and may be terminated at any time.

In this study, we will interview individuals about their gaming practices and preferences, and observe them as they play games with others. For example, in an interview, we may ask, “How long have you had your game console? Why did you buy it? What games do you most often play on it?”

Study participants may decline to answer particular questions, if they wish, and may withdraw participation at any time.

Interviews typically last 20–30 minutes each. With your permission and the permission of participants, we will optionally use recording devices to record the interviews and observations. These recordings will allow us to more easily recall facts when we later analyze gaming practices. Any data collected will be made anonymous in any publication or public presentation. At any time, you or any participant may ask us to not use any recording device. In this case, we will simply take notes.

At a later time, we may conduct one or more follow-up studies. These will be the same format – interviews and observations. You and other participants may decide at that time whether or not you wish to continue to participate in the study.

Risks

There are no known or anticipated risks to participate in this study other than those associated with the normal use of gaming consoles.

Confidentiality and Data Retention

All data collected is considered confidential. Codes, rather than names or other identifying information, will be used in notes and/or recordings. Even though we may publicly present our findings or publish our results in papers, only the researchers will have access to the data collected. Names and any other identifying information will not appear in any publication resulting from this study. However, with your permission and the permission of the participant(s), anonymous quotations and pictures may be used. Notes, images, and/or recordings collected during this study will be retained indefinitely in a secure location in either the researchers' office(s) and/or research facilities.

Compensation

Participants will not be compensated for participation in the study. However, the information you provide will help us understand current practices of local, wireless gamers. This, in turn, could influence the design of new wireless games.

Questions

If you have any questions about participation in this study, either during or after the study, please contact Edward Lank at (519) 888-4567 ext. 35786 or Michael Terry at (519) 888-4567 ext. 34528. This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. In the event you have any comments or concerns with this study, please contact Dr. Susan Sykes at (519) 888-4567 ext. 36005.

Permission Form

I agree to allow the researchers to recruit members of my organization to participate in a study being conducted by Professors Edward Lank, Michael Terry, and their student, Christine Szentgyorgyi, of the School of Computer Science at the University of Waterloo. I have made this decision based on the information I have read in this Information Letter and have had the opportunity to receive any additional details I wanted about the study. I understand that I may withdraw this permission at any time by telling any of the researchers.

This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. I was informed that if I have any comments or concerns with this study, I may contact the Director, Office of Research Ethics at the University of Waterloo at (519) 888-4567 ext. 36005.

I agree to allow interviews and observations to be recorded using an *audio* recording device.

___ YES ___ NO

I agree to allow interviews and observations recorded using a *video* recording device.

___ YES ___ NO

I agree to allow anonymous quotations to be used in any presentation or report that comes of this study.

___ YES ___ NO

I agree to allow pictures to be taken. The pictures will be used in teaching, scientific presentations and/or publications. I or others I work with will not be identifiable in the pictures.

___ YES ___ NO

----- (Please print)
Name of person granting authorization

Signature of person granting authorization

Title of person granting authorization

Date

----- (Please print)
Name of witness (student)

Signature of witness

Date

B.3 Thank-You Letter

Social Gaming Study

Professors Edward Lank, Michael Terry
Christine Szentgyorgyi
David R. Cheriton School of Computer Science
University of Waterloo

Thank you for participating in the social gaming study! Your participation contributes to our understanding of how people use wireless, handheld gaming consoles in practice.

I hope you will get in touch with us if further thoughts occur to you about your gaming habits.

Sincerely,

Edward Lank, Michael Terry, and Christine Szentgyorgyi
{lank, mterry, cszentgy}@cs.uwaterloo.ca

As a reminder, should you have any comments or concerns regarding this study, you may contact the Director, Office of Research Ethics, at (519) 888-4567 ext. 36005. This project was reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo

Occasionally, we may wish to contact study participants for follow-up interviews and observations. If we have permission to contact you, please indicate this by filling out the following information and removing this portion of the letter. Filling out this form is voluntary, and, if in future we do contact you, you may still, at that point, decide whether or not you wish to participate. If you do not fill out and return this form, we will not contact you in future for follow-up interviews and observations.

Name (please print):

Preferred email address:

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