Renegade Gaming: Practices Surrounding Social Use of the Nintendo DS Handheld Gaming System

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ABSTRACT
Today's handheld gaming systems allow players to engage in multiplayer games via ad-hoc, wireless networking. They are also now sufficiently commonplace that it is possible to study how portability and ad-hoc wireless networking have affected the social gaming practices of owners of these systems. In this paper, we report findings from a qualitative study investigating the collocated multiplayer gaming practices of Nintendo DS owners. Based on interviews of nine DS owners and observations of three organized gaming events, we identified three major themes surrounding the social, multiplayer gaming practices of Nintendo DS users: *renegade gaming*, or the notion that users reappropriate contexts traditionally hostile to game play; *pragmatic* and *social barriers* to the formation of ad-hoc pick-up games, despite a clear desire for multiplayer, collocated gaming; and *private gaming spheres*, or the observation that the handheld device's form factor creates individual, privatized gaming contexts within larger social contexts. These findings lead to a set of implications for the design of future handheld gaming systems.

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Handheld games, social gaming, Nintendo DS

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INTRODUCTION
Ad-hoc, wireless networking is now a standard feature on the latest handheld gaming consoles released by Nintendo and Sony: the Nintendo DS (DS) and the PlayStation Portable (PSP). While this functionality may merely seem a convenient option to enable local multiplayer games, the availability of ad-hoc wireless networking, combined with the portability of modern handhelds, enables gamers to engage in multiplayer games in a wider range of physical locations and contexts than is feasible with other gaming platforms, such as gaming consoles or laptops. In other words, these features reduce the impact the physical environment has on users' decisions about where collocated multiplayer games can practically be played. For example, a group of DS owners can play together on the beach, on the bus, or while waiting in line at a restaurant—places that are inaccessible, from a practical standpoint, to other platforms.

In addition to the ability to transfer existing gaming practices to a wider range of physical locations, the combination of ad-hoc wireless networking and portability also opens up the possibility for new and different gaming practices. For example, unplanned "pick-up" games, similar in spirit to pick-up sports games, are much more feasible: players may discover other DS owners in public places and approach them to initiate multiplayer games.

While ad-hoc wireless networking and portability offer the potential for new gaming practices, the multiplayer gaming practices surrounding this new generation of handheld gaming devices are generally unknown. Given that sales of these units can be counted in the tens of millions, there is now ample opportunity to study how the gaming community has appropriated these capabilities.

This paper reports findings from a qualitative study examining the collocated multiplayer gaming practices of Nintendo DS owners. We interviewed nine DS owners about their gaming practices and complemented these interviews with observations of organized gaming events. The gaming events featured gaming on the DS and home gaming consoles, and had 15–60 participants each.

The primary purpose of this study was to answer fundamental questions regarding multiplayer gaming with the DS, including who people play with, under what circumstances, and for what reasons. We were especially interested in learning whether players' multiplayer gaming practices took advantage of the DS's portability and ad-hoc wireless networking to game in ways not possible with other platforms.

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Three themes emerged from this study:

- *renegade gaming*, or the notion that physical and social contexts are readily reappropriated for gaming purposes,
- *pragmatic* and *social barriers* to the formation of ad-hoc pick-up games, despite a clear desire for collocated multiplayer games, and
- *private gaming spheres*, or the observation that the handheld device's form factor leads to the creation of individual, privatized gaming contexts within larger social contexts.

Our results reveal that DS owners regularly take advantage of the system's capabilities and push the boundaries of where it is possible and acceptable to play games, both in terms of physical location and sociocultural context, a phenomenon we term renegade gaming. Players reported gaming in stairwells at work, in classrooms, and in public lounges at school, with people they knew, but also with people whom they serendipitously encountered in public spaces. However, while the combination of portability and wireless networking makes ad-hoc, collocated pick-up games with strangers possible, we found that particular aspects of the DS and its games' designs actively work *against* this type of gaming. That is, even though there is a desire to game with chance-met strangers in public places, subjects reported a number of technical and social hurdles that make this style of gaming difficult.

Finally, our study found that the form factor creates a private gaming sphere that works to isolate players from the larger social context. This isolation manifests itself in two forms. First, players report that multiplayer gaming on the DS is less of a "face-to-face" experience compared to multiplayer console gaming. Second, the form factor makes it difficult for spectators to observe the game play. As a result, we found that multiplayer gaming with the DS can actually be considered an anti-social activity in an otherwise social setting, such as a party.

The rest of this paper is structured as follows. First, we describe the Nintendo DS and its feature set, then we provide an overview of related research in social gaming. We describe our study, including methods and subjects, then present results. We conclude with design implications and potential directions for future work.

BACKGROUND

Nintendo DS

The Nintendo DS was released in 2004 and is the latest in Nintendo's line of handheld gaming systems. It features a clamshell design with two 3-inch screens, as seen in Figure 1. In addition to its standard button controls, the bottom screen is a touch screen, which can accept stylus or fingertip input. A built-in microphone allows voice input. Games are sold on small game cards, with over 300 titles released in the Americas and over 500 released in Japan. At the time of this writing, Nintendo has sold 47 million DS units worldwide.[1]

Figure 1. The Nintendo DS

Wireless Networking and Download Play

The DS includes wireless networking capabilities that enable two forms of multiplayer gaming. The first form is online play over the Nintendo Wi-Fi Connection (WFC), an Internet-based gaming service. The second form of wireless gaming is local, peer-to-peer gaming. Multiplayer gaming on Nintendo's WFC supports up to 8 players, while local wireless supports up to 16 players, depending on the game.

One of the notable features of the DS's built-in wireless networking is *Download Play*. Download Play enables local players to download a temporary copy of a game to engage in collocated multiplayer gaming. The downloaded version is automatically removed by the system when it is shut off or reset. This feature enables people to play with one another even when all players do not physically have a given game. Download Play is not available for all games, but many of the more popular multiplayer games feature this capability.

Research in Social and Mobile Gaming

The Nintendo DS enables handheld, multiplayer gaming. In this section, we review related work in multiplayer gaming and handheld gaming.

Two of the most prominent types of multiplayer gaming are the persistent online worlds of multi-user dungeons (MUDs) and massively multiplayer online role-playing games (MMORPGs). MUDs have been studied in the computer supported cooperative work community [4, 11], while their modern descendants, 3D graphical MMORPGs, are the subject of much current research [12]. In studying these newer games, Ducheneaut et al. [5] cite many sources identifying "the social factor" as the main reason for players' attraction to MMORPGs. However, they also note that players may enjoy the presence of other people less for the direct social interactions they provide and more as an audience for their achievements, a spectacle to laugh at, or simply a background social presence. In collocated multiplayer gaming on the DS, we expected to see a similar

[1] http://nintendo.com/corp/report/FinancialHighlights0706.pdf

desire for social play, particularly in light of Ravaja et al.'s finding that players preferred a human opponent to a computer-controlled one in a laboratory experiment using the Game Boy Advance [13].

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 [3], as well as the specific hardware characteristics of mobile phones and the challenges they pose for gaming [2, 7]. Korhonen and Koivisto describe a set of playability heuristics for mobile phone games [10], some specific to mobile phones and some that generalize to all handheld games. For example, they suggest games provide the ability to handle interruptions such as an incoming call, and to start games and play sessions quickly. Despite some common characteristics, however, Fritsch et al. [7] note that mobile phone hardware is much less suited to gaming and conclude from their data that serious gamers with other gaming systems do not tend to play mobile phone games.

Some research efforts have explored the combination of portable and social gaming in novel game forms. One particular type of game that has been studied extensively is that of location-based or context-aware games. Played on mobile phones, PDAs, and other networked devices, these games exploit GPS and other location-sensing technologies to build gameplay around physical, real-world locations. Examples such as *Pirates!* [6] 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. Sanneblad and Holmquist's Collaborative Games [16] require players to physically share their displays with each other to succeed, and support spontaneous ad-hoc game formation with nearby players.

To summarize, most research in wireless, multiplayer, handheld gaming has dealt with either standard mobile phone games or location-based games. While the Nintendo DS shares some similarities to these existing systems, its particular feature set, combined with its widespread adoption, uniquely distinguishes it from these other gaming systems.

STUDY

Methods

To understand the gaming practices of DS owners, we interviewed nine DS owners individually and performed in-situ observations of three gaming events organized by a university gaming club. Collectively, the interviews and observations granted us multiple perspectives on the gaming practices of DS owners. We describe our interview methodology and interview subjects next, followed by a description of the gaming events.

All nine subjects interviewed were male, between the ages of 18 and 34. They included both university students and professionals. All subjects considered themselves experienced gamers and had participated in multiplayer games with the DS.

The interviews were semi-structured and lasted approximately 30 minutes each. In the interviews, we asked subjects to discuss their gaming practices with both the DS and other gaming systems. As much as possible, we asked subjects to walk us through specific instances of recent gaming experiences to ground the interviews and aid recall. Follow-up interviews were conducted with six of the participants to answer questions that arose during data analysis. These interviews also lasted approximately 30 minutes each.

To complement our interview data, and also gain entrée to this particular culture of practice, we attended three university gaming events organized by a local, student-run gaming club. The events were held in public areas in the campus student centre and were open to the general student body. Each event lasted 5 to 7 hours. We obtained consent to observe each event, recorded our observations using handwritten notes, and spoke informally with attendees about their experiences.

Each gaming event had a different theme. The first event we attended was specifically focused on DS gaming, though a game console was present (and used). Approximately 15 individuals participated in this event over its duration. The second event was a general gaming event that included both gaming consoles and the DS. Approximately 30 individuals participated in this event. The final event was a console-only gaming tournament where players competed for prizes. Approximately 60 individuals were present, of which 52 were tournament players. Two of the authors directly participated in the first event (the DS-specific event), and one author participated in the second event (the general gaming event).

Observations conducted at these events served several purposes. First, they provided us with the ability to directly observe the practices surrounding multiplayer gaming with the DS, including the larger sociocultural context surrounding game play. Second, the presence of gaming consoles provided a point of contrast for comparing multiplayer DS practices. Finally, they gave us the chance to participate directly in multiplayer gaming with experienced DS players, offering a perspective to complement our observations and interview data.

Interview Questions

The interviews were semi-structured, and aimed to address the following research questions:

- What motivations do people have in playing the DS?
- Where do games occur, and under what conditions/circumstances do people play?

- What preferences do people have in their choice of game, gaming partners, and gaming environment?
- How do multiplayer games form?
- What is the personal experience of engaging in a multiplayer game with the DS?

On embarking on a study of handheld multiplayer gaming, one basic issue is whether people actually engage in multiplayer games. All of our participants reported experiences playing with others, though, as we will note, the frequency of multiplayer gaming did differ for some.

RESULTS

Multiplayer computer gaming is a multifaceted experience that can be analyzed from a number of perspectives. In this section, we frame our results around four themes. We begin with a discussion of gaming contexts, specifically the physical locations and larger sociocultural contexts of multiplayer gaming. We then discuss gaming goals, or what individuals hope to achieve from the gaming experience. Next, we discuss multiplayer game coordination, including how gaming partners are found. We conclude by talking about the in-game experience. While our primary focus is on multiplayer gaming with the DS, we use single-player and console gaming as points of contrast to show how gaming practices surrounding the DS are similar to or different from other forms of gaming.

Gaming Contexts

The DS's physical dimensions and weight make it extremely portable. It can easily be transported in a handbag, backpack, or even large pockets in clothing. This portability is fully utilized by our subjects, who reported playing the DS in a variety of physical locations and within a number of sociocultural contexts. Participants reported multiplayer gaming in coffee shops, during a "boring" class, in restaurants, even in the full glare of a sunny beach while traveling abroad.

Many of the multiplayer games reported took the form of regular meetings with a group of friends. For example, one participant, P1, regularly played with co-workers at lunch time. Since leaving that company, his co-workers have expanded the practice:

> Apparently now they actually have this, like, league where … 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 a game. (P1)

The behavior of this group is noteworthy by virtue of the location and context in which gaming occurred, neither of which are, by themselves, particularly conducive to game play. Both of these settings hint at the flexibility afforded by the DS. We expand on this notion next.

Renegade Gaming: Context Reappropriation for Gaming

The range of gaming contexts in which subjects reported playing is notable in that it demonstrates the multitude of physical locations and sociocultural contexts that our subjects *reappropriated* for multiplayer gaming purposes, a dynamic we call *renegade gaming*. More precisely, players created multiplayer gaming subcontexts within larger host contexts—contexts that do not always consider gaming a legitimate activity. For example, the co-workers playing in a stairwell clearly do so because they are aware that their activity is not wholly acceptable in a workplace setting. However, the DS's feature set allows them to *maneuver around* physical and cultural obstacles to game in ways not possible with other gaming platforms. Most significantly, the DS reduces the *physical preconditions* necessary for multiplayer gaming: Users simply need to be able to hold the DS and focus on its screens.

Since we found evidence of multiplayer gaming occurring in a variety of novel contexts, we wanted to better understand what boundaries players define for the limits of acceptable contexts. We probed this question in the original set of interviews as well as follow-up interviews.

Boundaries for Renegade Gaming

In examining the question of where DS owners draw the line for acceptable multiplayer gaming contexts, our analysis suggests that subjects apply three different rules: the degree to which it may disrupt other, non-gamers; the judged social appropriateness of gaming in the environment; and personal image management.

When creating a gaming subcontext within a larger context, subjects seem to assess whether their actions would be *physically disruptive* to others, for example, via the noise made when gaming. If so, then gaming is deemed inappropriate. For example, when asked, subjects reported that playing in a doctor's waiting room was acceptable as long as it did not disturb others.

Subjects also seem to assess whether it is *socially appropriate* to insert a gaming subcontext into the host context. This rule is related to the concern for not disrupting others, but can apply in situations where game play may not cause a meaningful physical disruption. For example, in our follow-up interviews, subjects indicated that contexts such as weddings would be inappropriate because it would be disrespectful to play during such an important event.

One of the locations individuals report playing in is classroom settings. Probing this context further in our follow-up interviews, we found that the classroom represents a "boundary" gaming environment in that there is not a general consensus regarding the acceptability of playing in this context. Four participants said they did not play DS in class, although one mentioned sometimes playing on a laptop, which he saw as being less conspicuous. Two participants mentioned that they had

played in class, though they both tried to keep their games private.

One subject illustrates the difficulty in assessing the appropriateness of gaming in the classroom. First, he indicates that the class is not an acceptable venue for gaming, but he then goes 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)

An almost counterintuitive example of a place where multiplayer DS gaming can be deemed socially inappropriate is a party. Our participants indicated that if there are others at a party without a DS, it can be considered inappropriate to engage in multiplayer gaming because the DS's form factor can actually work to *exclude* people from what is otherwise a social event. Specifically, if one does not have a DS, it can be difficult 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 final rule applied when judging the appropriateness of gaming is related to personal image management, namely controlling how others in public perceive the player. Noting that our subjects were all aged 18–34, one subject, P5, indicated that he did not play while waiting in public places such as airports or school buildings, particularly if he had no one else to play with, to avoid feeling childish and attracting unwanted attention. While he would prefer to play on his DS, he would read a book or listen to music instead.

Gaming Goals

The flexibility the DS affords in terms of gaming contexts and game play modes (single player, local multiplayer and Wi-Fi multiplayer over the Internet) means people can game for any number of reasons. In this study, subjects reported gaming for the following purposes:

- To pass time
- To learn or keep one's mind "sharp"
- To be social
- To engage in competitive play

Passing time and learning both apply to single player and multiplayer gaming paradigms. Given that the social and competitive motivations for gaming are unique to multiplayer, we focus our analysis on these topics.

Social Gaming

The ability to game with other human players, rather than just by oneself, emerged as an important gaming motivator for our subjects. Numerous examples suggest that without this social component, the DS would be a much less attractive gaming platform. For example, P6 stated, "I haven't played *Mario Kart* at all unless it's with other people, recently." Thus, while single player options are clearly available, they simply are not enough for this participant to play the game anymore; we conclude that he needs the human element to complete the gaming experience. Echoing the importance of this human element in long-term enjoyment of games, P7 indicated that he "won't buy games unless they have a good multiplayer aspect to them, so they have better replay value."

Our subjects stated that they valued human opponents for the unpredictable, challenging game play they provide and for the social interactions that arise when playing with other people. The social interactions associated with collocated play seem to be particularly valued. For example, some subjects indicated that the ability to "trash talk" (i.e., playfully brag or boast about one's performance) was a valued component of local wireless play. The inability to do so easily via the Wi-Fi option (i.e., Internet play) was specifically mentioned as a deficiency of the DS's design.

In addition to the friendly banter of trash-talking, subjects described a form of social engagement that is much more empathetic in nature, whereby players share in each others' successes and failures. For example, P6 spoke to the value of being able to directly observe and comment on another opponent's performance:

> [Playing with 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.

The enjoyment of being able to amicably reflect on each other's performance, even when the performances were riddled with mistakes, was also relayed by a player at the large console tournament, who related a story of being paired with someone similarly unskilled at the console game. The pairing resulted in a very enjoyable game for the two because they could both laugh at each other's mistakes and inability to adequately control their virtual characters. As with trash-talking, participants noted that this amicable commentary and sharing of gaming experience is not adequately supported by the remote, Wi-Fi option.

Competitive Gaming

In our observations of multiplayer gaming at organized gamer events, we found that the competitive nature of play was a strong motivator. Players vied actively for the top spot, or, at the other extreme, simply to stay out of last place.

In more personal gaming environments (e.g., when playing with one's friends), the competitive element appeared to be

reduced, but not absent. In particular, subjects clearly preferred games in which players' skill levels were relatively on par with one another. P3 illustrates the preference for equally-matched gaming opponents, even though he recognizes the activity as a leisurely "pastime."

> [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.

Thus, even when games are not strictly competitive in nature, there is still a clear desire to find opponents that are equally matched.

Coordinating Game Play

The clear preference for local multiplayer gaming makes this form of play an important aspect of DS ownership. As such, it is useful to understand how these multiplayer games arise.

Our study shows that players currently organize their local multiplayer games "out-of-band" from the DS itself, typically planning gaming sessions in advance. We suspect that this method of game formation may, in part, be because of the few mechanisms provided by the DS to support the serendipitous discovery of local gamers or gaming events. However, even when other gamers are spotted by chance, DS games typically do not make it easy to join existing games fluidly, or to communicate one's willingness to join a multiplayer game using the DS itself. As such, there are significant technical and social barriers to ad-hoc gaming. We expand on each of these issues next and also report the workarounds that have been developed to overcome these limitations.

Local multiplayer gaming requires two or more DS owners to be present in the same physical location with their gaming units. In addition to this basic requirement, DS owners must be aware that others have gaming units and would be willing to engage in a multiplayer game. These requirements may seem obvious, but they imply a number of logistical and social barriers that must be overcome, of which our subjects are acutely aware:

> 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… I mean, put [the need to determine who has a DS and what games they have] together and it's like a mountain, you know, I'm not going to climb. I'm not going to climb a mountain on a bus, that's for sure, 'cause mountains take long. (P1)

Others described the social awkwardness of initiating games with strangers:

> 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. …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. (P3)

> On the subway you'll see someone playing DS but… it's kind of awkward, so [I usually play multiplayer games at gaming club events] where you know people have the system and … you're comfortable playing with other people. In a more open environment like in a train… it's harder to … communicate that you want to play with them. (P8)

P8's tendency to play multiplayer games at planned events or known gaming contexts was a common theme among our participants. For example, P2, P4, and P5 all commented on the planned nature of local multiplayer gaming. P5 noted that "you really have to plan to start up at the same time… connect with people face-to-face." P2 and P4 commented on the regular nature of play, playing "with friends over coffee once a week" (P2) or in a class "that was basically a daily planned event" (P4). P1 noted that playing was organized, in his experience, in one of two different ways:

> 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 such-and-such game today?'

As a result of the pre-planned nature of local gaming, partners for local play were most likely to be chosen from a player's regular friends and acquaintances from school, work, clubs, and other groups.

Ad-Hoc Game Formation

While most of the multiplayer games were explicitly planned, a few of our participants did report impromptu pick-up games where they challenged or were challenged by another player in a public place. One participant (P7) had played several pick-up games while spending time in a student lounge and the student centre on his campus. Another participant (P6) saw another student playing DS between classes and approached him to start a multiplayer game. However, these environments are all arguably "semi-private" and not as public as, say, a bus. As such, we specifically asked subjects whether they engaged in pick-up games with strangers in public contexts such as a bus. This type of gaming seemed to be rare. As we discovered, there are a number of ways that the DS seems to actively work against the fluid formation of ad-hoc pick-up games.

Past research in ad-hoc pick-up sports, including basketball [8] and ultimate Frisbee [15], describe distinct entrance,

participation, and exit norms. These norms form an interesting contrast to pick-up gaming on the DS, and can highlight some of the ways the DS makes ad-hoc multiplayer gaming difficult, so we frame our analysis around them.

Players of pick-up basketball games have been shown to follow very ritualized scripts surrounding the act of joining a game in progress [9]. These scripts emerge from cultural norms and are regulated by the players themselves. The DS, on the other hand, strictly creates and enforces the means by which multiplayer games are formed and by which players can join a game. At present, players can typically join a game only when it is being initialized and configured; once most games are in progress, other players cannot join, even in the game's interludes and transition points. This can make it awkward to join an existing game, because it requires that players quit their current game and start over. On the other hand, pick-up basketball provides a number of well-defined times in which a player can join.

Exiting a DS game can also be difficult if it disrupts the game in progress. Some games, such as *Mario Kart*, allow players to leave at any time, with their virtual character replaced by a computer character. (The one exception is that the host—the individual who initiated the multiplayer *Mario Kart* game—cannot leave without it ending the game for all players.) Exiting other games, such as *Tetris*, can cause the game to conclude for *all* players. Accordingly, players must be aware of the game's behavior when exiting, and assess whether their gaming plans are likely to coincide with others' plans before committing to a multiplayer game. In contrast, pick-up basketball games provide many more exit points, reducing commitment costs.

The social awkwardness of initiating a game with a stranger can also be difficult to negotiate, and the DS does not provide any provisions for reducing this awkwardness. At the same time, there is always the possibility of a single-player game, which may be seen as the path of least resistance to enjoying a quick game. Again, this is in sharp contrast to pick-up basketball games, where the single-player option is not available because of the competition for resources (there are a limited number of basketball courts and hoops) and the need for multiple players to truly play a game of basketball.

One of the most obvious barriers to ad-hoc pick-up games is simply finding gaming opponents. Again, it is useful to compare the DS against pick-up basketball games. Basketball games require a physical location dedicated to hosting a basketball game, which then acts as a known meeting point for players. The DS, on the other hand, has virtually no physical requirements. As such, it can be hard to know *where* to find other DS players who are interested in local, ad-hoc pick-up games.

A number of workarounds have arisen to address this problem of discovering other local players. We found workarounds in three forms: the use of online forums to advertise the potential for ad-hoc gaming in certain locales, making one's DS publicly visible to advertise the possibility of a game, and commercially available "DS Buttons" to advertise what DS games one owns. We describe each in turn.

We discovered that some DS owners use online forums to help find other players. As an example, a traveling DS player posted the following request on Nintendo's online forums:

> 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, 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?

His post alludes to the desire to play with other human players, but the difficulty of finding them.

Numerous online groups have formed to facilitate the discovery of other gamers. For example, we found a *Tri-City Hand Held Gamers* group on the social-networking site Facebook to help individuals find other players in a given region. A much more tightly focused group, the *I'm at [anonymized] library right now and I have a Nintendo DS* Facebook group, is suggestive of a group that is trying to *create* a known location for ad-hoc gaming. Such attempts are suggestive of much more overt reappropriations of space for the purpose of DS gaming.

Perhaps the simplest approach we discovered is the practice of making one's DS visible to the public. This was a tactic employed by P3: "I can just carry my DS out and, like, have it out there." Making one's DS visible can get the attention of other DS owners, as P6 explained:

> The sight of a DS is interesting… I'm a gamer, it interests me more if someone's holding a handheld. …this person's pretty clearly another gamer… One of the biggest friends I made [at a summer program] happened to be playing a DS on the bus rides, and [it was] one of the reasons why we started a conversation.

Finally, one can now purchase "DS Buttons,"[2] buttons produced by a third party that display distinct logos tied to specific DS games. The buttons can be affixed via their pins to backpacks, clothes, jackets, and so on. The intent is to advertise to others that you own a DS and have certain multiplayer games. While two of our participants noted the existence of DS Buttons, neither had actually seen any in person.

[2] http://www.dsbuttons.com

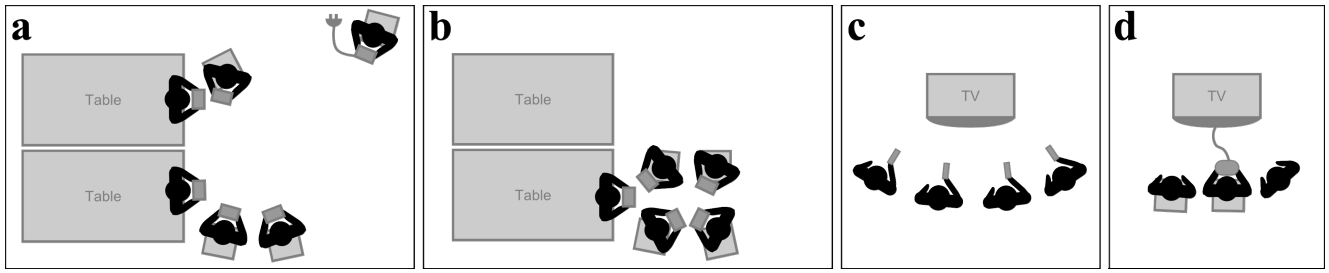

Figure 2. Physical layouts observed at a gaming event: a) 6-player *Mario Kart* on DS; b) 5 people playing *Pokémon* on DS; c) 4-player *Wii Sports* on a console; d) 3 people taking turns at 1-player *Donkey Konga* on a console

The DS Gaming Experience

In this section, we characterize the gaming experience and describe how it has some markedly different properties from console gaming.

Gaming Characteristics

A typical multiplayer DS game begins with one player, the host, starting up a game that the others join. The most popular multiplayer games, such as *Mario Kart* and *Tetris*, tend to be short, where a full match can be played in 5–10 minutes. These games proceed round-by-round, with pauses between each round to show cumulative standings for the session. Games can end after a single round or go on for several hours, depending on the availability and interest of the players.

Physically, players have a choice in how they arrange their gaming environment and where to position themselves in relation to each other; each player has their own system, connected wirelessly, so players can theoretically sit anywhere within the 30–100 foot communications range. However, in our observations of the gaming events we found that players sat in more regular configurations. While playing single player games, players spread out across the space. As multiplayer games formed, they moved closer together into tight clusters or open arcs, with the exception of players who needed to sit near something else, such as a power outlet. Figure 2 shows some of these configurations.

In general, players made sure to sit close enough for conversation, to engage in trash-talking and other banter. P5 noted how players sat close enough to chat, but not necessarily close enough to physically interact:

> [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.

In contrast, when players on the console systems played multiplayer games, we observed them gathering closely together around the shared screen. Players sat in close proximity to each other, but all faced the same direction, towards the display. The DS, on the other hand, allowed players to sit directly facing each other.

Private Gaming Spheres: Privatizing a Group Experience

The differences in physical configurations between DS and console gaming, coupled with the differences in the physical form factors, led us to question which of the two gaming experiences players felt was a more social activity. We addressed this issue in our follow-up up interviews, asking participants where they sat when playing multiplayer games on the DS and how the experience compared to console multiplayer.

Despite the ability to sit directly facing one another, or in any other practical social orientation, we found that players considered DS multiplayer to be less social, with three main factors contributing to the difference: the lack of a shared display, the reduced potential for spectators, and the closed nature of the gameplay experience.

When describing the social experience of console multiplayer, the first thing most of our participants mentioned was the shared screen. The DS's individual screens have advantages—they scale to more people than a single split display could, and they allow players to keep information hidden from their opponents—but they also act to break up the shared experience. Without the shared screen, players cannot coordinate strategies, observe the effects of their actions on others, or comment on things that others are doing:

> 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)

The shared display of the console setting brought players together inside each others' social spheres, both physically (through forced proximity) and emotionally (through a shared external focus). In contrast, the individual screens of the DS allowed participants to sit farther away from each other and to limit their focus to within their own personal space, giving rise to what we call a *private gaming sphere*. All play on the DS takes place close to one's person, inside the region of private space 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. The players

themselves do not need to look beyond this space, even in multiplayer, which may further cut them off from social experiences of the kind they would have on a console or shared system.

The second factor that contributed to participants' feeling that consoles were more social than the DS was the DS's lesser potential to support spectators. Reeves et al. 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 [14]. 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. P3 commented that while others not currently playing would watch and make comments on console play, it was harder to "stare over someone's shoulder" to watch the DS, so people were not interested in watching. This factor again points to the existence of a private gaming sphere, a virtual bubble around the DS player that shields him from observation by the outside world.

The problematic effects of the DS's form factor were echoed by an organizer at one of the gaming club events. When 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 competing, activities we observed in abundance at the console tournament.

The last factor that was reported to make DS multiplayer feel less social was the insular, tightly-focused gameplay experience. P2 noted that when playing on consoles, people took turns and were not always engaged in playing. They had unrelated conversations and did things outside the game. In contrast, DS players were focused on nothing but the game in progress.

DESIGN IMPLICATIONS

The results of this study suggest a number of potential design implications. In this section, we focus on two particularly salient design implications suggested by the data, namely better support for ad-hoc, pick-up gaming, and mechanisms to expand the social gaming experience. We describe each in turn.

Mechanisms that allow one to more easily locate other local DS gamers, invite a player to a multiplayer game via the DS itself, join preexisting games, and gracefully exit games would all help address the desire for pick-up games. The implementation of these suggestions is certainly technically feasible for a system such as the DS. Research systems for mobile ad-hoc gaming, such as Sanneblad and Holmquist's OpenTrek platform, have already included support for these features [16]. Indeed, certain DS games already incorporate some of these features, to varying degrees. For example, in the DS games *Pokémon Diamond* & *Pearl*, shared multiplayer spaces exist where nearby players will simply appear in each other's game worlds. Making these features more common in games would likely be welcomed. However, they would need to be implemented in a way that adequately addresses safety and privacy concerns, since the system is marketed in large part to younger children.

To help create a broader social context, the system could provide provisions to externally display game state on a shared display so non-players could observe game action. In their discussion of public interfaces, Reeves et al. describe the amplifying effect created by large screens [14]. A large, shared view could enhance the social experience surrounding group gameplay. While a seemingly simple solution, it actually creates a unique research problem. Most games are designed to show only the player's perspective. If one creates a shared display to show game state, it is not obvious which player's view should be shown on the external display. One potential solution to this problem would be to create a "bird's eye view" or introduce a separate "commentator" or "cameraperson" role for a non-player who could selectively choose vantage points in the game.

We note that it may seem that adding such a mechanism would be counterintuitive, since it would reintroduce some of the console's physical portability constraints, and that players who desired such an experience could simply use a console instead. However, the ability of handheld systems to scale to many players more easily and gracefully than consoles leads us to believe that there would be a viable context for this type of system.

CONCLUSION AND FUTURE WORK

The results of this study shed light on the multiplayer gaming practices surrounding the latest generation of handheld gaming units, and the distinct multiplayer culture that is emerging around the DS. In particular, we have identified three themes related to the multiplayer gaming practices of the Nintendo DS: renegade gaming, pragmatic and social barriers to ad-hoc pick-up games, and private gaming spheres.

Our study focused on the gaming practices of a narrow demographic, namely males aged 18–34 with university-level educations. However, the DS is used by a much wider range of individuals, including children. It would be worthwhile to understand how the DS is co-opted by other populations, such as young children, and how their practices differ from those of our population.

Another avenue for future work is studying how games such as *Pokémon Diamond* & *Pearl*, which, in concert with the Nintendo Wii console game *Pokémon Battle Revolution*, display a portion of the game on an external screen, alter the gaming experience. For example, do such games lessen

the impact of the private gaming spheres created by the current devices?

In conclusion, the innovative feature set and relatively low cost of modern handheld gaming platforms has resulted in the sale of tens of millions of gaming systems. Because of the commonplace nature of these systems, it is now possible for gamers to engage in multiplayer gameplay in a less restricted fashion than with past generations of gaming systems or with other gaming platforms. Our research is the first analysis of how these new features have been appropriated by mobile gamers in real world gaming contexts.

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