# Is CSCW Ready for some Football?
# An evaluation of Madden 2005

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# Introduction

<u>Video Games and CSCW</u>

In recent years, the scope of CSCW – Computer Supported Cooperative Work – has expanded to include non-work collaborative applications of technology such as social uses for SMS and instant messaging (Grinter 2002), Massively Multiplayer Online Role Playing Games (MMORPGs) like Star Wars Galaxies (Duchenaut, 2004), and collaborative interaction with shared displays in an educational setting (Brignull 2004). However, little attention has been paid to the genre of console video games – games designed for Microsoft's Xbox, the Sony PlayStation and PS2, or the Nintendo GameCube. These games are interesting and relevant to CSCW for a number of reasons.

While games are software applications that run on technology similar to that which supports groupwork applications, differences exist between them. Games are intrinsically motivating, and don't suffer from some of the adoption issues that other CSCW systems face. However, games have traditionally been designed for single-player interaction, and this trend is starting to change. The concepts of roles, communication, and awareness that are important considerations when designing groupware systems are likely to become important for game designers as well.

Previous research suggests that contextual information available in a given situation imparts suggestions as to how people should behave in that situation (Haney 1973, Zimbardo 1973). Harrison & Dourish (1996) use MUDs as an example of an application that uses the concept of virtual "spaces" to enforce behavioral norms appropriate for the particular spaces within which users find themselves. This concept is prevalent in other kinds of games, and CSCW applications as well. CTools incorporates various roles such as Member, Observer, and Owner, and each role has its own access privileges and responsibilities.

In addition, communication technologies such as email and instant messaging that are used to support workplace interaction are starting to be incorporated in multiplayer online games. MMORPGs and most console video games tend to be restricted to text interactions, but some games are beginning to incorporate Voice over IP technology (VoIP) (Halloran 2004, Hew 2004) as well. When talking about what is happening in the game starts to become essential to success in the game, concepts from CSCW research such as awareness will be increasingly important for game designers to consider.

Game designers also have to consider interesting and complex interaction design problems. Some games have a similar level of complexity as airline cockpits – in fact, flight simulator games exist, but the information and interaction design problems are not restricted to this genre of games. Game designers make explicit decisions about the information that should be provided to users at various points during the game, and what actions and decisions should be handled or controlled by system, in order to create an engaging and challenging game. As game systems have become more powerful, the information presented to users in every screen of the came has increased, and the games themselves have become more complicated. This is compounded by the problem of designing for multiple players, and issues addressed by CSCW researchers such as single display groupware and new interaction techniques (Tse 2004, Brignull 2004) are relevant.

Finally, multiplayer games can suffer from some of the same usability issues as other groupware systems, but they cannot be evaluated using the same methods. Traditional methods for evaluating interactive systems such as heuristic evaluation, cognitive walkthrough, or think aloud usability studies are slanted towards creating "walk up and use" systems. This focus is not appropriate for game design – games must be challenging enough to be engaging, but not so challenging that they are no longer fun to play. CSCW researchers are just beginning to develop methods for evaluating games. Mandryk (2004) used physiological measurements such as galvanic skin response and heart rate to determine whether users were enjoying game play.

Desurvire (2004) proposed a set of usability heuristics for games, but they have not as yet been validated.

As demonstrated above, the challenges that confront traditional CSCW research are also being encountered by the designers of console video games. This paper describes a project to use concepts from CSCW to explore the design and evaluation of one particular video game, Madden 2005.

<u>Research Questions</u>

Madden 2005 is an NFL football simulation game for all of the major gaming platforms. It was released in August 2004 and sold more than 1.35 million copies in its first week, making it the biggest first-week success in the Madden franchise's 15 years on the market (http://www.gamesindustry.biz/news.php?aid=4020). A new game is released for each football season, and consistently outsells its competitors.

We chose to focus on Madden because it is a popular game, and because the multiple-player and online modes of the game make it interesting from a CSCW perspective. In this project, we were interested in three aspects of the game: roles, communication, and usability. The research questions we investigated were:

- What roles do players assume during game play? What factors might affect the roles people take in cooperative and competitive conditions? How stable are roles?
- How did usability issues manifest across different conditions of the game and experience of the users?
- What are the main communication tasks that must be accomplished in the game?
- What design recommendations should be made to better support the collaborative and competitive?

# Method and Participants

<u>Participants</u>

We recruited 8 participants through email to student email lists and personal relationships. All of the participants were graduate students at University of Michigan, and six were aged between 25 and 34 years, and the rest below 25. Two participants were women and six were men. Although they all had experienced playing both general and multiplayer video games, and most of them had played sports video games including football, their skill level and frequency of play were varied. Therefore, each pair was matched as closely as possible with regard to their level of experience with football games and familiarity with video games in general. On average, they watched a football game on television once a week or every other week, and understand basic game rules. All participants used a computer to communicate with others on a daily basis. Participants were not paid, but they were provided with food during the session.

<u>Materials and Procedure</u>

Our study used a 2x2 mixed design. The within-subjects factor was "Game Mode", with two levels: teammates vs. opponents. The between-subjects factor was "Experience", also with two levels: expert vs. novice.

| Game Mode (within) by Experience (between) | Teammates | Opponents |
|---|---|---|
| Experts | 2 pairs | 2 pairs |
| Novices | 2 pairs | 2 pairs |

The study took place in the Behavioral Lab at the University of Michigan Business School. A large conference room equipped with a projector, screen, and sound system was utilized. A Microsoft

Xbox with two controllers was hooked up to the projector and sound system. Two recordings were made of each session, one that captured the participants, and the other that recorded the projection screen. All sessions were completed in one day.
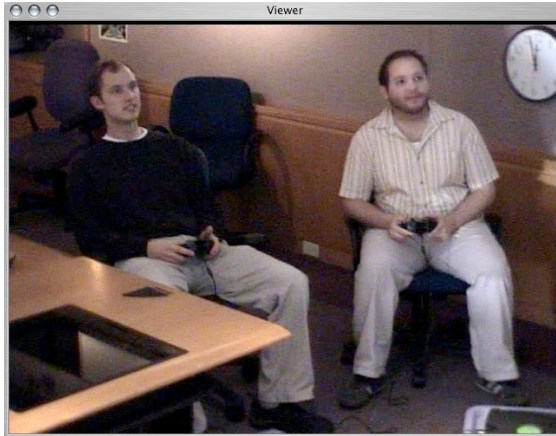


**View from Camera 1**



**View from Camera 2**

Two pairs started as opponents for two quarters, and then started a new game as teammates and played two quarters. The other two pairs played in the reverse order. The primary purpose of having these two opposite game modes was to allow us to understand how the social interactions involved in playing with someone else are different in relation to possibly different motivations and objectives. After playing four quarters of Madden, the game was stopped and participants were interviewed about their experiences. Each session lasted approximately two hours. See Appendix A for the protocol.

## System Description

Madden 2005 is a video game simulation of NFL football created by Electronic Arts. While there are many features to this game including practice (running isolated plays), tournament (simply playoffs), or franchise (running a team for multiple years), the version of the game that we focused on was an isolated game for two players. At the startup of the game the players can choose the teams that will play and also if the two players will be on the same team or on opposite teams.

The game contains all the elements of a real NFL game, consistent with the Electronic Arts motto, "If its in the game, its in the game". After the coin toss, the game play consists with four quarters of football.

Within the game there are two main tasks. The first is choosing a play from a series of different formations that are displayed on the screen, and then different plays from within the formation. This task occurs when the players or on offense or defense. Selecting a play is an individual activity – only the player holding the "player 1" controller is empowered to select plays within the game.
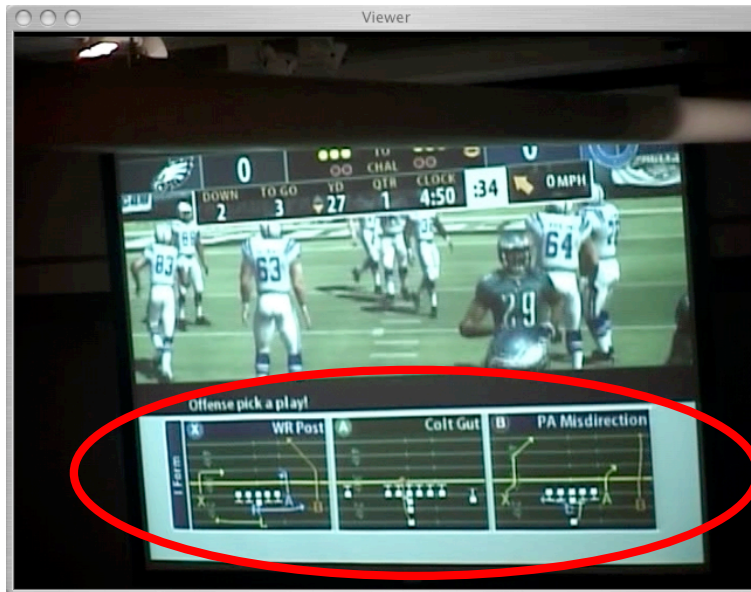
**Selecting a play**

Then the next task is to execute the play. When on offense, the person with the primary controller is the quarterback and runs the play. They are responsible for starting the play and in a pass play determining whom of the available wide receiver they should throw the ball. When on defense, each player has the ability to choose which of the 11 defensive players they want to be and then control that player to try and prevent the opposing team from executing their play.


**Executing a play**

The team with the highest combined score after the four quarters is the winner. If the score is tied at the end of the game, an overtime period is played and the first team to score wins.

When playing against the computer there is an artificial intelligence component that controls the play of the opposing team. To make the game more engaging to players of all levels the level of the AI of the game can be set to many different levels from "rookie" to "all-madden" settings. The AI determines how quickly the computer will "read" what play the human is trying to run on offense, or how quickly the computer will notice that the human player has a person in the game

outside of position when on defense and the computer ability to exploit that error.

Players are able customize nearly any element of the game from the settings menus. If the quarterback is getting sacked too often, they can increase blocking. If the receivers are not catching the ball often enough, they can increase receptions. This level of customization allows the game to be tailored to the skill level of each individual player, and to change as the player becomes better at playing the game – assuming that the player knows that the settings exist, and how to change them appropriately.

# Analysis and Results

<u>Analysis</u>

In our data gathering and analysis, we selected three areas known to be relevant to CSCW research: roles, communication, and usability. Notes were taken by the three experimenters during the study sessions. The data captured in the notes illustrated trends in tasks, behavior and communication. These data were carefully examined to first discover how the proportion of social and task talk differed according to different game mode and experience (Halloran 2004). We were interested in how the expert groups and novice groups form different talk functions because the discrepancy in their experience would produce different approach to the game, and that would affect their communication accordingly. For example, the expert users were expected to talk about more advanced strategies using football terms, whereas the novice users' conversation was expected to more focus on control functionality. Both groups may convey a task talk, but their talk focus is likely different because of their experience level. Also, the gestures the players used while communicating with each other were a point of interest while reviewing video clips.

The usability analysis consisted of a review of the video captured during the sessions. During the initial pass through the video, evidence of usability problems was captured, along with the timestamp of the occurrence. This evidence consisted of things like exclamations of surprise or confusion, complaints about things not working "right", consulting the manual, and looking down at the controller. A second pass through the video was undertaken, matching the timestamps of the usability problems and the utterances of the participants with what was occurring in the game. Finally, instances where the participants used the onscreen help were noted, as well as responses in the interviews about things participants felt were hard or confusing.

<u>Findings: Roles</u>

Roles transferred across tasks with unequal requirements. The two tasks that were identified were determining what play to call (cooperative task) and then executing the play (central/supportive task). Calling a play is considered a cooperative task because the rules of the game do not specify that one player or the other chooses what play should be called. The design of the game enforces the fact that only the person holding the "player 1" controller can physically select plays.

Executing the play is considered the central/supportive task because the person who has the main controller is in change of directing the quarterback and makes the decision on how to execute the play. The person who has the second controller can pick any other player on the same team.

When skill and experience were equal, the person who was dominant in the central/supportive task was also dominant in the cooperation task. When the subjects physically swapped controllers and thus who was dominant in the central/supportive task, the control also swapped over in the cooperative task. So, for example, the person who was the quarterback almost always chose the plays with little consultation from the supportive player on the shared task. In all situations in the cooperative game the two players switched roles during the course of the

condition. As soon as the roles were switched the person who took over for being the quarterback, also started calling the plays.

When skill and experience were unequal, the more highly skilled player dominated in the cooperative task regardless of what role they played in the central/supportive task. This finding only occurred at the beginning of the experiment. During the course of the experiment as the less experienced player has more repetitions with the game; they felt more at ease with how to call plays in the cooperative task. By the end of the experiment the behavior was similar to that of the equal experience condition.

Findings: Communication

In a collaborative game, players are more communicative in terms of coordination and collaboration. As the game requires the players to choose a specific formation and an associated play from a range of different options, the two players naturally involved in active ongoing conversation to discuss their offense or defense strategy:

OFFENSE
P1:        "Any suggestions?"
P2:        "There are streaks on side, let's do the 'shotgun' (for formation), and do the 'corner' (for play)"
P1:        "OK"

DEFENSE
P1:        "Blitzing, lots of blitzing!"
P2:        "If you can beat that guy (while pointing an opponent player out on the screen with a finger) that would be awesome"

Since the player with controller 1 was in charge of choosing offense or defense strategies, the other player made a frequent confirmation on what formation and play was chosen before the game resumed. They often (especially expert users) used their fingers to draw a path or route line in the air over the screen while discussing their plan. They also assisted each other in figuring out game features. They were aware of how one's play affected the team effort so that they often mentioned on their own 'bad' performance to the other.

"Oh… I missed him, sorry"
"Oh… I think I ran too straightforward"

In a competitive game, players are less communicative and have mostly social talk. In general, the players talked much less to each other than when they played collaboratively. They sometimes made social comments on each other's play, but they did not convey strategic issues. They still assisted each other with procedural issues related to controller functionality, the occurrence was lower.

Expert and novice players show differences in understanding the game, using strategies and game features, and cooperating.  In a collaborative game, while expert players were able to discuss concrete sub plans and advanced strategies, novice players' strategic discussion was very simple.

BETWEEN EXPERTS
P1:        "(after they chose a formation and play) which way do want to go?"
P2:        "Depends on how they line up" (and then they adjusted their play and route accordingly)

BETWEEN NOVICES
P1:        "(In choosing a formation and play) what do you want?"
P2:        "I don't know…Whatever"

The novice players tended to stay with one or two formations independently from the opponent team's formation. In contrast, expert players constantly revised their previous plays and experiment other formations. Novice players cooperated with each other mostly with game features and controller functionality whereas expert users rarely talked about them.

Lastly, the expert users used 'football language' like blitzing and shotgun, and their shared understanding of the language helped them to continue effective communication while playing. In contrast, lack of novice users' understanding of some football terms on the screen hindered their choice of plays and their task talk.

Findings: Usability

When participants played on the same team, they encountered two main problems. First, both experts and novices had trouble keeping track of which football player on the screen they were controlling. The game marks the football players that are under the control of the people playing the game by highlighting them with orange or green circles under their feet (see image below). It was difficult for players to remember which color they were, in the face of everything else that was going on during the game. Also, players tended to switch controllers so they could take turns calling plays, and that meant they were not playing the same color throughout the game.



**Who am I? Orange or green?**

Participants on the same team also experienced problems with coordinating passing plays. It was the experience of participants in this study that they were much more successful at completing passes when they let the AI take over, so that the computer controlled the receivers. Attempting to catch the ball themselves resulted in incomplete passes. This is an interesting usability issue -- in usability studies of office applications, for example, there is no equivalent to the AI taking over. When a user is unable to complete a task, that task is not automatically completed by the computer. In this case, the usability analyst cannot use "whether the pass was completed" as the criteria for success or failure – because the computer will do this if left alone. Instead, it was the frustration of the players at not being able to complete passes, and at the difficulty level of this action, that brought this out as a usability problem.

Expert participants were particularly frustrated by the incomplete passes when playing on the same team. They were used to a certain amount of success in the game, and found that they performed far below what they were used to when playing as teammates. Both pairs of experts also scored more points as opponents than as teammates, and one pair indicated that they would have quit rather than continue to lose the game, if they had been playing at home.

Novice participants, whether playing as opponents or teammates, were just getting used to the

game. They seemed to experience information overload, and had trouble figuring out what was going on during the first 10-15 minutes of game play. For example, the participant with controller 1 who was supposed to select the plays often did not do this quickly enough, and received a delay of game penalty. The play clock is visible on the screen, but novice players did not notice it until after receiving several penalties. This is a discouraging way to start playing a new game.

In addition to the football rules that were replicated in the game but not represented in the interface, participants were unfamiliar with the game controllers. Many of the actions required (passing, sprinting, etc.) require players to press a combination of buttons, which was often too much for a novice player to remember. In addition, there are multiple views of the field that are available to players, and can be very useful. Novice players were unaware of these views, and consequently the game was more difficult for them than it needed to be. Ultimately, because the AI in the game will do a lot on the behalf of the players if they allow it, novice players began to rely on the AI in order to stop making beginner mistakes. Novices also tended to help each other out with the game and with the controller whether or not they played on the same team. When playing as opponents, the coordination problems were absent, but players still had confusion that was due to the complexity of the controllers.

# Discussion

Roles, Communication, and Usability: Insights

From the analysis we conducted, Madden 2005 seems to be optimized for a competitive situation where there is just one player on each team. The analysis of roles illustrated that two roles emerge when playing collaboratively instead of competitively: the play caller (usually the quarterback, except in cases where the less experienced player had controller one) and a player in a supporting role who usually took control of the receiver or runningback, but could play any offensive player on the field. These roles are built into the game through design decisions to only allow the player holding controller 1 to call the plays, and due to the context of football – the quarterback position is seen as one that requires more thinking and planning than other positions.

Because these two roles had different tasks and responsibilities in the game, more communication happened when players that were teammates coordinated their activities than when players were opponents. This coordination took time, and in some instances interfered with game play, making successful performance more difficult. Combined with the challenges associated with completing passes, the added task of communicating about plays made the collaborative situation less enjoyable for participants in our study.

This presents an interesting interaction design problem: how to involve "supporting" players in a more central role so controller switching isn't necessary for them to have an enjoyable and engaging experience. This problem is compounded if the game were played online where players are distributed, because awareness of the other player would be reduced. Other ways to visually present information in the game may be required in that situation in order to better support coordination and discussion about play calling.

Design Recommendations

The first recommendation is that the game should adapt to the skill level of the players. The differences in behavior patterns we observed between the expert and novice players were consistent. For example, the novice players took longer to select plays, received more delay of game penalties, and selected inappropriate plays (extra point block on 1st and 10). These mistakes during the game set the novices apart from the experts. It might be possible for the game to recognize these common beginner errors, and offer help or prompt the players to switch to an easier mode of play.

Secondly, onscreen help that is more visible, without disrupting the flow of play, might also be beneficial. In order to enter into the onscreen help, users must first pause the game and scroll to the bottom of the menu. If this option were more visible, perhaps an addition to the score indicator at the top left of the screen or a message that appears between plays, it is possible that more users might be aware of it and utilize it more.
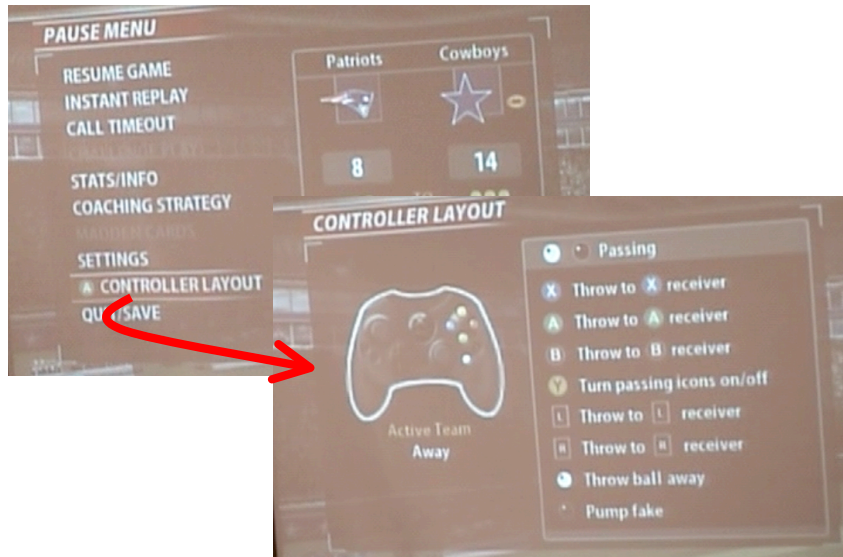


**Current representation of onscreen help: buried two levels down**
**Players must pause the game and then select "controller layout"**

Third, game console designers should make it possible for either controller 1 or controller 2 to call plays. Much of the confusion over whether a given player was "orange" or "green" was due to the fact that they switched controllers in the middle of the game, in order to hand off the power to select plays to the other player. Confusion could be reduced if players were able to retain the same color throughout the game. Also, a small LED might be added to each controller so that when the player on the screen is "orange", the controller displays an orange light to match. A quick glance down at the controller would provide the player with important information, rather than requiring the player to take some unique action during the game (jumping, running backwards, etc.) in order to identify the player s/he was controlling.

Finally, to better support communication between two players on the same team during the selection of plays, game designers might consider providing a visual indication on the screen that highlights the play that is selected. There is no reason to hide this information when two players are on the same team, and the additional information displayed in the interface might promote discussion about other options of plays to call, or about the coordination that will be necessary to successfully execute the play.


## Conclusion

The fields of usability and video games have been around for a few decades, but there has been little interaction between them. (Jørgensen, 2004) It may be explained by the conflict between the classic game design goal characterized as "easy to learn, but difficult to master" and the usability goals of making interface easy to learn, use, and master. (Desurvire, 2004) In a presentation at the University of Michigan, a manager from EA Games (the producer of Madden) responded to a question about usability testing in the game design cycle by saying, "game developers do not want to be stifled by the quality assurance people. We do not see the reason to hire usability people. The market likes our games." However, it is questionable from the present study whether

the game is easy to learn. We believe that usability principles can help game designers to understand the users' difficulty in 'learning and using' the interface without hindering the 'intended' difficulty embedded in game mastery. Pagulayan et al., in their Microsoft Playtest group case studies, conclude that "*[The] relationship between theories of game design and traditional HCI evaluation methods has yet to be defined but definitely yields an exciting future.*" (2003, p.900) The authors of this paper shares their point of view.

At the same time, CSCW researchers can find factors from their previous work manifested in video games. Video game like Madden 2005 is an example of Computer Supported Cooperative Play (CSCP), which is defined as 'mutual engagement by two or more individuals in recreational activity mediated by a computing environment' (Wadley, 2004, p. 238) Important concepts within CSCW that can be contributed to CSCP include collaboration, coordination, and awareness. CSCW researchers can also examine how cognitive factors like mental models, attention span, and memory capacity are designed to be supported in collaborative video games. Moreover, a predominant trend is for games to be designed for online multi-player games using computer mediated collaborative technologies such as text message and VoIP. How these technologies increase or inhibit the enjoyability of group scale games can lead to interesting CSCW research questions.

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## Appendix A: Protocol

INTRODUCTION
- Welcome participants, see if they want something to drink or to have a snack
- Give overview of study
- Session will last about two hours
- Tell them about the recording equipment
- Ask participants to sign consent forms
- Start the recording equipment

INSTRUCTIONS
- Brief overview of Madden 2005
- Tell participants to either play on the same team or opposing teams – counterbalanced
- Tell participants we'll play one half, and then stop the game and they'll switch to the other conditon
- After playing both ways, we'll ask them some questions about the experience
- Ask participants to talk while playing, but no formal instructions like in a psych experiment or usability test – just want to encourage them to talk, not say every single thing they are thinking
- Start the game

DURING GAME PLAY
- Take notes, keep track of interesting events/communications
  - if people coordinate their activities, how they go about doing so
  - are people aware of the other player on the screen
  - talking about game logistics vs. game play
  - decision points – how do they know what to do next? Do they discuss it?
  - mistakes
  - confusions
  - other conversations about aspects of the game while playing
- Note scoring and times (relative to the game and relative to the study session)

INTERVIEW
- At the end of the second half, stop the game, and adjust cameras; ask questions about things that happened during the game

- Overall reactions
- Competition vs. Cooperation
  - Which was more fun? Why?
  - Any differences you noticed between playing as teammates vs. opponents?
- Ergonomics/Industrial design
  - What did you think about using the controllers in the game at first?
  - How did these impressions change as you played the game?
  - Which buttons did you use to do what in the game?
- Communication/Coordination
  - How were you communicating during this time?
  - Why did you say < blah > at that point?
  - Tell us what you were thinking when you did < action >
  - Narrate the video for us in this part – tell us what was going on here. What did you do next?
- Interface elements
  - What did you think about doing < action > in that way?
  - Describe the options available on the screen here
  - Which player are you right now?
  - Tell us what you were thinking when you did < action >

- Probes:
    - Can you talk more about that?
    - What did you do next?
- Ways to improve the game? Final comments or questions?

WRAPUP
- Stop the recording and finalize the dvds
- Thank them for coming, offer snacks