Motivating Play through Score

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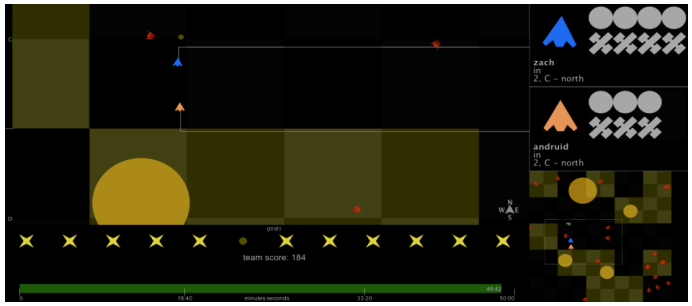
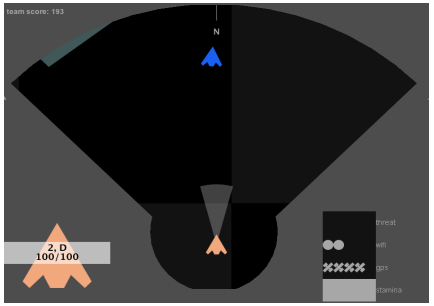


(a.) coordinator view



(b.) seeker view

figure 1. Alternate perspectives in prototype game for teaching team coordination. The coordinator (a.) has an overview of the virtual world, while the seekers (b.) are embedded in it. Each role has access to different information about the game space. Score is accumulated for collecting goals and avoiding threats.

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Abstract
Score motivates game play by rewarding behavior and providing a gauge of performance, enabling comparison and competition. Players compete individually and collaboratively to maximize score. A scoring rubric assigns value to action, motivating players to accomplish specific tasks.

While abstract and arbitrary in theory, in practice, score can be a powerful motivator. We connect the role of score in games with our own user study designed to teach team coordination. We show how score motivates play and learning. Players with alternate perspectives cooperate to improve their score and best other teams. Point values direct strategic play. Intense competition emerges between teams who have never met, even though scores are not directly accessible. We examine how the scoring rubric underlies motivation. Rewarding desired behavior with score and making scores publicly available are key design implications.

Keywords
Games, engagement, score, motivation, rewards.

ACM Classification Keywords
H5.2. Information interfaces and presentation: User-centered design.

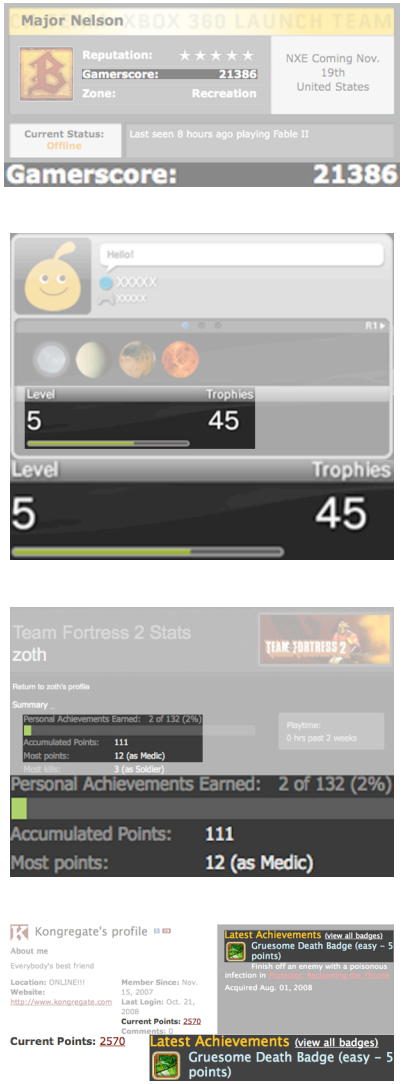

figure 2. Online profiles for XBL, PSN, Steam, and Kongregate, highlighting score.

Introduction

Score rewards players for accomplishing tasks within a game. In theory, it is an arbitrary, abstract construct; in practice, score intrinsically motivates players. Score gauges progress, allowing comparison and competition over time and between or within individuals and teams. While games themselves are engaging, score motivates play and directs action.

In this paper, we cover a brief history of score. We describe a game for teaching team coordination (**figure 1**) and its scoring rubric, which assigns values to game actions. We discuss findings from a game user study, which we relate to the history of score. We conclude with design implications for engagement: rewarding desired behavior with score, and make score public.

History of Score

Score determines the winner in athletics and board games. In many videogames, score has no direct impact on play, it is a *reward of glory* [3]. In some cases, this is because there is no way to "win" the game [2]; in others, it is a way to compare the degree to which the player has won. Unlike other types of rewards, which may improve the player's ability (e.g. free games, extra lives), score rewards the player.

Pinball and videogames have used scoring mechanics since their inception [2]. A high-score list logs the greatest scores achieved, often with attribution (e.g. initials). High-score lists were common in arcade games, where the data was public. Players could compete even if they did not know one another, earning "bragging rights". The Twin Galaxies [http://www.twingalaxies.com] organization was formed to maintain and publicize top arcade scores.

As gaming transitioned from the arcade to the home, the value of high-score lists diminished. Individual games tracked high scores, but, unlike arcades, these were not public. Gaming magazines published subscribers' scores in an effort to increase access. Global networks succeeded where magazines left off, making scores public, enabling competition.

Online gaming communities, such as Microsoft's Xbox LIVE (XBL) [http://xbox.com/live], Sony's PlayStation Network (PSN) [http://us.playstation.com/PS3/network], Valve's Steam [http://steampowered.com], and Kongregate [http://kongregate.com] support competition though score (**figure 2**). These services reward players with *achievements* ("*trophies*" on PSN), digital badges for in-game accomplishments. Achievements are displayed on a player's online profile and contribute points to the player's aggregate score.

Some games integrate networked high-score lists into the games themselves, motivating play. For example, *Geometry Wars Retro Evolved 2* displays a score for a player to beat: the current top score of one of the player's friends. Other games use score to motivate real-life activities. In *Chore Wars* [http://chorewars.com], players create a character that gains experience for self-reported house work (**figure 4**). In the *Passively Multiplayer Online Game* [http://pmog.com], players earn points for visiting web pages and can go on "missions" by navigating hyperlink trails that other players create.

Game Design and User Study

We studied players of a desktop prototype of an educational location-aware game. The goal of the game is to teach team coordination, so cooperation is an essential component of the design. Game players take on one of two interdependent roles characterized by in-

entity (state)	summary
 seekers (*in*; *online*)	>0 HP; *can* collect goals; *tracked* in coordinator view; **+10 points/second**
 seeker (*safe*; in; online)	restores HP; *can* collect goals; immune to threats; *tracked* in coordinator view; **+0 points/second**
 seeker (*offline*; *in*)	*cannot* collect goals; immune to threats; *not tracked* in coordinator view; **+0 points/second**
 seeker (*out*) & threat	0 HP; **cannot** collect goals; **tracked** in coordinator view; **-10 points (-25 points)**
 one-seeker goal	collecting scores **+100 points**
 two-seeker goal	collecting scores **+200 points (+400 points)**
 three-seeker goal	collecting scores **+300 points (+900 points)**

figure 3. Game states and scoring rubric. A redesign updates the rubric to encourage more teamwork; updated scores are in parenthesis.

game abilities and information access: coordinator or seeker (**figure 1**). Previously, we evaluated the game in terms of simulating teamwork from work practice [4], here we examine the engagement created by score.

The coordinator observes an overview of a virtual world with limited detail and assists the team by acquiring and sharing information. Seekers traverse the virtual world to find and collect goals while avoiding threats; their view of the game world is highly detailed, but limited in scope. Threats capture seekers, preventing them from collecting goals, and some goals require multiple seekers to collect. Seekers may go offline (a seamful condition of location-aware games); in this state, they are safe, but cannot contribute to the team's progress, nor are they tracked in the coordinator interface.

Players communicate with each other and work together. The coordinator is always physically separated from the seekers, and may contact them via two-way radio. To simulate the freedom of a location-aware game, where seekers can group and split up, the seekers may be co-located or distributed. In the co-located condition, they can speak to each other face-to-face, but when separate, they must use radios.

Scoring rubric

The scoring rubric (**figure 3**) emphasizes teamwork, to motivate participants to learn to work together. Teams gain the most points by collecting goals that require multiple seekers. The team loses points if seekers are captured by threats, which the coordinator helps to prevent. Score is computed on the team level to minimize individual competition.

Study design

We observed 40 participants over a month in which they played four 1-hour gaming sessions. Participants formed 10 teams in which the coordinator role shifted each session. Two games were played each session (co-located and distributed conditions), with discussion time before, in between, and after. We recorded all in- and out-of-game utterances by the players. Although we did not formally publish scores, we did furnish participants with information about others' scores when asked. All participants received the same compensation regardless of performance.

Results and Discussion

Study participants were excited to play the game each week, eager to improve and compete.

Within team improvement over time

Participants expressed a desire to improve their scores, engaging them in play. Overall, scores increased, but not monotonically. When a team regressed, members were disappointed in their performance.

Between team competition

Study participants exhibited an intense interest in how well they performed relative to the other teams in the study. Many were disappointed to find that scores were not publicly available. Some rejoiced when they became the highest scoring team, which incited other teams to compete:

> One team earned a record score, and remarked that they would rather get a "#1" trophy than monetary compensation. On hearing this, another team bested the first, saying they would provide the first group with a 2nd place trophy instead. The first team responded by achieving the all-time high score. They were happy to be #1 again, and told the experimenter

figure 4. "A Fabulous Invention" – A gaming comic [1] about Chore Wars motivates participants to do house work. [Reproduced with permission from the authors.]

that they did not want to know if anyone ever beat them. A third team, after hearing about the record, claimed that the experimenter was tricking them into playing harder.

In another group, one team member suggested a new, risky strategy because he believed they were far enough ahead of other teams that they could afford a lower score if it did not pay off.

Scoring rubric impacts strategy

Participants considered the scoring rubric when deciding strategies. One team observed that three single-player goals are equivalent to one three-seeker goal, and decided that collecting single-player goals was a more effective strategy. Teams discounted the penalties for captured seekers. Coordinators directed seekers to new locations, but told them not to worry about being captured on the way. Some strategies sacrificed seekers as a distraction, so that others could collect a goal.

Strategies that de-emphasized teamwork or sacrificed team members run counter to the game's educational purpose. We redesign the scoring rubric to account for this (**figure 3**). We increase the point values of multi-player goals significantly and increase the penalty for being captured. We hypothesize that this will motivate players to protect each other and view multi-seeker goals as essential. We will test this in future work.

Conclusion

In practice, score is a powerful construct that motivates engagement with computer systems. Rewarding participants for completing specific tasks using score motivates action with little cost. As we have seen in our study and the history of score, much of the value of score lies in public access. Publicly accessible high-score lists provide the opportunity for players to formally and informally compete with friends and strangers.

Score is not without drawbacks. Participants may try to "game" the system or cheat to improve their score. The online community coined the pejorative term, "achievement whore," for players who play games with easy achievements for the sole purpose of acquiring a high score, not for enjoying the game.

We observe that aspects of online life already embody score, without formally being part of a game: contacts on social networking sites, such as Facebook [http://facebook.com] or LinkedIn [http://linkedin.com], board games played on Boardgame Geek [http://boardgamegeek.com], songs played on Audioscrobbler [http://last.fm], distance run with Nike + iPod [http://apple.com/ipod/nike], or posts in a forum (some forums ascribe rank to post count). These cumulative abstract quantitative measures of activity drive engagement.

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