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# outWord: Encouraging Walking with a Social Game

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**Abstract**

In this paper we present outWord, a social, competitive, location-based game for mobile devices that promotes walking and enhances the walking experience. With outWord, players use mobile devices to pick up letters from a virtual map and spell them for points, competing with players worldwide. Based on previous research and interviews with potential users, we used user-centered design techniques to understand the users' gaming, technology use and walking behaviors and iterated on several game prototypes to promote walking.

**Keywords**

Social game, mobile technology, walking, user-centered design, contextual research

**ACM Classification Keywords**

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**Introduction**

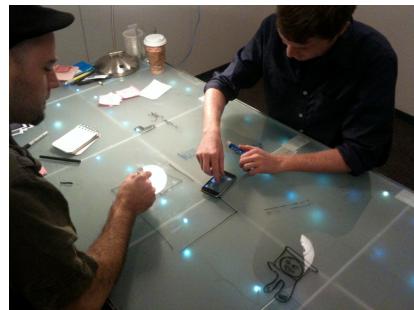
In this paper we consider the use of a social game to promote walking. There is a long tradition of using computer games to motivate an extrinsic activity, such as an educational goal or an exercise goal [1][5]. Research shows that people play games because of the properties of the games and not because of any

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**Figure 1:** A game play observation

particular extrinsic goal a game supports [2]. Players of exercise games like Dance Dance Revolution, for instance, are motivated more by their desire to have fun and interact with others than by their desire to exercise [2].

Numerous researchers have studied the benefits of using computer games to motivate walking behavior [1][2]. Lin et al. [3] demonstrated that individuals could be influenced to walk through game elements, but found that players lost interest after the initial game sessions, in part because they had to wear a pedometer and upload their walking data to a centralized location. Similarly, Thomas et al. [6] found that a physical game that required players to wear backpack-sized computer equipment limited the game's appeal with larger audiences. New technological developments allow us to overcome some of these barriers. In particular, the current generation of mobile devices include hardware for interfacing with the Global Positioning System (GPS), which can in turn be used to identify a player's location and thus eliminate the need for additional equipment or player actions (such as uploading data) to play such a game.

Thus, we hypothesized that a social game played with people's existing mobile devices could be used to motivate the extrinsic goal of promoting walking and enhancing the walking experience among its players, without the need for additional equipment.

### Contextual Research

As noted, we were interested in using the properties of social games to promote walking behavior. We focused on an audience that was likely to use current mobile technology and likely to play games on these devices.

Research indicates that college-age students both play computer games and are comfortable with technology [4]. Thus, we set out to better understand that particular demographic's usage of mobile technology, game playing behavior, and motivations through a contextual process that included interviews, observations and subsequent analysis. We interviewed ten students at schools in and around Ann Arbor, Michigan, aged 18-32 and observed game play sessions of mobile video games to understand this demographic's technology usage and game playing behavior. We created and analyzed notes from these interviews and contextual observations to better understand the interests and behaviors of students as it related to our design goal. This analysis revealed a number of insights regarding the use of mobile technology by our demographic, their interest in games and game playing behaviors and finally the games themselves. These findings are:

An unfulfilled niche exists for mobile games that are playable on the move. We found that many students both owned the Apple iPhone and frequently used this device on their way to class and work, to keep in touch with friends by checking email and various social networking applications. We also found, however, that few students played games while walking, with some noting that many existing games required extensive coordination and timing and were difficult to play while engaging in any other activity, including walking. Students were more likely to use social applications such as email, Facebook and Twitter when walking than playing games, because the cognitive load of these activities was much lighter.

The primary motivator for game playing is often social, even if the games themselves are not. While our interviewees typically did not consider themselves competitive—only one of the interviewees considered himself strongly competitive and the majority professed to not care much about their score—they were interested in comparing their scores with other players, even if games they played had no mechanism for doing so. While students did not play many mobile games with a strong social component, they often played such games on social networking sites (e.g., Mafia Wars) where the social aspect was a core part of the game. Regarding this discrepancy, our interviewees noted that the reason for this is that the available games for the iPhone platform tend to be for one player.

Mobile game players are more interested in casual games that are easy to understand and play. Our interviewees were uninterested in games with complicated play mechanics or niche themes (e.g., high fantasy). Further, they preferred games that provided some level of challenge but were not overly difficult. Several players referred to these games as allowing them to "turn their mind off."

With these findings, we set out to design a casual, simple game that was playable on the move and leveraged a strong social component. In so doing, we uncovered mechanics that were likely to encourage both continued and repeated play while promoting walking.

### Design Process

After our first round of interviews and analysis, we focused our efforts on rapidly developing, play testing, and iterating on prototypes to uncover what players



Figure 2: A hi fi prototype of Build-a-Bot

found engaging in social games. This section describes these prototypes, and the results of the play testing. Taken together, these tests revealed additional information about what players enjoyed and found addictive in the games, and consequently, indicated game mechanics that might encourage walking. Each of the prototypes we developed utilized the GPS services available on the iPhone to provide players with a map-based interface to the game. The tests included small group tests, single play-test interviews and a subsequent release of a full-featured game on Apple's App Store for convenient distribution to over 1,000 devices.

Our first prototype, Pasalon, was a social game in which the goal was to move a unique digital entity "residing" in a player's iPhone from a starting location to a goal location by physically transporting it. The core mechanic of the game was a "pass," by which a player could transfer the digital entity to another player's phone, provided the other player was within a short distance (under 10 meters). Following a series of brainstorming and mockup sessions, we developed a hi-fi prototype of this concept for the iPhone. Our play-test of the hi-fi prototype provided us with mixed results; while players grasped the concept and the mechanics quickly, many players were concerned that they might have to pass the creature to individuals they did not know and felt that this constituted too much involvement on their part.

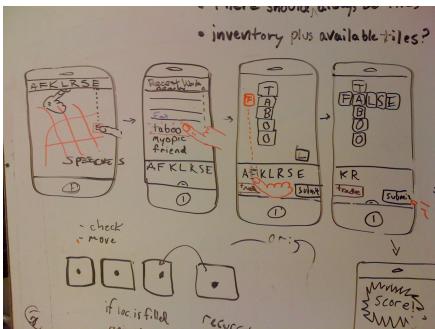
In developing our second prototype, Build-a-Bot, we leveraged what we learned from our previous play tests and expanded on the mechanics of the first prototype by adding a collection component. In this game, players picked up robot pieces scattered throughout a

specified area. The object of the game was to combine the parts to build a robot, which would interact with other players' virtual robots. Build-a-Bot retained the pass mechanic of our previous prototype as it provided a means by which players could exchange robot parts. Because our previous prototype had shown us that players were uncertain about passing to players they did not know, we made this mechanic an optional part of this game. However, play testing revealed that even so changed, players were unwilling to trade, both because they did not see a benefit and because the effort required exceeded what they were willing to invest. Further, while some players found the robot theme appealing, others did not.

Concerned that our initial prototypes violated the finding that players preferred simplicity in their games, we chose to examine the aspects of the game that were most engaging. Specifically, as our play-tests revealed, users found the collection aspect of the second prototype engaging, with some willing to walk out of their way to "out-collect" other players. This fit with our initial finding that players were less interested in a challenge than something that allowed them to "turn their mind off." Thus we made this the core component of our third and final prototype.

### Our Solution: outWord

With the findings from our initial contextual research and design iterations, we developed outWord, a location-based word game. In outWord, players compete against each other by picking up virtual letters from a map display. They use these letters to create and submit words for points with longer words being worth more points. A centralized server distributes these letters to the virtual map and players can pick up



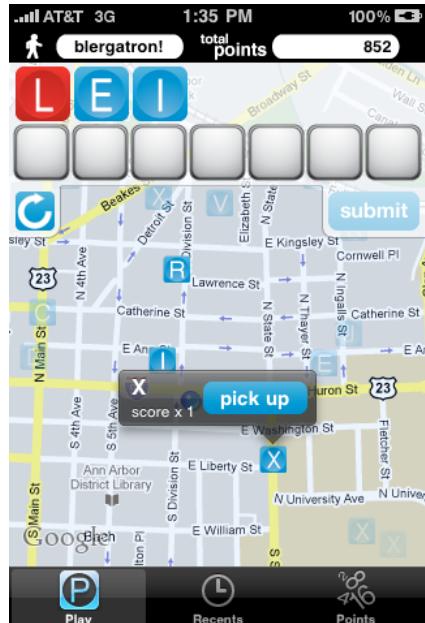
**Figure 3:** Initial sketches of outWord

letters within a two-block radius of their current location. In order to promote walking within the game, outWord displays letters outside of the two-block radius as translucent. This encourages players to walk to the letters, especially if one of those letters is needed to finish a longer word. outWord uses the same basic design as many other word games in that only dictionary words are counted as valid words and the point value of a word is based primarily on its length. outWord is intended to be played for short periods of time. There are no game instances and everyone participates on the same server. outWord uses a location-based and time-based scoring system where each player attempts to maximize a "score radius" within which he or she has the highest score, as well as his or her position on outWord's leaderboard, a list of players ranked by score which resets weekly. Along with checking the leaderboard, players can review the recently submitted words, the names of players that submitted them, the players' locations and how many points they received.

After developing a hi-fi prototype of outWord, and conducting a small initial play-test, we developed a fully featured version of the game for the iPhone and made it available as a free download on the Apple App Store.

### outWord Assessment & Discussion

We conducted a second round of interviews with seven active players of outWord to assess both their reactions to the game as well as our success in promoting walking. These interviews confirmed our initial finding that a casual, social game could promote walking behavior and gave us several additional findings resulting in design ideas for improving our players'



**Figure 4:** outWord's map-based interface

experience. These new findings with their related design ideas are:

Players play outWord while walking. The specific contexts in which our interviewees played varied and included playing during a walking commute as well as taking a walk specifically to play outWord. However, of the players who primarily played during commutes, all had gone out of their way to pick up a letter outside of the two-block radius. Interviewees noted that they had played the game in other contexts besides walking, such as on the bus, but overall referred to it as a walking game. We felt that, while our main goal was to promote walking, we did not need to address players' use of the game in other contexts.

Players are motivated by outWord's social component, but that component is limited by the leaderboard presentation. We found that players were strongly influenced by the social and competitive aspects of the game, even if they indicated otherwise. While many players indicated that they were uninterested in their score and position on the leaderboard, they frequently viewed others' recent words and used the leaderboard to compare themselves to their friends. They expressed disappointment that they could not always identify their friends based on their user names. Fittingly, most interviewees indicated a desire for more social interaction within outWord. We plan to encourage social interaction in outWord by enhancing this aspect of the game through customizable friend lists which would allow for competition within a smaller group as well as giving players the ability to share additional information with specific other players. We are also considering game elements that encourage

players to interact, such as building off of others' words for additional points.

Even though outWord's primary interface features a map, players who walk often need to refer to a different application for directions and destination information. A number of interviewees noted that they had used outWord's map interface for some aspect of travel planning, but wished it would display their destination and route. Thus, we are considering adding an interface that allows players to overlay travel information on the outWord interface without interrupting game play.

## Conclusion

outWord motivates the extrinsic activity of walking through engaging players with a simple, fun game and social components. Thus walking plays no active role in the game itself. Players of outWord are not required to walk to play the game and their walking behavior is not tracked or used in game play. Regardless, outWord's players both play outWord while walking and walk to play outWord. While there is undoubtedly potential for incorporating the walking behavior of the players into the game mechanics, we see those mechanics and especially the social components as the primary motivator for our players to walk. The incorporation of additional walking mechanics may threaten the simplicity and casualness of the game design and thus remove some of its appeal.

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