

# PhotoPlay: A Collocated Collaborative Photo Tagging Game on a Horizontal Display

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## ABSTRACT

We are exploring the use of collaborative games to generate meaningful textual tags for photos. We have designed PhotoPlay to take advantage of the social engagement typical of board games and provide a collocated ludic environment conducive to the creation of textual tags. We evaluated PhotoPlay and found that it was fun and socially engaging for players. The milieu of the game also facilitated playing with personal photos, which resulted in more specific tags such as named entities than when playing with randomly selected online photos. Players also had a preference for playing with personal photos.

**Keywords:** games, annotation, tagging, photos

## INTRODUCTION

A common criticism of photo annotation systems is that they are too costly in terms of user time and effort and that they will therefore be underused. The focus of much research in this area has been in reducing the time cost associated with applying tags by simplifying the annotation or tagging interface [1]. Another approach to consider when trying to engender tagging behavior is to analyze the incentives that people are given. Research looking at photo tagging behavior on Flickr [4] has suggested that the incentives for tagging there are both in organizing one's own photos and in the opportunities to share with one's contacts. The ESP game [7] incentivizes photo tagging with the ludic engagement of guessing how someone else might tag the same random photo.

In the PhotoPlay system described in this paper, we combine aspects of these incentive structures to provide a collocated game environment with opportunities for social engagement and sharing of one's photos and stories with friends. As a byproduct of the game and the social interaction, validated and relevant tags are generated for personal or online photos. We contribute a game design and rationale which extends collaborative tagging to encompass the collocated negotiation of valid tags in small groups.

## GAME AND INTERACTION DESIGN

PhotoPlay is a computer game designed to be played by three to four players around a horizontal display. The goal for each player is to build words related to any of four photos on the display by selecting from a 7x7 grid of letter tiles (Figure 1e). Once a tile is used in a word and attached to a photo, that tile has a timeout period of 20 seconds until it can be used again in another word. Tiles may not be re-

peated in a word. Letters are chosen by a random process for each round, with at most 5 letters of the alphabet missing from the board.

Words attached to photos remain hidden (Figure 1c) until the end of the round (2.5 minutes) at which time each word is revealed and evaluated collaboratively by the group. Each player reads off the words they attached to each photo and if there is consensus in the group that it is a relevant word for the photo, the word earns the player points.

A word can be challenged by any player if its relevance to a photo is questionable or if it is misspelled. The person who owns the word is given a chance to explain how it is relevant and discussion is allowed. Each player then inputs their vote on the relevance of the word; a yes increments and a no decrements the relevance. If the word earns a positive relevance score it is validated and earns the player points. The winner of the game is the first player to surpass a given threshold of points.

For serious games it is important to balance the fun of the game with the completion of the underlying goal (production of textual tags). Many design decisions in the word building phase of the game were made to ensure that the game was sufficiently challenging so as to make it fun but without drastically hindering the goal of producing tags. Parameters such as the tile timeout duration and number of missing letters could make the game too challenging (e.g. if letters timed out for too long) or too easy (e.g. if no letters were missing the letter tile grid becomes a keyboard). Many of the parameters of the design such as the grid dimensions, tile timeout duration, number of missing letters, and round duration were developed through trial and error and initial user feedback in order to balance the difficulty of the game.

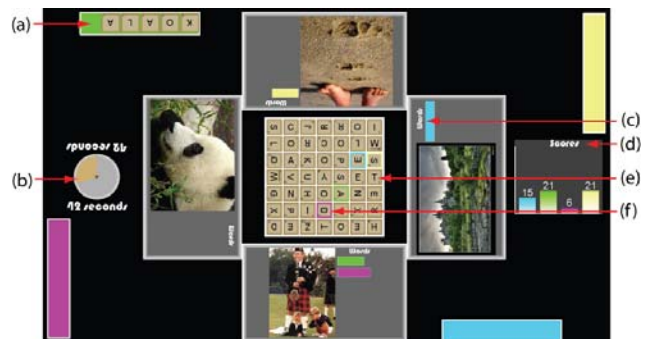


Figure 1. Overview of the interface. (a) "private" letter tray, (b) clock, (c) word proxy, (d) score chart, (e) letter tiles, and (f) letter select cursor

The design of the scoring phase of the game builds from designs of traditional board games such as Boggle and Scrabble. Cancellation scoring (no points for duplicate words) rewards players for adding less common or obvious words to the photo, such as additional background information that an individual familiar with the photo might know. The scoring of the words is based on the value of letters but could easily be changed to be based on the length of the words. The challenge portion of the game was designed to promote public scrutiny and voting on the validity of the tags in order to filter out bad or irrelevant tags.

A design objective of PhotoPlay was to capitalize on the rich social interaction and group dynamics that are associated with traditional board games [3]. Collocation of players around a horizontal display allows for important interaction properties such as deixis and gesturing, one-to-many verbal communication, non-verbal communication, awareness, and mores of group play [5, 6]. Thus we tailored the visual interface of PhotoPlay to a horizontal table display. In order for each player to have a good view of each photo during the round, the four photos rotate around the center of the table every 15 seconds. The letter tiles in the center of the board are randomly rotated at 90 degree increments (Figure 1e), which equalizes the task difficulty of selecting letters for the four differently oriented players.

To give each player feedback on the word they are building as they select letter tiles, we incorporated a letter tray which is oriented toward the player (Figure 1b). In practice players were extremely focused on the letter search task and rarely peeked at the trays of others. In light of the prevalence of game controllers in living room environments we opted for each player to have their own controls in the form of a standard 10 button game controller. However, in order to induce more social interaction and to provide awareness information about user actions in the scoring phase of the game, we use a shared public control, a big red challenge button, which sits atop the table display and which any player can hit to challenge a word.

## EVALUATION

Formative design evaluation was conducted through heuristic evaluation with standard and game specific heuristics and tabletop design guidelines [2]. After several iterations we conducted a formal user study with the goal of evaluating the social interaction and enjoyability of the game and the effect of photo content on the specificity of the tags created during play. Fifteen participants were internally recruited and divided into four groups; three groups of four and one group of three. Each group played the game in each of two conditions manipulating the source of the photos. The first condition drew the photos from the players' personal collections and the second from a set of 100 diverse photos from Flickr. Each group got comfortable with the interface, played in both conditions (in balanced order), and filled out a questionnaire. Video and observational notes were recorded and analyzed for each session. All tags and images were logged and coded based on their specificity (e.g. if it was a named entity).

We found that when playing with personal photos, 10% of tags were named entities versus only 1.2% of tags when playing with random online photos. On a 7 point Likert scale with higher being better, players had a mean preference of 4.60 for playing with personal photos and a mean preference of 3.33 for playing with random online photos. Preferences were dichotomized (4's were counted as negative) and a Chi-Squared test was run on the preference for playing with personal versus random online photos. There was found to be a significant difference and preference for playing with personal photos ( $\chi^2 = 5.0$ ,  $p = .0253$ ,  $dof = 1$ ). The mean rating of "How fun was the game?" was 5.25, which indicates that most players also felt that the game was fun (regardless of content source).

Qualitative feedback on the questionnaire generally indicated that PhotoPlay is an enjoyable game. Some players noted that they would play it with friends and that using personal photos could make the game "a good conversation starter." In some cases, people indicated that they learned something interesting (such as the name of a person or place) about the other players through their photos.

## CONCLUSIONS

We presented PhotoPlay, a collocated collaborative game designed to be fun while collecting useful photo tags from players. Our evaluation has shown that it is an enjoyable game and that players preferred playing the game with their personal photos rather than random online photos. A primary design contribution is in our use of multiple incentives for play, including the provision for players to share and connect with friends by playing with their own content. Having tags of varying levels of specificity can support deeper and more personal forms of indexing for the group. Since named entities are bound to re-occur in personal collections, their labeling could serve to bootstrap automatic recognition algorithms (such as for faces).

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