Social Interaction in Gamebased Applications on Smartphones in the Context of Tourism

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Abstract. We present and compare two different approaches for touristic applications using smartphones. Our goal is to add value to the touristic experience in an appropriate way by provoking or improving social interaction between tourists. Because touristic actions always are motivated intrinsically, we decided to implement two game-based approaches. We use smartphones in two completely different ways: In the first approach, we use it as an input device for a large interactive display which is exhibited in public. In our second approach, we use it to enable tourists to explore places all over the world in a long term multiplayer game.

Keywords: tourism, gamebased, smartphones.

1 Introduction and Related Work

Nearly every tourist owns a smartphone and uses it to discover new sites ([21]). Our goal is to use smartphones to improve social interaction between tourists. Social interaction can be a conversation, a common gaming experience or the overcoming of situations in which tourists are confronted with others or in which they can play together. One trait that all situations that lead to social interaction have in common is that tourists *communicate* with other tourists. If such systems provide fun and improve social interaction, they are more likely used by tourists. In our oppinion, social interaction adds value to the touristic experience. In tourism, actions have to be motivated completely intrinsically (see [17]). Thus, we chose two gamebased approaches.

Many projects implement mobile touristic games. In [13], [3] and [22], location-based interactive stories are implemented and evaluated. In [14], a mobile tourist guide was implemented evaluating the requirements of tourists. Finally, in [12], a game with social aspects was implemented and evaluated. Services like Foursquare, Google Places, Wikitude or Layar also show that there is a demand for location based applications.

Stationary systems are also common in tourism. In [5] and [9], the possibilities of mixed reality systems in museums were discussed. Another project named 'One Rock' is very informative about social interaction while using Augmented Reality telescopes in public places [15]. In [6], another telescope providing game-based interaction and exploration for tourists was implemented.

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There are also works connecting a mobile phone controller with a large public display. In [18], it is shown how cell phones can be used to interact with a large public display. In [19], cell phones were used as controllers for a racing game on a large public display. Finally, in [1], a smartphone application is connected to stationary systems: The app leads to Kiosk systems in a city. Their system, 'Smartymote', also had a social component.

2 Social Interaction in Smartphone Games

One opportunity to enhance touristic experience is to enable social interaction between tourists. There is plenty of social interaction in games. Some games encourage social interaction by long term motivation, while others encourage social interaction by attractive, fast and easy experiences with others. Social interaction motivates humans and adds value to their experiences. Apps in a touristic context can only be motivated intrinsically and not extrinsically: 'There is no need to learn or work when people travel around the world - tourists want to spare free time in their holidays and not to work or to learn' ([17]). In ([8]), it is stated that 'Consumer researchers argue that the 'experiential' aspects of consumption, like consumer fantasies, feelings, and fun, play an important role in consumer choice behavior.'

We studied two different opportunities for social interaction: First, all players interact at one place. Second, players are spread all over the world while playing the same game. Before the tests we asked our test persons which way of playing games they prefer. 78% answered they like playing with others using a single display, while only 50% like playing games while being at different places. People prefer to interact with other players directly than computer mediated like in online games.

Generally, stationary consoles are not used in public places or in a touristic context today. In contrast, portable consoles or smartphones are more commonly played within public spaces because they are much more flexible. Players can decide to play the game simultaneously when they meet or asynchronously at different places. To make a statement about the richness of social interaction comparing these two approaches, we implemented two games using smartphones: A mobile asynchronous strategy game and a stationary synchronous action-game played on a public display using smartphones as game controllers.

3 Slingshot: A Stationary Mutliplayer Game with Smartphone I/O

This approach enables tourists to play a console-like game in public using their smartphones. A large public display attracts the attention. Tourists can download a special Smartphone-Controller application. The user input happens by moving the smartphone like a Wii-Controller and using the touchscreen for buttons and drag and drop gestures. The main action of the game takes place on

the large display that is visible to all players as well as spectators. Only some private details like special items are shown on the smartphone displays.

The concept was inspired by native smartphone games like Angry Birds or Graviturn as well as console games using mimetic interfaces like the Wii game Boom Blox. The public screen shows a virtual shooting range scene while the smartphone touchscreens of all participants display an interactive slingshot providing a draggable animated rubber strip. As the taut rubber strip is released, a projectile is shot into the 3D scene on the public screen. The downrage is located by the pitch and yaw measurements of the smartphone. A ballistic curve ensures a synchronous feedback to the player's movements and helps to predict the trajectory of the projectile.

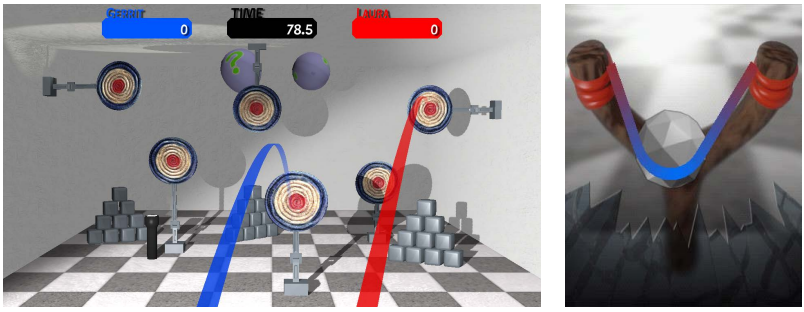

Fig. 1. Left: The app on the public display. Right: The slingshot on the smartphone's touchscreen.

Up to four players are able to play the game simultaneously. During a timespan of 120 seconds they try to hit as many targets as possible and hamper other players by shooting projectiles with special competitive effects: A 'curse item' reduces the range of the opponent's ballistic curves while the 'dynamite item' detonates after a short delay, hits many targets at a time but can be eliminated previously by the opponents.

4 Treasures: A GPS-Based Mobile-Trading-Card-Game

The second approach presented in this paper is a mobile trading-card-game. There are several major differences between the two game concepts in the way they engage the player. The two most notable ones are that Treasures is not limited to certain locations and that the sessions of Treasures are – on average – shorter than Slinghot's sessions. The player is permanently provided with surrounding venues based on the smartphone's geo coordinates (similar to Foursquare). These venues can be used to perform game-related actions, like searching for a duel or checking in. Treasures aims to improve the traditional Check-In System that is widely used by many popular applications such as

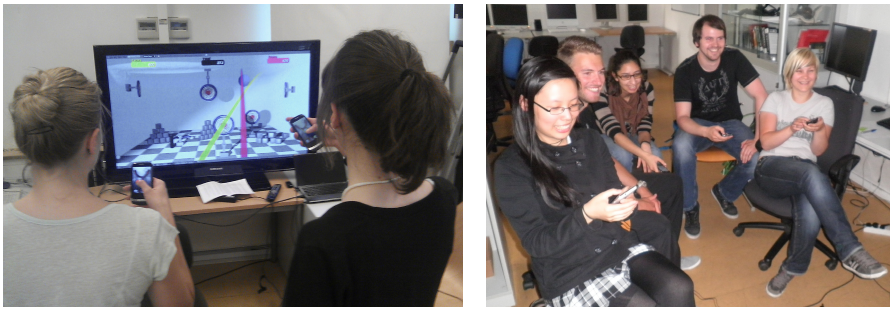

Fig. 2. Left: Two players using their smartphones to interact with the game. Right: A group of students enjoying Slingshot.

Foursquare, Facebook, and Google Places. For this purpose the game introduces common game design patterns of social games like grinding and asynchronous interaction between players. The usage of said patterns strives to give the social interaction between the players a deeper meaning, thus motivating the users to play the game on a long-term basis.

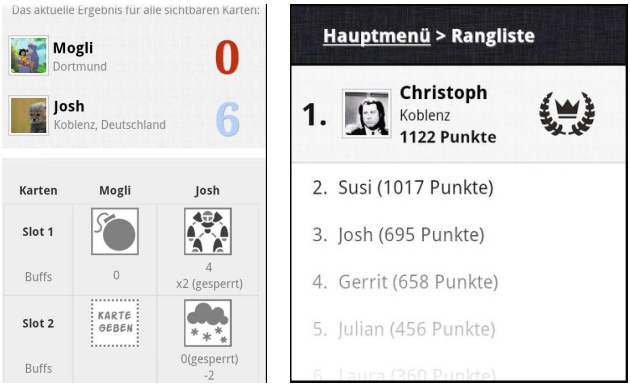

Fig. 3. Left: The duel screen. Right: The highscore screen.

The game is inspired by card-games like Magic: The Gathering and Munchkin. Some rule-based accommodations were carried out to adapt to the mobile-game nature (e.g. the game's duels are not turn-based but asynchronous). Players check in at a venue and receive game cards and points as a reward in return. They can face other players in duels when they search for a duel at the same location. Each player can use up to six game cards in a duel to achieve a score higher than the opponent's score. Additionally, other players can interfere in a duel by offering cards to the participants of a duel.

On top of that each user is assigned to one of two fractions depending on his home city and current location. The fractions are "Tourists" and "Residents".

In the current prototype duels can only take place between a tourist and a resident. The fractions were introduced to test the influence of a loosely tied group system on the social interaction between the players. By giving players who do not know each other a common ground, they get a new reason to interact with each other.

Finally, there are different goals to the game that a player can chose depending on his or her preferences. A player can try to conquer venues for the assigned fraction by winning duels at a location and thus, incrementing the score of the own fraction at this venue. The team with the better score is considered the owner of a venue. This allows players to defend their home town against tourists and vice versa, it also allows invading foreign cities. Furthermore, a player can also try to improve his own score to achieve a better position in the player highscore list. The score of a player depends on the number of check-ins, the performance in duels and the help offered to other players in duels (see figure 3). Thus, a player will constantly be rewarded for interacting with his environment.

5 Evaluating Social Interaction in the Two Approaches

We evaluated two independent groups of test persons. There have been 11 test persons for Treasures (3 female and 8 male) with an average age of 25.5 years. For Slingshot, we evaluated 23 persons (6 female and 17 male) with an average age of 25.6 years.

We decided to restrict the evaluation process as little as possible. We evaluated Slingshot by running the game on a large TV. The test persons could play the game completely without any restrictions. They could form groups to play in, they could just watch or play by themselves. On the other hand, Treasures has been played completely free for a week by the test persons.

We created a questionnaire to evaluate the person's social interaction during the game which we presented to both groups of test persons after they played. The questionnaire consisted of different questions regarding the test persons attitude towards multiplayer games, their player type and the social interaction in the game they played. The questionnaire aimed to evaluate social interaction.

In average, our test persons play computer games between 4 and 5 hours per week. 72% of the test persons for Treasures like playing computer games, and 56% of the test persons for Slingshot like playing computer games. Thus, our test persons had a positive attitude towards computer games. We assume that most tourists generally like computer games but also are not hardcore gamers either.

For a better categorization of the results, we evaluated which type of player our test persons are. According to Richard Bartle [2], there are four different player types: Achiever, Explorer, Socialiser and Killer. Achievers 'give themselves game-related goals, and vigorously set out to achieve them' [2]. Explorers try to explore the virtual world of a game. Socialisers 'use the game's communicative facilities' [2]. Finally, killers aim to 'cause distress to other players' [2].

The player type strongly influences how a player is engaged by a game. Each player was asked to rate his or her affiliation to each Bartle type on a scale from zero to four. Figure 4 depicts the numerical average of said rating. In general, the differences between the participants in the polled groups were not significant, only the Socializers were notably less represented in the Slingshot group than in the Treasures group.

Since both games rather focus on competition between players, the lack of Socializers in the participant group does not have noteworthy consequences for the evaluation. However, with the Explorer being the most prevalent player type and with both games only slightly utilizing explorational elements, effects on the perception of the games cannot be conclusively ruled out. Both games intensively utilize elements that rather appeal to Killers and Achievers, thus the game might appeal to players that also have traits of these player types.

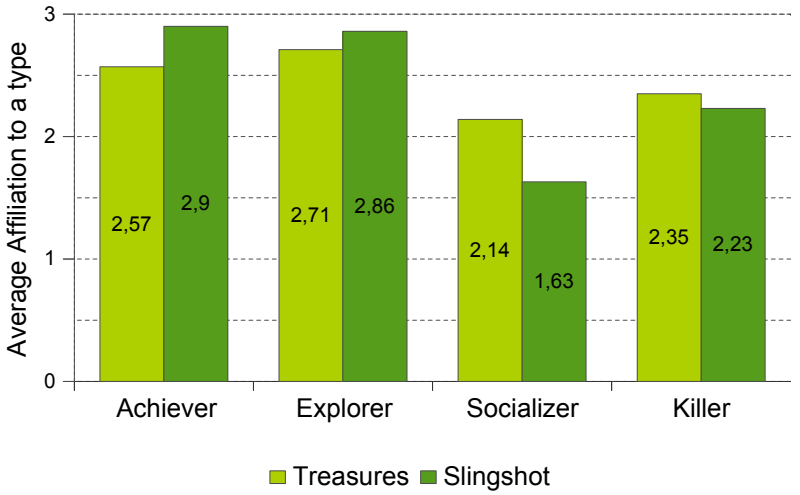

Fig. 4. Self-assesment of the participants of the second evaluation regarding their player type

5.1 Attitude towards Social Interaction

To evaluate if social interaction in the context of games plays an important role, we asked general questions to all 35 test persons (25 male and 9 female) of Slingshot and Treasures in a previous survey about their attitude towards multiplayer games. 63% stated that they like playing competitive games while 92% enjoy playing cooperative games with other human players. 71% enjoy playing games where teams act against each other. These figures show that particularly games are favored in which players have joint goals. Such games require a high amount of social interaction. Although working together requires communication among the participants, only 38% of the test persons see the need of direct communication like face-to-face communication. In addition, social interaction

goes beyond the duration of a game round if players talk about the game while not playing it. 76% of the test persons stated that they talk about computer games while not playing. For example this is the case when players exchange strategies or share their game impressions afterwards.

5.2 Consolidation of Existing Acquaintances

The following items aimed to evaluate the applications' opportunities to consolidate existing acquaintances between players. Figure 5 shows the results.

1. Because of the game, I talked to other players in general.
2. I prefer playing with friends rather than with strangers.
3. I would like to play the game with other people again.
4. The game is an interesting group activity.

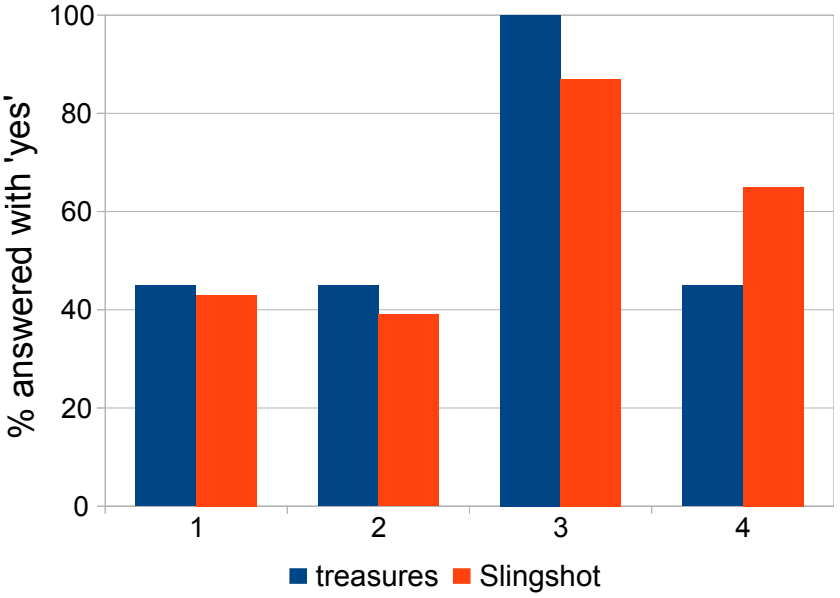

Fig. 5. Results for the items in the section 'consolidation of existing acquaintances'

Over 40% of the players talked to each other in general because of the two games (question 1, Treasures: 45%, Slingshot: 43%). 45% of the players in Treasures and 39% of the players of Slingshot stated that they preferred playing the game with friends rather than strangers (question 2). This means that many of the test persons would play the games also with strangers. Most test persons wanted to play the games again with other people (question 3, 100% Treasures and 87% Slingshot). Players liked both games and would not only like to play them

again but also to play them again with other people. Slingshot seems to be a more attractive group activity (65% Slingshot, 45% Treasures). We expected this result because the game concept of Slingshot aims to be a dedicated group activity.

5.3 Making New Acquaintances

The next item group aims to evaluate if the games can improve socializing. It can add value to touristic activities to make new acquaintances.

5. I would play with strangers.
6. I got to know new players by playing the game.
7. One can get to know new people with this game.
8. In a foreign place, I could get to know new People with this game.
9. It doesn't bother me if strangers watch me playing.
10. I prefer playing with friends rather than with strangers in public.

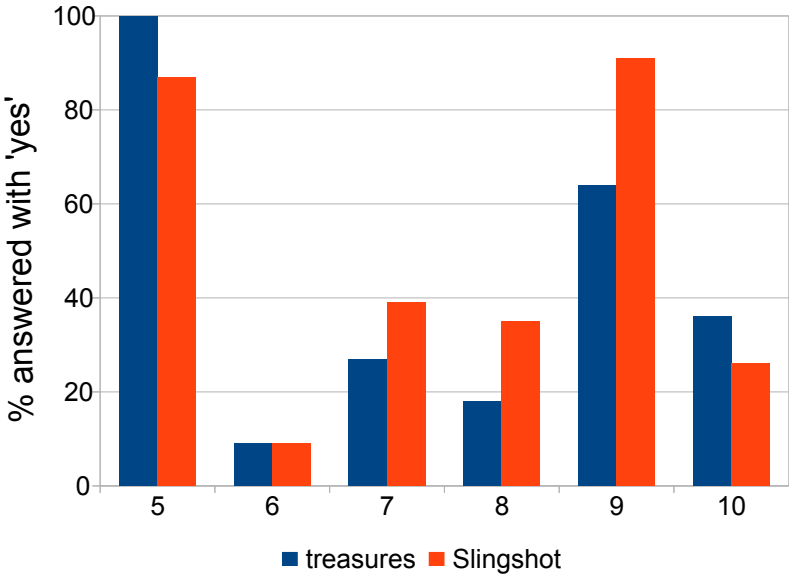

Fig. 6. Results for the items in the section 'making new acquaintances'

Nearly all test persons would play the games also with strangers (question 5, 100% Treasures, 87% Slingshot). Slingshot has a slightly lower result because the game experience is more personal. You have to actively play with others players while Treasures can be played without meeting other players. Most test persons didn't make new acquaintances while playing the games (question 6, 9% of the test persons) but many stated that it would be possible to make new

acquaintances with the games (question 7, 27% Treasures, 39% Slingshot). The fact that test persons stated that Slingshot is the better game to make new acquaintances was expected by us because it forces the players to play at one location while this is only optional in Treasures. Secondly, Slingshot uses a large public display. This enables people who are not participating to watch the game. The result is slightly lower if it is not only about to make new acquaintances but to make them in a foreign place (question 8, 18% Treasures, 35% Slingshot), but still Slingshot is better to make new acquaintances. Most test persons wouldn't be bothered if strangers watched them playing (question 9): 64% Treasures, 91% Slingshot. People would be more bothered being watched playing on their smartphone than playing on the public display. Players expect others to watch the gaming activity on a public screen, but they do not expect them to watch them doing something on their smartphone. Many people would play the games with strangers in public. Only 36% would prefer playing Treasures with their friends and 26% would prefer playing Slingshot in public with their friends instead of playing it with strangers (question 10).

5.4 Social Dynamics

In the last part of the evaluation of social interaction, we aimed to find out how far the two games can provoke and improve social dynamics between the players.

11. I talked with other players about the game.
12. I distressed other people in the game.
13. I helped other players in the game.
14. I could introduce other players into the rules.
15. Others distressed me in this game.
16. Other players helped me understanding the rules.
17. I felt mischievousness while playing.
18. I preferred the game as a single player game.

Both games made most of the test persons talk to each others about the game (question 11, 82% Treasures, 83% Slingshot). Players teased other players in both games (question 12, 91% Treasures, 65% Slingshot). In Treasures, players teased each others more than in Slingshot due to the fact that it is a long term game in which they can find new strategies to tease others. Slingshot is a more spontaneous experience where players don't tend to tease each other as much. While many test persons distressed other players, they didn't help each others in the games as much (question 13): 36% of the players helped other players in Treasures, while only 13% helped others in Slingshot because both games are mainly competitive. Most test persons stated that they could introduce other players into the games (question 14, 82% Treasures, 91% Slingshot). All players felt that they have been teased by other players in Treasures (question 15), while 57% in Slingshot felt this way. The action oriented game play of Slingshot makes players try to get as much points as possible. For this, it is not necessary to tease other players. In Treasures, it is necessary that players tease others due

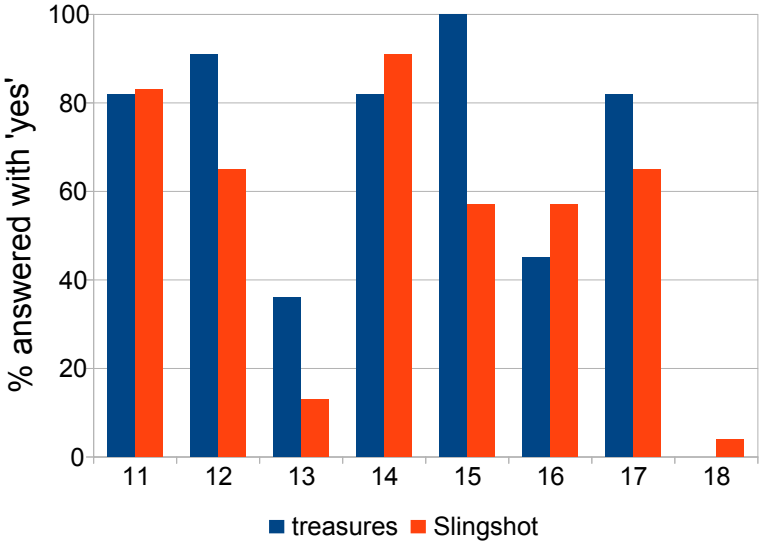

Fig. 7. Results for the items in the section 'social dynamics'

to the game concept. 45% of the players in Treasures and 57% of the players of Slingshot felt that others helped them to understand the rules of game (question 16). There were many players who felt mischievousness while playing (question 17, 82% Treasures, 65% Slingshot). Once again, it is shown that teasing others is necessary in treausures but not in Slingshot. Both games improve social dynamics by mischievousness. Nearly nobody would prefer the games as single player games (0% Treasures, 4% Slingshot).

6 Conclusion and Prospect

Both games initiated significant social interactions. In Slingshot, social interaction is generated by a fast, action oriented group activity. Players interact directly with each other by interrupting or helping other players. Games like Slingshot are great for tourism because people can play them using their own smartphones. In addition to that, such systems are interesting because they are not widely used yet. Social interaction in Treasures is rather indirect. Players do not have to meet up to play the game. Furthermore, there is a strong competition between players.

Games like Slingshot and Treasures could also be connected to create a system in which players can play with each other at all times and where they can also meet up to play at stationary public displays. Such a unified mobile app could lead them (in a playful way) to interesting venues which are equipped with stationary public displays. This idea fits perfectly to the application area of

tourism: Players could not only play such a game when they are on vacation but also in their all-day-life. Thus, this would enable tourists to stay in touch with their friends on the one hand while also regularly giving them information about venues nearby on the other hand.

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