

Understanding and Conceptualizing a Mobile Social Game for Strangers

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ABSTRACT

The paper focuses on exploring design parameters that would incorporate icebreaking to encourage strangers to form interpersonal relationships through a location based mobile social game. The platform's conceptual design is a new iteration of MeteorQuest and GlowPhones. The new iteration aims to incorporate the original design values from GlowPhones: physical and social play, exploring one's physical surroundings, away from screen gaming through the creative use of sensors. The parameters required to design for strangers are self-disclosure, collaboration, common ground, difficulty, ambiguity, and unique player roles. The previous project's minigames are redesigned to reflect the new design parameters.

Author Keywords

Self-disclosure, icebreakers, collaboration, common ground, interpersonal relationship

INTRODUCTION

Interactions with strangers can create a sense of belonging to a wider community and result in improved mental health [22]. Using games to bring strangers together in a social experience can help break the ice between them and encourage participation [10]. GlowPhones is a mobile game designed for players to enjoy playful social interaction while exploring their physical surroundings [13]. GlowPhones took some inspiration from Pokemon GO (henceforth PGO) which is a location-based augmented reality mobile game that was released in 2016. Vella, Kellie et al. [22] found that PGO creates individual and social benefits for its players. In PGO 'players are rewarded for physical movement and inhabiting public places' [22]. When PGO players inhabit public spaces together it also works as an icebreaker for starting conversations with other players. Playing Pokemon GO gave players a sense of belonging and connectedness in their local community because they spent more time getting to know their surroundings [22]. And although Pokemon GO was not intended to function as an icebreaker, since the players' focus is directed to the screen, it did have positive effects because it was location based and required physical activity [22].

Getting to know a stranger starts with self-disclosure [1] which is revealing oneself through conversation by sharing stories, personal information, and opinions. Getting a positive reaction when you share your stories with other people also helps people form a positive opinion about one another [18]. Creating social connections between strangers can be difficult, even in the context of social

gatherings, people can feel uncomfortable starting conversations or participating in formal introductions [19]. Icebreaking activities can be used to trigger and support interactions among strangers but the issue with icebreaking is it can feel formal and forced [19]. The purpose of icebreaking activities is to 'create a positive atmosphere, relieve tension or formality within the group and encourage early participation and collaboration' [10]. This can make people feel comfortable enough to socialise with strangers and encourage them to initiate further interactions and start the process of getting to know each other. Just using icebreaking activities on strangers can leave the interaction feeling like a formality especially if it is being facilitated by another person [10]. And only playing a game where you can forego conversation may also feel superficial or shallow [23, 17]. PGO does not require players to speak to each other to play the game but if a player wants to progress in the game faster, they will need to work with others, which may be why the game can produce an icebreaking effect.

In physical co-location games players are given a reason and context in which they can share personal stories with one another [22] and enjoy a natural form of communication and socialisation [11]. Research into Pokemon GO [22] has shown that location based games encourage socialization and work as an icebreaker by facilitating conversation with strangers because of the shared space [22, 10]. GlowPhones showed that players engaged in playful conversations while they explored their local forest because players had opportunity to navigate the surroundings together [13]. Encouraging social and physical play was the premise of GlowPhones [13] which utilised the phone's sensors to make the game facilitate exploring one's surroundings with friends. MeteorQuest [21] then applied the same premise to bringing families together to encourage collaboration and social play. We are interested in redesigning the game [13, 21] to be applicable to strangers playing together and getting to know each other in the process.

The goal of this paper is to explore how a physical co-located mobile game can be designed to support socialisation between strangers [30]. This paper focuses on researching the components needed for the next iteration of GlowPhones [13] and MeteorQuest [21]. We aim to maintain the GlowPhone values of using the phone's sensors in a novel way, away from screen gaming, and physical co-location to encourage physical and social play. We are interested designing the game in such a way that allows strangers to interact in an organic way. We will explore how to redesign GlowPhones and MeteorQuest

in order to emphasize player socialisation and collaboration. To support this, we have reimagined MeteorQuest's mini-games in order to support the shift of focus from family members to strangers. The new iteration could act as an icebreaking activity without a facilitator and encouraging early communication in the form of self-disclosure [1], to find common ground [6], and collaborate in a playful manner to create a positive social experience [22].

RELATED WORK

Interactive technology can be applied in different social contexts to support icebreaking and encourage early face-to-face interaction and communication with strangers. There are different studies on interactive technology that can serve as a tool for getting strangers to interact with each other. Breaking away from formality in icebreaking activities is crucial because it hinders natural social interaction. The *Opinionizer* [19] was designed for strangers to interact in a "lightweight manner" [19] by sharing opinions through a large public display. The *Opinionizer* consists of a large screen and laptop for input, and a topic is written on the screen to get things started. A helper is present to answer questions which encouraged people to approach the laptop to input their comments. Or stand aside to observe other people's input. The aim is to create a subtle form of ice breaking that allows people to choose their own level of participation. This means users can easily enter and exit the conversation, or simply observe, to create a less forced method of icebreaking.

Another approach to icebreaking is to cut out the necessity for a facilitator by using mobile technology to aid the icebreaking activity. *Who's Next* [10] facilitated icebreaking with strangers by mediating through a mobile application. Participants would sit together and answer questions about themselves by typing answers into the app on their phone. The answers would be used to create a guessing game; each person took turns guessing what information belonged to which stranger. Over the course of *Who's Next* an icebreaking effect took hold and players began making jokes with each other and starting conversations about information they previously shared with the group [10].

Playful behaviour can make it easier to interact with strangers which is why *Smart Icebreaker* [16] is a prototype of a serious game for creating intimacy between strangers. All the participants (1st semester students) upload their photos onto an application for all the other students in their semester to view. Each person is given a photo of another student which they use to create an avatar. As each player finishes an avatar it reduces the number of avatars left to make, until they complete avatars of all the students' photos. Afterwards the avatars are posted next to the original photos to give each participant an opportunity to ask questions and rationalise their choices to others. *Smart Icebreaker* [16] was intended to create intimacy between strangers by getting them to familiarise themselves with someone's face which is seen

as the equivalent of making eye contact in the real world [16].

Operation Sting [15] is a collaborative icebreaking video game designed to improve group work. The game was developed from a list of requirements that sought to address icebreaking and promote collaboration in ad-hoc work groups. The game's properties included low to medium difficulty, the need for verbal communication, concurrent play, and collaborative patterns. *Operation Sting* [15] encouraged collaboration through the use of patterns which included the used complementary roles, in order to create synergies between players, shared goals, and limited group resources which contributed to players having to work together. The gameplay experience of player roles helped in establishing further interaction between group members by having each participant assigned a role with different abilities. This encouraged involvement, and contribution of all team members in a collaborative effort to progress through the game. *Operation Sting* [15] was tested to see how groups would collaborate after playing it, in comparison to groups which have not done any icebreaking, and groups that have done a generic icebreaker. The results showed that the game increased interaction between team members. They seemed more focused on discussion than those that have not played the game. It supported subsequent collaboration in terms of participant engagement in the group task.

Yoon et. al. introduces FishPong [23], the game is designed for face-to-face interaction by moving focus away from a gaming device. FishPong is an interactive system designed to encourage spontaneous social interaction between strangers in public spaces such as a café. FishPong consists of an interactive tabletop and magnetically tagged cups to manipulate the movement of a virtual fish instead of a ball by placing the cup on the tabletop. FishPong [23] incorporates the "play first, talk later" approach in a social environment and provides a way to overcome cultural barriers such as spontaneous interaction between strangers. This approach supports the participants playing together collaboratively then conversing by being able to use their coffee mugs, as well as being able to join mid- game due to FishPong's scalability as each new cup set down on the table generates its own fish and anyone can join as long as there's space around the table.

Getting strangers to collaborate in a game can help with breaking the ice and intuitive collaboration which is what *Table Tilt* [17] was intended to do by getting players to collaborate instinctively. In *Table Tilt* players use the accelerometer in their phones to push a virtual ball around their screen which they can tilt onto another player's screen to get it into the hole. The game was designed to be intuitive for players to collaborate because players share and combine their screens to work together and win the game.

In contrast to *Table Tilt* [17], *GlowPhones* [13] was designed to take attention away from the screen whilst also collaborating as a team to complete the game. Taking attention away from the screen was compensated by using the phone's sensors to encourage players to pay attention to their surroundings and enhance physical play. *GlowPhones* [13] consists of three mini games related to a narrative and required players to navigate to designated areas. The platform explored proxemics play and used F-formations to study the spatial behavior of players and challenge their personal space. The games and the navigation method within *GlowPhones* are all intended create physical and social play by challenging social norms. Each player uses their phone to navigate their way through the forest and help each other interpret the navigation to complete the game. The idea being that players experience a more natural form of social interaction if their attention is not focused on the screen but on each other. The games also seek to break down social and cultural barriers, by making it necessary for the players, in specific parts of the game, to hold hands or behave in a silly manner [13].

MeteorQuest [21] followed the same concept as *GlowPhones* [13]. The platform explored the possibility of a location based mobile game that could support family members in intergenerational interaction [21]. The game focused on group navigation and included three mini games within a wider narrative that the family had to complete. The family members were assigned separate roles. Two of the players were navigators and were the only ones that could use the light navigation system, while the others were communicators, who had to share instructions with the rest of the group. The use of unequal information encouraged family members to navigate as a group. The study was also conducted through the lens of proxemics play [13] and the minigames were designed to encourage physical closeness. Each minigame was developed with specific proxemics zones and f-formations in mind, to challenge cultural norms and bring family members closer together.

RESEARCH PROBLEM

The goal of this paper is to explore how a physical co-located mobile game can be designed to support socialisation between strangers [30]. This paper focuses on identifying the components needed to create a game that can address icebreaking with a group of strangers and encourage a positive social exchange for the newly acquainted players. The research findings will contribute to the development and implementation of a new iteration of MeteorQuest.

DESIGN RATIONALE

Mobile technology, co-located physical activity and sociability

In keeping with the development platform from MeteorQuest the new game will be developed as an android application. The app will support API level 19 and above (Android 4.4 Kitkat) and will run on approximately

95.3% of android devices. The aim is to utilise the phone's sensors in a novel way to minimise screen time and encourage social and physical play [13]. MeteorQuest made use of an accelerometer, gps, and a magnetometer for their mini games and navigation. We have found use for the same sensors with the possibility of also incorporating others into our game design. Making use of a mobile phone's sensors in an appropriate way allows for design that takes the player's attention away from the screen to participate in co-located physical activities with other players. Being physically present to play the game and keeping focus away from the screen preserves *GlowPhones*' [13] original values and encourages natural social interaction. Based on the findings by Vella et al. [22] physical co-located social games can encourage socialising and help create an icebreaking effect, and where there is focus on the screen it should be a shared experience where players have the opportunity to share the gaming device.

Players and Groups

Various research in HCI focus on multiplayer mobile games to facilitate groups in icebreaking activities and socialising. *Who's Next* [10] aims to facilitate groups of 4-10 persons, however the game is only tested on groups of 4-5 persons. *Glowphones* [13] is a two-player game, MeteorQuest [21] is a 4 player game, and *Operation Sting* [15] is 3-4 player game. Not all of these studies provide an explanation for their choice in the number of players. The number of players per group is an important consideration when encouraging socialisation between strangers. A number of research papers focuses on the effect of the groups size on cohesion, dissatisfaction and intimacy in the group [25, 26, 27]. The research indicates that cohesion and intimacy was perceived higher by the members in smaller groups, whereas members in larger groups experienced increased dissatisfaction, disorder, and conflicts.

The correlation between group size and participation level has also been studied [24, 27]. The results indicate that small groups are more cooperative and make more contribution compared to larger groups. In addition, members perceived less trust within larger groups than members in small groups. An increasing group size also increases the anonymity of the participants, resulting in the participants feeling less accountable for their choices in the group, and therefore more competitive [28]. Another study suggests that groups size may have an effect on interaction. Each member in a large group have fewer chances to speak and present ideas causing them to feel that their individual opinion is less important and feeling dissatisfied. Whereas smaller groups have more effective and extensive interactions [29]. Most of the studies mentioned above determined small groups as 3-6 persons. Therefore, the numbers of player in our mobile game should not exceed 6 players.

The Benefit of Roles

MeteorQuest is a 4 player game with two roles which means tasks overlap between players. Looking at related works and other conceptually similar games we have

found that roles are an important aspect of encouraging collaboration and communication between players. However, it is important when roles are implemented that they be distinct. Klopfer et al. [11, 12] conducted two game studies and found that giving each player a distinct role, and abilities along with it, created collaborative team work. In *Mystery at the Museum* [12] parent-child pairs were teamed up with other parent-child pairs to form a group of six. Apart from the familial pairs, participants were strangers, and roles were used to encourage collaboration across the pairs. For parents and children, distinct roles were assigned based on their anticipated abilities and to encourage children to learn. *MeteorQuest* had the starting components for creating collaborative play by making use of roles, which worked well for family members. To design the game for strangers we will need to address the existing roles to make them individual to each player within the group.

If players are given a specific role to perform and unequal information, then teams are more likely to collaborate [11]. Convertino, Gregorio, et al. [6] made similar design choices for their collaboration tasks. Each team member was given a specific role, individual information and tasks that went along with the role. The key being that each person used their roles to gather information and share it with their group in order to come to a solution [11, 12, 6]. ‘The interdependence of roles served as the starting place for collaboration’ [12] which also leads to collaborative problem solving. Having role interdependence gives each player the impression that they had the most important role in the game because they felt their contribution was pivotal to finding a solution [12]. In all three studies the game could not be won solely by one person, all the players had to share their unique information to find a solution. Roles are a key component in promoting discussion and collaboration between players across all three studies.

Communication: The Benefits of Self-disclosure

Communication is an important factor in bringing people closer together [30]. It is the way in which people share information and discover common traits or interests that can lead to relationships or even friendships. Information exchange is crucial in forming and maintaining any kind of relationship [8]. Which is why icebreakers can open the way for self-disclosure between strangers through a playful activity that relieves tension [10]. Self-disclosure can also be a means towards creating interpersonal relationship between strangers [2, 30]. And in order to create interpersonal relationships individuals must make the conscious act of communicating information about themselves [9, 30]. Revealing personal feelings and thoughts with others increases liking, trust [5, 7, 30] which are very important for creating and maintaining interpersonal relationships.

People feel closer to each other if they start with small talk and progress to more intimate conversations [30]. Although self-disclosure during a first meeting is capable of producing a perceived closeness among strangers it is

not the same level of closeness that is developed over time through relationship formation [30]. However, creating initial closeness through self-disclosure does provide a possibility for future communication. And receiving an enthusiastic response from the listener increases the possibility for intimacy [18]. There are benefits to sharing positive events and receiving a positive response to one’s news because it facilitates interpersonal relations [18, 30]. This is called capitalization, it is the process of sharing one’s positive events and receiving an enthusiastic response. This event sharing capitalises on the positive news by making it a more prominent memory and maximising the significance of the recounted event [18]. In other words, sharing one’s happiness with others helps increase it and makes one view positively the person they’re talking to.

Common ground

Common ground is the collective action of interlocutors gradually and constantly updating mutual knowledge, beliefs, and assumptions [5] through discussion. Common ground is developed through continual communication between group members to reassure understanding and shared knowledge when undergoing a collaborative task [4, 6]. For example, a group of five strangers playing *World of Warcraft* [3, 14] have different roles but have a shared goal to defeat non-player characters (NPC) in a dungeon. To complete it, they must possess the same knowledge, which can be accumulated through an information exchange. If they do not understand each other or come to a shared understanding they will have difficulties in completing their tasks. Even if they know what they are supposed to do individually, without communicating on tactics, and understanding what they must do as a group, they lack the common ground to achieve their purpose.

In *MeteorQuest* common ground was pre-existing, even if they had no prior knowledge of the game, because family members are not strangers and have accumulated communication skill. In the case of strangers there is little to no common ground and will have to be developed in order to ensure efficient communication and good collaboration between group members. A group of strangers can accumulate common ground by performing collaborative tasks and taking time to discuss their given task or plan. Collaboration usually improves with practice, so giving players an opportunity to find solutions together throughout the game helps accumulate common ground [6].

Difficulty and Ambiguity

MeteorQuest focused on increasing the level of difficulty as a requirement, considering the feedback on *GlowPhones*, so that the game would be more engaging for the players. While their results showed an increase in difficulty as perceived by the players, an argument could be made against the validity of their results. The perceived difficulty comes from a different demographic to that of *GlowPhones* with not all players having prior experience of gaming. In *GlowPhones* participants were between 22 and 31 years old, with an average of 24.6

years old, with all participants claiming to ‘have experience in playing mobile games’ [13]. Whereas MeteorQuest’s test subjects were between 10 years old and 57 years old, with an average age of 31.5, and it is unclear what the ratio of prior gaming experience is. Lower competence score was reported by the parents compared to the child participants [21]. This suggests that parent participants had little to no prior gaming experience. Therefore, it is arguable that GlowPhone’s participants viewed the game as easy due to their prior experience, whereas MeteorQuest players viewed it as more difficult due to a lack of experience, making the results incomparable for measuring increased difficulty.

Games should support variable levels of difficulty to meet the players’ level of gaming experience. The difficulty level should not be set too high in the beginning of the game but encourage the player to try new strategies. However, it would be necessary to evaluate participants to determine whether the game suits the players’ gaming skills [32]. Our solution to difficulty is to create a variation of difficulty levels, though the perception of difficulty will depend on the users’ prior game experience and response after playing the game. The difficulty of the minigames should be focused on group collaboration and should encourage communication. Every player should have to contribute in order to complete the minigames. The games should not be possible to complete by a single individual just by looking at the other players’ phones [21]. Increasing the level of difficulty in collaboration tasks benefits the group in finding common ground [6]. The more constraints you impose on collaboration the better the group’s communication [6, 13] which is likely due to the urgency and pressures of coming to a solution. Even if the task is stressful, or players may have conflicting ideas on how to find a solution, it would still be an opportunity for negotiation and collaboration, thus creating common ground between players. A few of the ways in which we can manipulate the difficulty in our iteration is by putting time pressure on the tasks, giving fewer clues or puzzle pieces, and increasing the level of ambiguity present in the game.

Dillenbourg argues that ambiguity (probability of misunderstanding) can encourage interaction between group members and create a grounding experience (develop common ground) [31]. Furthermore, GlowPhones states that:

‘seeking contextual information beyond the low-resolution display is encouraged by its limited information. Furthermore, the relationship between information encourages interpretation and this has shown to encourage engagement with the system and other users. [...] deliberately use ambiguity to give rise to uncertainty and encourage discussion’ [13]

MeteorQuest has also incorporated this into their study, and our evolution of the game will seek to incorporate ambiguity into the interaction design by giving players an opportunity to find their own creative solutions to a task. Aside from encouraging discussion between

players, the use of ambiguity can potentially encourage playful behaviour and relieve tension within the group if players use it as an opportunity for interpretation. In *Who’s Next* [10] participants were constrained by a rule (people can’t tell the person guessing that it’s their answer) that each group interpreted in their own way. Which suggests that where there is no definitive course of action there is an opportunity for interpretation which can lead to creative solutions and playful behavior.

Collaboration

Collaboration Components	Explanation
Distinct Player Roles	Each player needs their own unique role within the game, and their own abilities, so that all equally contribute to the game.
Difficulty	Increasing the level of difficulty can add pressure to the group which forces them to respond to said pressure by intensifying their level of efforts to work as a team.
Ambiguity	Creating room for interpretation encourages players to start discussions and contribute to the group’s progress through the game. Increased communication also helps player socialisation.
Common Ground	Players need a common understanding of the task at hand in order to solve it. Accumulating common ground, similar to roles, means no sole player can complete the game without the help of their team and must communicate to find solutions and progress within the game.
Concurrent Synchronicity [15]	Concurrent synchronicity means each player is occupied at the same time so that no one feels left out during the game.
Subject Matter [15]	Subject matter refers to the game’s theme or game narrative which we find holds relevance for our purposes in getting strangers to participate and work together (and socialise in the process). A coherent theme would help engage players into participating which is why we want the minigames to serve a purpose to an overall game narrative.

Figure 1: Table of Design Components for Collaboration

Collaboration refers to the ‘mutual engagement of participants in a coordinated effort to solve a problem together’ [20]. Collaboration requires a group of people to communicate, accumulate common ground, and work together, to achieve a shared goal [31]. Each group member has to participate and contribute to the progression of the collaborative task [15]. Encouraging collaboration can be done through roles, common ground, difficulty, and communication (as stated earlier). These components contribute to a preliminary design rationale for a collaborative game. Further to this Nasir, Maaz, et al. [15] identify the importance of complexity, subject matter, balanced participation, and concurrent synchronicity [15]. In summary, designing for collaboration requires the following components (see figure 1).

Using the above parameters to create collaboration will, as a result of collaboration, keep players engaged in the game’s challenges, encourage participation, and discussion. Which in turn keeps the group playing together. As long as the team is engaged in the game, they spend time together which gives them the opportunity to build interpersonal relationships.

REDESIGNING METEORQUEST

A new iteration of MeteorQuest (to be named later) aimed at strangers would build upon, and where applicable, change aspects of the mini-games and navigation methods based on our findings.

Navigation

In MeteorQuest players have two options for navigation 1) flashes which intensify in frequency the closer you get to the target location or 2) colours indicating whether you are going the right or the wrong way, green for right way red for wrong way.

This was similar to GlowPhone’s navigation method which they highlighted had some issue when participants walked slowly the colour cues would start switching between colors, making it uncertain whether players were walking in the right way or not [13]. This is also an issue in MeteorQuest which can potentially be due to the frequency of the location updates. In which case we can address this by allowing the player using motion sensor to request location feedback. Which could activate a sound file or a screen color indicating whether or not they are on the right track. This would give players a clearer validation of direction, but we would aim to keep it at the same level of ambiguity as previous iterations of the game. So that it would not be specific enough for players to forego the navigation activity.

Puzzle Quest

The design focus of Puzzle Quest was to transition from a large to a small o-space [21]. The players started in a large o-space in a square form with approximately 4 meters between them. There was a light bulb in each corner of the square where they individually could unlock a unique sound piece. The sound file could only be played when the metal detector was triggered. Afterwards they had to put the puzzle together to assemble a message.

This large o-space resulted in minimum interaction and frustration between the players due the lack of progress. Only in the end the players would form a small o-space to figure the puzzle out and successfully complete the minigame [21].

We want to avoid prolonged separation of players during the sound puzzle and increase interactions between the players. To do so we want to use one of the player roles as a beacon and have group members rally around that person and pass on the information, they received to decipher the puzzle together. The person will have a unique ability and/or tool that is imperative to the solution. We would also avoid placing metals ourselves and instead have the group work together to find metal objects.

Charge the Battery

This game is designed by GlowPhones and incorporated in MeteorQuest for its ability to break cultural barriers by making players feel silly, and by encouraging them to share an intimate zone of proximity [13, 21]. In MeteorQuest’s ‘Charge the Battery’ players are required to share a phone by placing their fingers on a button on the opposite sides of the screen and shake the mobile device to make the battery charge. In GlowPhones the game requires players to hold hands while jumping up and down to achieve the same goal.



Figure 2: Redesign of Charge the Battery

We redesigned this game to include three, instead of two, long listening buttons (see illustration above) to encourage players to share their device with other players and get close to each other in order to finish the game.

Players can charge the battery alone at the beginning of the game, using MeteorQuest’s version, to maintain their personal space before they have gotten a chance to spend more time with other players. As the game progresses, they will be encouraged to be more intimate by communicating more and to cross proximity zones. This is where the new design becomes a useful tool because it can encourage players to ask their team members for help and rely on each other to win the game whilst occupying an intimate zone of proximity.

Meteor Chest

Meteor Chest was the final minigame in the quest where they had to unlock a 4-digit lock on a metal chest. Each player has four different pieces of a number. The pieces were blurred until touched to a metal object. The intention for this was to make players place their phones together on top of the metal chest to unblur the images and use the phones like puzzle pieces.

The numbers are rather easy to figure out, even when blurred, from a distance by looking at one of the other player's screen. We wanted to make the pieces less discernible from a distance so that players would be forced to find metal and put the phones together as originally intended by MeteorQuest.

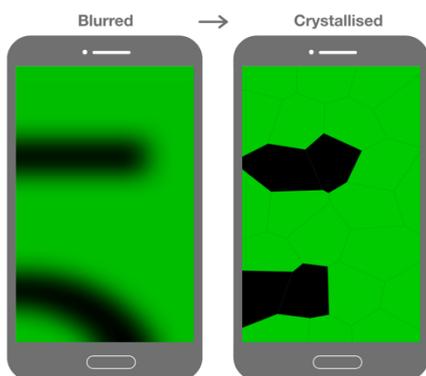


Figure 3: Redesign of Meteor Chest

Other ways of redesigning this type of game would be to increase the number of puzzle pieces. As group size increases so does the puzzle with each new phone added, with the possibility of allowing each person to have multiple puzzle pieces on their screen. This would mean assembling a part of the puzzle on each phones screen and then combining the phones to complete the image. For added complexity we could add extra pieces or have missing puzzle pieces. Which could result in, for example, only a small percentage of pieces being usable in the solution with extra pieces being added to increase the level of complexity.

Design choice	MeteorQuest	New Iteration
Target group	Families	Strangers
Number of players	4 players	6 players
Narrative	Find a meteor and destroy it	Treasure Hunt-type game
Focus	Proxemics, f-formations	Communication, Collaboration
Roles	Two communicators, two navigators	Individual roles and abilities for each player

Navigation	Screen glow (green and red) and light flashes	Sound, colour gradient, time-limited compass visual
Location	The location is set through manual database manipulation	Customizable by users in advance

Figure 4: Table showing differences between previous and current iteration

THE PLATFORM: THE QUEST

The new iteration, the Quest as we will henceforth refer to it, will incorporate four locations that can be chosen prior to the game's commencement. Although we will aim to give users freedom in their choice of locations, we will provide them with some requirements that each location should accommodate to support the game activities.

First location: Start

The first location must provide a suitable space for the group to sit in a circle and place their phones in the middle and talk. In the beginning the group will be assigned their individual roles. An audio message will play for everyone the instructions and roles. Following this the group will play an icebreaking minigame.

The game begins with all the players placing their phone on the forehead. An identical UI will appear on every phone with a yes or no question so that players sitting in a circle will be able to view the questions on their group members' phones whilst also being able to make contact with each other. Tilting the phone forward means yes and backwards will register as no (see figure 5). This game would aim to cover self-disclosure on a basic level by getting people to respond to a yes or no question that should reveal their likes/dislikes. And although they are looking at a screen, it is positioned in such a way as to allow for people to make eye contact, hold a conversation and still be aware of their surroundings.

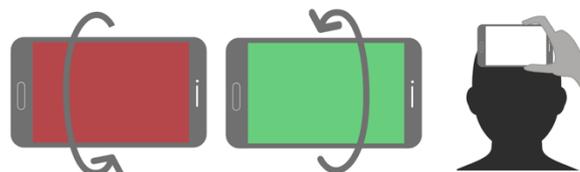


Figure 5: Icebreaking Tilting game

Another game can be designed to address self-disclosure and proximity by having a question appear only on one phone and the other devices serving as one option in a multiple choice question. If, for example, a question has three options then each option will appear on a separate phone. To pick the answer on any given phone the player must place their finger on the screen which will have six buttons so that all players can choose one option if they want to. This will mean players can cross proxemic zones, experience sharing a phone early in the game.

The activities conducted in the starting location should relieve tension between the players and give them an opportunity to get to know their team a little, as well as to understand what the overall Quest will be about. At this location the group will have an opportunity to sit together, discuss their roles, abilities, and any other game mechanics they may not understand by asking their team members.

Second location

The team navigate to the second location. This location should preferably be a man-made environment so that there is ample opportunity to find metal objects. The players will be instructed that they need to find metal to activate a secret message. 5 players will receive a portion of the secret message. Whilst the 6th will hold the unique role and it will be their role to collect the pieces from all the other players. One of the players will have gotten a call with a decryption clue and all the players will work together to decrypt the secret message. The message solution will indicate to a third location.

As mentioned previously, we do not want players to be apart for long during the sound puzzle game but rather to gather to find a solution. We want to avoid placing metals ourselves and instead have the group work together to find metal objects. This gives players not only a task to rally around but an ambiguous task because there is no guarantee of metal, and they will need to work together to find it.

Third location

This location should be similar to the previous because the group will need to work together to solve a puzzle. Once the puzzle is pieced together the team will see the code they will have to remember because it is needed to complete the final minigame. Next, the team will have to work together in order to charge the battery. Once the battery is charged an input field will pop up on the phone of one of the players. He will be able to input the code from the previous minigame. To complete the Quest all the players will need to place their fingers on the screen at the same time.

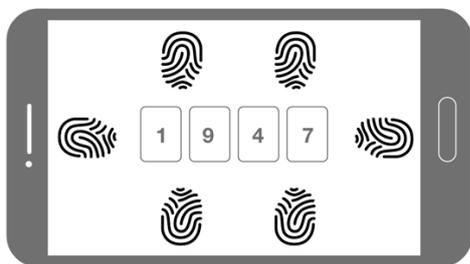


Figure 6: Final minigame input field.

DEVELOPMENT AND EVALUATION

Technical implementation

In MeteorQuest the developers chose to implement Google Firebase, which is a real-time database, as the back-end system. The choice was made to make it possible to control and monitor different aspects of the game

in real time. This also means that the game, as it currently stands, has to be manually controlled in order to be played.

We would like to implement a remote database and change the game so it can be manipulated through the game interface. The current implementation only supports running one game at a time and we would like to add the possibility of being able to run more than one game at any given time. The software will still be installed to a mobile device and the remote database will be located on a remote server. To communicate with the remote database a web service is required. The implementation is illustrated in figure 7.



Figure 7: Client server architecture

NEXT STAGES

Further exploration will be conducted on how to implement unique roles and unique abilities, and how they will be used to enhance collaboration. New technologies such as Augmented Reality will also be considered as a possibility for interactive gameplay. Novel use of smartphone sensors such as using accelerometer across screens [17], gyroscope, and other smartphone sensors will be further explored. The focus will continue to be on physical co-located play that minimizes screen time.

EVALUATION

The focus of the study is to bring strangers closer together. With that objective in mind, the evaluation will use a qualitative research approach. To explore if the application has potential for initial relationship formation between strangers. Interviews, field observations, video, and audio recordings will be used to gather data.

The interviews will focus on gathering subjective information from players regarding their experience during gameplay, if and how it helped them get to know and collaborate with fellow players. Field observations and recorded data will help with objective analysis regarding body language, communication, proxemics, duration, common ground accumulation and collaboration.

Evaluation of player experience and observation will be conducted to see if self-disclosure helped with group members getting to know each other and if it aided in their collaboration throughout the game.

As common ground develops there should be an increase in conversational turns [6, 15]. The group's communication should become more efficient, in the sense that understanding each other becomes easier and requires less clarification. Information sharing between group members is expected to be needed more in the beginning of the game, and as the game progresses players would

show signs of shared understanding. To assess if common ground was developed, we will transcribe communication records and compare interactions from the start of the game to those in the end of the game. We will compare the duration and number of turns, pauses, and interruptions [6] that take place in the first minigame to those happening during the final minigame. Qualitative content analysis of video and audio records and on site observations will be conducted to see if the players break the ice and their level of interaction increases [10, 15]. Assessments will be made to verify whether or not they experience enjoyment together as a group, if they laugh, smile, and interact in a playful way.

SUMMARY

In summary, we have reimagined MeteorQuest's minigames in order to support the shift of focus from family members to strangers. The new iteration could act as an icebreaking activity without a facilitator and encouraging early communication in the form of self-disclosure, to find common ground, and collaborate in a playful manner to create a positive social experience. The main research goal is to explore how a co-located mobile social game can facilitate strangers getting closer together.

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