Designing XR Games that Bring us Closer: A Workshop to Combine Game Design and Psychological Determinants of Closeness

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Abstract

The following paper discusses the SPIELEND project, which aims to foster social connections through play among friends and families separated by physical distances using Extended Reality (XR) and smart textiles. The project combines psychological insights on closeness with game design to create XR games that bring people closer. The paper outlines a workshop conducted as part of the project, where participants explored various game mechanics and their impact on social closeness. Findings show the successful combination of game principles and closeness determinants, paving the way for further development, evaluation and socially enriched game design. The SPIELEND project explores solutions for addressing the challenges of distance and social isolation in modern society.

Keywords

Extended Reality, Game Design, Games, Play, Social Presence, Closeness, Intimacy

1. Introduction

In our society, it is quite normal that friends or family members move to another city or, due to ongoing globalisation, even go abroad for reasons of study or work. In-person meetings become rare, a lot of communication happens digitally, even more so during the COVID-19 pandemic: 52 percent of people aged 16-29 used video calls to communicate with family and friends [1]. Nevertheless, digital communication lacks spontaneity, non-verbal exchange and emotionality and thus is in its current form not able to replace meetings in co-presence, as became obvious when "Zoom fatigue" spread during COVID-19 [2]. To make matters worse, according to the World Health Organization (WHO) we are in the middle of a mental health crisis with increasing numbers of depression and anxiety, especially among young people [3]. This made us wonder: How can we foster true social connection across distance? And what technological tools can we use or create for this purpose, and how can we determine whether these brought people actually closer?

The project SPIELEND [German for "playing"] (an acronym for: "Soziale Präsenz durch immersive, emotionale und lebendige Erfahrungen von Nähe auf Distanz") addresses these questions by developing innovative approaches for creating high quality social interaction and fostering closeness among family and friends living across distance through play.

2. SPIELEND Project

The SPIELEND project investigates how to design a game fostering closeness and social presence, through play, sensory modalities and representation of the fellow player. For this purpose, we aim to develop game concepts based on existing game patterns, and extend them with sensory qualities using Extended Reality (XR) and Smart Textiles. As an interdisciplinary project, funded by the Federal Ministry of Education and Research Germany, the SPIELEND project will (1) investigate psychological concepts and their influence on experiences of closeness in a game situation and develop new measurement methods, as currently many different psychological concepts are used in HCI [4] (Julius-Maximilians University Würzburg), (2) conduct a user-centered design process to design different games and other essential components to promote social closeness (University of Wuppertal), (3) investigate and realise the Extended Reality components and player representation (Augmented Robotics and OFFIS), (4) and develop Smart Textiles for enhanced sensory experience through wearable and tangible game components (ITA Group of the Aachen University).

In the first phase of the project, different psychological concepts (e.g. social presence, closeness, intimacy, togetherness) were investigated and factors influencing these concepts were collected. Further, 21 user interviews on the topics of playful habits, shared play, and emotional closeness were conducted and informed the design of user scenarios and personas.

3. A Workshop to Design Concepts for XR Games that bring us closer

In this position paper, we report on how we designed and conducted a workshop that aids the exploration of design concepts for XR games that bring people closer despite physical distance. To achieve a shared vision of the planned XR-game application within our project group, it was necessary to create a common understanding of the previously conducted work and findings, as well as selecting influencing factors on closeness and game patterns.

For this, we organised a workshop where all participants became familiar with visions and psychological factors for enhancing closeness, and were able to experience the game mechanics first hand. Furthermore, the workshop offered space for feedback and exchange and provided a starting point for the process of a game design which fosters closeness and can be realised through augmented reality and smart textiles.

3.1. The Workshop and Material

The workshop took place as part of a project meeting in Berlin, Germany, in October 2023. Nine people participated in the workshop, including four of the authors of this paper, who

had prepared the workshop. Overall, the workshop took three hours from start to finish. The workshop was structured as follows: (1) introduction to the workshop, (2) introduction to our *10 ways to design concepts for XR games that bring us closer*, (3) presentation and discussion of two XR game scenarios, (4) game circle and assessing closeness determinants, and (5) group reflection. Below, we will provide insight into every phase.

Introduction to the Workshop. First, we welcomed all participants and introduced the premise of the workshop, namely testing game patterns and assessing how the game might foster closeness through psychological determinants.

Introduction to our *10 Ways to Design XR Games that Bring us Closer.* The second phase of the workshop introduced participants to *10 Ways to Design Concepts for XR Games that bring us Closer*. Through literature research across different concepts of closeness, e.g., [4, 5, 6, 7, 8, 9], in the run-up to the workshop, we had identified 95 influencing factors in total. In order to make them usable in a half-day workshop for game design, we categorised them into two groups: 1) more relevant for fundamental game conception, which need to be addressed in the early stage of game design (35 influencing factors relevant for the workshop), and 2) more detail-oriented, which can be incorporated later in the process.

We inductively clustered the influencing factors deemed relevant for game conception into 10 determinants: (1) *Non-verbal Communication*, which includes aspects like physical proximity and facial expression, as well as the capability to express emotions; (2) *Modality and Tangibility*, which considers different sensory modalities as well as tangible tokens; (3) *Shared (Embodied) Experience*, which includes the experience of touch, synchronous movement and a shared environment; and (4) *Self-disclosure*, which refers to sharing emotions, thoughts, or experiences. Further determinants are (5) *Supporting Each Other*, which includes mutual trust, support and obligations; (6) *Perspective Taking*, which means taking over the physical or emotional perspective of another player; and (7) *Integrated Communication*, the ability to communicate with each other within the gaming applications, which fosters the feeling of connectedness. Determinant (8) *Nature of the Task* incorporates different aspects, such as mutual dependency, gift giving and different ways of social communication; (9) *Frequency and Duration* predicts a higher experience of closeness through more and longer interaction and (10) the *Unforeseeable* considers playfulness beyond the game and lucky coincidences. Further, the additional determinant *Beyond the Game* considers how a game can become integrated in daily routines and how the players relationships can be made salient outside of the game.

Presentation and discussion of two MR game scenarios.

As a cornerstone of the game development, two scenarios and five personas had been developed based on the user interviews. The focus in this project is on spatially separated relationships between friends (scenario one, see Fig. 1) and family members (scenario two, see Fig. 2). The first scenario shows two friends maintaining their relationship over a great distance. However, both lack the feeling of being together that can only be poorly covered by telephone calls. The novel game, in which both friends have XR glasses and tangible smart objects, enriches communication with a shared immersive activity and the feeling of co-presence. The second scenario shows a shared gaming experience between family members (daughter and mother). In contrast to scenario one, here only one person has XR glasses, while the other person plays via a mobile device. In this scenario, the difference in technical affinity as well as the different end devices is decisive for the game development and the fulfilment of user needs.
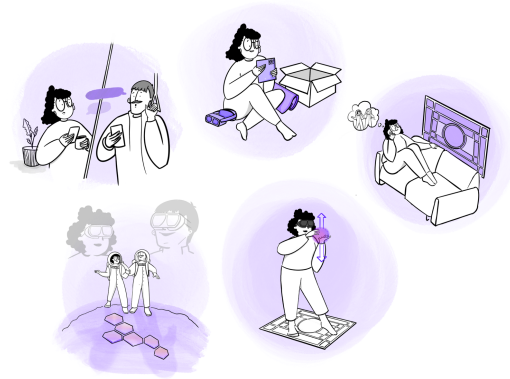
Figure 1: SPIELEND scenario one, playing with friends.

Figure 2: The second SPIELEND scenario, playing with family members.

Game circle and assessing closeness determinants. Since the final game will be designed as a two player scenario, participants were grouped in pairs to explore the game patterns through the game circle activity (see Figure 3). The game circle consisted of five stations which offered a variety of mini-games, across different categories: competitive, cooperative, or communicative game mode while putting a focus on the body, a game board, or the room. Each of the games focused on a different combination of these categories, as well as different game patterns. The selected game patterns and mechanics stood out in our prior research to have a positive impact on social interaction, or were frequently mentioned as particularly entertaining in our user interviews. Above all, mutual teasing, lying and cheating were mentioned surprisingly often in

Figure 3: Exploring game interactions through the game circle

our user interviews as important and especially entertaining interactions when playing together. This "mean" way of playing is also referred to as *treacherous play* [10]. To successfully design a treacherous game interaction, Carter suggests four main game patterns: open communication, interactions that require trust between the players, consequential play and, most importantly, ambiguous relations [10]. *Movement-based games* were also particularly popular among our interviewees. As part of the literature research, this finding was supplemented by *coordinated action*, such as lifting objects together, as a play mechanism to particularly support social closeness [11]. Furthermore, the *equal distribution of responsibility and commitment* in the game, often referred to as a sense of fairness and purpose by our interviewees, came up in our interviews and in the prior literature research as a core component of social interaction in the game [12]. These game patterns can be easily integrated as a game mechanism, for example in the form of alternating turns and balanced role distribution. The design of *asymmetrical information, perspectives and objects* also including *complementary abilities* is also conducive to social interaction between the players, as it creates a need for cooperation [12]. In general we found that, keeping the rules for the mini-games simple and focusing on one core game mechanism allowed for a clearer evaluation of the effect of each selected game mechanism.

The first game was designed as a competitive board game, focusing on the game mechanics of lying and cheating. The goal of the game was to reach the finish line before your opponent. To do this, cards were alternately drawn with the number of moves allowed or instructions, such as "back to the start". The players could then decide whether to follow these instructions or lie and make a different number of moves. The opponent in turn had to assess whether the move was true or a lie. If the player was accused and the move was true, the accuser had to go back to the start, and vice versa.

The second game focused solely on communication and used body movement and nonverbal clues as a game mechanics combination, in which participants explained prompts to their fellow players through pantomime. Here, the players cooperated through communication to win the

race against time and tried to guess as many terms as possible in just 5 minutes. This game was well known to all the players. However, it could be observed that the success of the game depended heavily on the team combination, the difficulty of the terms and the player's own ability to self-reveal.

The third game was of a cooperative nature again, based on the game pattern of asymmetrical information and complementary abilities. The players stood in front of a playing field with 4x4 squares. Their goal was to reach the treasure without stepping on a mine. One player was equipped with information in the form of a map and had to guide the other across a field of mines to the treasure. To find out how the map needed to be oriented, the first player needed a first clue from the second player by finding out what's under the first field. The second player had to turn over each field upon stepping onto it. If the entered field represented a mine, all fields were covered up again, the players swapped roles and had to start again from a different starting position. This role reversal therefore also required that the uncovered information – the direction of the map and the symbol on the field – was passed on to each other and kept by both players, which meant that the responsibility for achieving the goal was shared equally. It became clear here that the complexity of this game is easily scalable due to the size of the playing field. Due to our spatial and time limitations, we kept the playing field small.

The fourth game required both participants to physically interact with a flexible game board to guide a marble to its destination, exploring a movement-based game with a game board focus. The obstacles to be overcome on the way to the destination were holes in the game board, which the marble had to be circumnavigated by synchronous and asynchronous movements of the players. Again, scaling the game board up, adding more obstacles and using a smaller playing figure – in this case, marble – can enhance the complexity of the game.

In the fifth game, we designed a competitive game using the game pattern of ambiguous relationships and asynchronous information. Each of the players received a postcard. The postcards showed different motifs from two different locations. The cloze text on the back was also different on each side. The aim of the players was to fill in the gaps by interrogating the other player using specific questions about the motif on their postcard, and to find out whether the other player was an ally or opponent. After completing the cloze, the resulting letters could be put together as an instruction, telling the player to look for a secret message under the table. The first player to find this message won the game. One difficulty that became clear in this game was that in order to create a sense of ambiguity in a relationship, an appropriate narrative had to be built up, which was also difficult due to the time constraints. In addition, content should be formulated vaguely enough to leave room for interpretation, which, in combination with the question of trust, meant that obtaining information was sometimes very tedious for the players.

Before starting the game circle, we provided every participant with two dockets for evaluating two closeness determinants after each mini game (see Figure 4). Before starting the game circle, we provided every participant with two dockets for evaluating two closeness determinants after each mini game (see Figure 4).

The docket included the name and details about the determinant and space for each mini game's evaluation, in which we asked whether the determinant fits well, is already part of this game, or how it could be applied. If not, participants were asked to provide their reasoning.

Group reflection. Finally, we had every participant reflect how their assigned closeness

DETERMINANTS X GAME MECHANISMS

1. Nonverbal Communication

Nonverbal Communication *(social presence)*

- Physical proximity (is positively influenced by the visibility of the other players)

- Formality of clothing

- Facial expression

Expressiveness *(intimacy)*

- Possibility to express emotions

STATION 1: _____
The determinant described above fits this game mechanism and can be easily integrated or applied:

☐ Yes   ☐ No
   How could the determinant be integrated   Why not?
   or applied to the game mechanism?

Figure 4: An exemplary docket snippet, translated from German into English for publication, showing the determinant's name and definition and space to evaluate the first mini game based on the determinant.

determinants fit with each mini-game and whether they thought it could be used to foster closeness. Insights were, for example, that the factor *Frequency and Duration* worked better with repeatable games, rather than "one and done" game mechanics with limited re-playability, like in game five. Regarding *Modality and Tangibility*, one participant suggested the game board from game four, where players are guiding a marble together, as a physical memento of the game situation: it could be integrated into player's everyday surroundings as a decorative object to increase closeness. Further, *Integrated Communication* was discussed regarding game

three, where one player guides their partner toward treasure: Participants mentioned, that the closeness could be improved if the communication was required to go both ways by design, not just from the player with the map to the treasure hunter. Some pairs coincidentally started with the right orientation of the map, which lead to a one-sided communication within the game. Also, depending on the communication skills and personality of the participants, the game mechanic did not work out as designed. Further findings from the participants related to *Nonverbal Communication* in game scenarios, for which visual contact with the other players is a prerequisite in order to be able to read them. It was also found that intensive gameplay leaves little time for communication and exchange, which in turn is not an optimal prerequisite for social closeness.

4. Data Analysis, Findings and Discussion

To investigate the relationship between psychological determinants and game mechanics, we conducted an interactive workshop. We provided ten determinants extracted from different psychological concepts and five mini games that embody different game mechanics. Participants were introduced to these concepts before gaining their own experiences in linking determinants and game mechanics.

From our closing discussion, we can say that generally, the combination of closeness determinants and game principles worked quite well. We were able to gain valuable insights as well as design approaches for our general development process, and found that closely linking the psychological model and the game components right at the beginning of the design process proved to be useful.

Furthermore, we collected participants' feedback and reasoning in form of printed dockets. After the workshop, the dockets were digitised and participants' answers were organised according to (1) the underlying psychological determinants and (2) the different game mechanics. The qualitative data was analysed by three of the authors, who familiarised themselves with the data by re-reading it several times. Key insights were documented during this process. These key insights were then discussed and organised in a deductive process. Inspired by Holtzblatt's Contextual Design approach [13], we created an Affinity Diagram-like structure and identified insights and recommendations. Resulting insights include:

In relation to the combination of game mechanics and psychological determinants, it has been shown that taking the perspective of other players (*Perspective Taking*) can be an effective tool for both competitive and cooperative games. Additionally, *Nonverbal Communication* was identified as a promising tool for competitive games, such as acting or behaving in a certain way to deceive or mislead the opponent. Further, *Nonverbal Communication* was found to be effective for cooperative games, especially when conversation was restricted. It was frequently used to convey emotions, with facial expressions being particularly important.

To promote social interaction between players, the game should include shared elements such as a shared environment, a shared token or game board, or a shared task or interaction. This relates to the determinants of *Modality and Tangibility*, and *Shared (Embodied) Experience*. Additionally, we identified the limited capacity of players as another important aspect. When a game demands too much attention, communication and attention towards the fellow player may

decrease. To promote social relationships among players, it is important to ensure that games do not require excessive attention or mental demand. Here we also found that *Shared (Embodied) Experience* contradicts asynchronous game concepts. Furthermore, *Nonverbal Communication* and *Modality and Tangibility* are particularly difficult to combine, as *Nonverbal Communication* is difficult to apply in games that require the main focus to be on the game board. Conversely, *Modality and Tangibility* are challenging to incorporate when the main focus is on the fellow player.

Additionally, communication among players and their interdependence can be either uni-directional or bidirectional, but participants preferred communication in both directions and balanced interdependence. *Self-Disclosure* was found to occur in two ways. It can be a central component of a game mechanic, can occur as an indirect result of the game design, or even just a side effect, such as intentionally or unintentionally (and possibly subconsciously) displaying emotions or body language. As it often occurs more subtly as a side effect or alternatively needs to be explicitly or implicitly incorporated, implementing *Self-Disclosure* in game mechanics can be challenging. In relation to the determinant *Frequency and Duration*, it is important to consider the repeatability of games. For example, story-based games are less likely to be played repeatedly.

5. Risks, Challenges and Limitations

The exploration of game mechanisms and the associated psychological closeness determinants, fused in this workshop, serves as a crucial component of the theoretical foundation for the game design process. Besides designing a symbiotic combination of game patterns and suitable closeness determinants, we identified future challenges during the workshop, particularly related to the transfer of interactions into a remote situation with technical components, as planned for the final application in Augmented Reality.

Initially, the reliability of technical components and a stable connection are prerequisites for smooth interaction. If these conditions are not met and the interaction flow between players is interrupted or delayed, it can negatively impact the perceived social closeness and eventually create a frustrating experience. Also, the synchronicity of movements, along with the perception of synchronicity by others, may not fulfil the desired positive effect on perceived social closeness if hindered by technical issues. These minor discrepancies could lead to a less immersive experience for players, potentially causing discomfort in the worst case scenario.

The resolution of these individual risks, challenges, and limitations will become evident in the further development process. By raising awareness of these challenges early on, we can derive design guidelines and establish a comprehensive solution approach within the system. On the technical side, the risk of disruptions in the digital space can be minimized in advance through appropriate design, which demands minimal computational resources, such as the use of graphics with low polygon density. In terms of content, framing the player experience by storytelling can help mitigate minor disruptions by contributing to player immersion. Furthermore, this is complemented by a system with diverse components, such as smart textiles, resulting in a multisensory feedback and experience. And finally, embedding not one but various social closeness determinants and player motivations is an integral part of the game design, in order

to engage players in different ways and enhance replay value.

Overall, we found that the success and entertainment of each game depended heavily on participants' personalities and the team dynamics, their individual soft skills, such as communication skills, and game design preferences. This serves as an important insight for future studies and workshops within the project.

6. Conclusion

Combining insights from the psychological literature on closeness determinants and research on game design, we developed and conducted a workshop, where participants could try out different game mechanics for themselves, and in the process, evaluated possible ways to create a closer social experience with their co-players. We found this combination useful and relevant to the design process, especially in the early stages. The feedback we received from the participants confirmed our assumptions and prior research.

7. What's Next?

Moving forward, we will use the workshop results to guide our selection of game mechanics and the game's design, with intermediate evaluations of the effect on closeness between players. Also, we plan to use the generated insights to further narrow down our theoretical conceptions about closeness in the context of play. To evaluate the final prototype, we will draw from existing evaluation methods, and further develop a new evaluation method for assessing closeness based on image schemas [14].

Acknowledgments

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