

# Staying in Touch with Friends, Family and Partners at a Distance through Social Activities in VR - but which Activities are Desired?

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## Abstract

Collaborative activities such as dancing, singing, and movement games which are based on synchronised interpersonal interaction can evoke feelings of togetherness and strengthen social bonds. Doing such activities with participants living far away from each other continues to be difficult, even in Virtual Reality (VR). Latency effects in VR disrupt the experience of synchronous movement, which often results in a poor user experience. Instead of togetherness, people feel disconnected and 'out of sync'. As part of a larger project that aims to improve experienced behavioral synchronization in VR, we plan to develop new interaction designs for synchronous activities in VR, so that people can dance, make music and play together across long distances. Open questions concern what kind of activities people would consider as beneficial to engage with, in what situations, and with whom. We report on our first set of interviews investigating these questions, which provide initial insights on user perspectives regarding potential interactions and requirements for social VR activities.

## Keywords

Social Virtual Reality, Entrainment, Proximity over distance, Synchrony

## 1. Introduction

Often, groups of friends live all over Germany, couples are in long-distance relationships, or grandparents live far away from their grandchildren. While one can meet in video conferences, this primarily lends itself to talking, but results in shared experiences only to a limited extent. Social VR enables diverse opportunities to meet with people located at different locations around the world (e.g. Germany, India, United Kingdom, etc.) in a virtual space, to see each other in the form of avatars, and to communicate verbally with each other [1]. Social VR also enables users to engage in shared activities, and thus is closer to real-life encounters, where groups of friends may play games together, or grandparents play with their grandchildren, spending time together while having fun. It is especially synchronized behaviour that evokes feelings of being 'in sync', supporting experienced intimacy.

Examples of such synchronized movement include dancing together, singing, and movement-based games, such as clapping games played by children (compare Fig. 1). Even activities where there is no given rhythm often become rhythmic, for instance when people begin to walk in

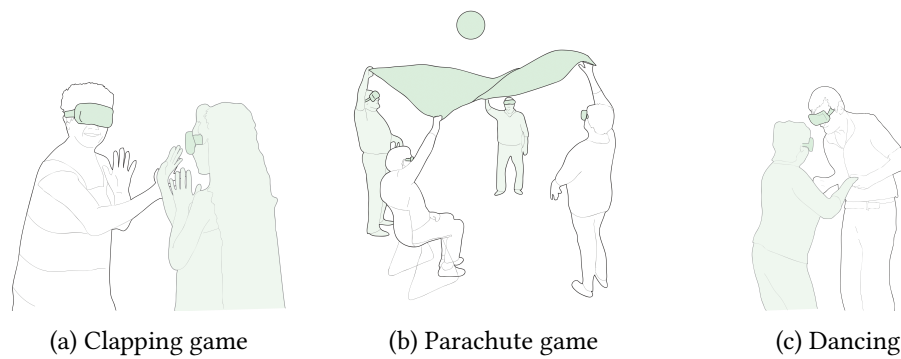
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**Figure 1:** Synchronized movements in VR can occur for example, by predicting and completing recurring choreographies (a), with music as a common external clock (b) or through the behavioral adaptation of virtual interaction media (c). Graphics by Dr. Alexander Kulik, Consensive GmbH. with permission

sync, or playing cards are dealt in a rhythmic way during a game of cards. Such rhythmic movement on the one hand shows that people have become 'entrained', and on the other hand supports feelings of 'being in sync', increasing sympathy. While Social VR offers the possibility of full-body interaction, and enables joint activities (games, joint visits to 3D environments), current VR environments and applications do not adequately support collaborative activities that rely on temporal synchronization.

The project GROOVE focuses on such body-based rhythmic activities in social VR, with families, couples, and groups of friends that are living in different places as target groups. One of the goals is to develop interaction designs for rhythmic, body-based activities, such as joint play or dance, where the interactive environment supports synchrony or may even simply create an illusion of synchrony. As a first step, we aim to find out what kind of activities the mentioned three user groups (families, couples, circles of friends) would be interested in, and what factors influence people's acceptance for such social VR activities.

## 2. Background

Relationships with family, friends and partners have a decisive influence on our health and well-being. Especially feelings of closeness and connectedness are factors for a longer life, better health and increased well-being [2, 3, 4, 5]. However, decreasing interactions due to physical distance can negatively affect these aspects.

The effect of falling into the same rhythm after a certain amount of time while interacting with another person has been extensively investigated and verified and is referred to as *entrainment*. This process usually results unconsciously in movements being coordinated with each other and "settling in" [6]. This can induce further synchronization of the movements. Hove and Risen [7] reported that synchronized behaviour supports the development and maintenance of feelings of intimacy and closeness. Launay et. al. [8] demonstrated a connection between synchronization and sympathy for the other person. Furthermore, Kinsbourne and Helt observed a correlation between sympathy and behavioral adaptations (i.e. one begins to mirror a person

that one feels sympathy for) and divide the latter into two categories: indirect adaptations such as synchronised behaviour and direct responses, involving posture, gestures, and spoken language [9]. This perspective extends the concept of 'social' entrainment by connecting it to the expansion of body synchronization within the realm of interpersonal communication mechanisms [10].

Rinott and Tractinski [11] have already investigated the relationship between interaction design and synchronization of motor behaviors between individuals. They examined how design decisions influence interpersonal motor synchronization, which is a crucial aspect of human interaction. Furthermore, this work contributes insights into the design principles and considerations that can affect how people move and interact with each other, and provides practical applications for fields associated with human-computer interaction and design [11]. These insights will be taken into account in further design developments.

Furthermore, cultural background influences the interpersonal interaction of people, especially between close ones like family or friends. This includes preferred forms of communication (e.g. direct vs. indirect) [12] and thus can additionally influence the perception of interaction. Therefore, also cultural aspects should be considered in future design decisions.

### **3. First Steps**

For the requirements analysis, user groups were defined (groups of friends, romantic couples, families living apart, e.g. grandparents and grandchildren) and potential participants in Weimar and the surrounding area were identified. For the first set of interviews, we focused on friends and partners of young adults, who live at a distance. Given international students tend to fit with several of our categories (having friends, family, and often also romantic partners in other countries), we recruited international members of our university for our first set of interviews. Moreover, international students might offer different perspectives on interaction with close ones due to their diverse cultural background, as described above. The group of participants will be extended to other user groups in the next step, especially with regards to older age groups.

Semi-structured interviews were conducted in order to identify user requirements and possible user scenarios. After participants had given informed consent to taking part in the study, some demographic data was gathered and they were asked to assess their previous experience with virtual reality and their overall technical affinity. Afterwards, the respective distance relationship and current in-person and mediated interactions were investigated. For example, participants were asked how often they meet or contact each other, how the relationship has changed since living at a distance, or whether they wish to have more contact with that person. Attention was especially paid to identifying typical activities when meeting in person or interacting through media. In particular, getting insights into whether there are any movement games that they enjoy playing with this person or activities that make them feel particularly connected, as such activities are highly relevant to our project idea.

Furthermore, we sought feedback on the project idea, and investigated participants' desires for potential interaction scenarios (types of activities and games) and requirements for increasing attractiveness and accessibility of such a solution.

Pilot studies had shown that participants have difficulties imagining possible VR scenarios or user requirements when they have only little or no experience with VR. Thus, an additional demo session was included during each interview, where participants chose two out of four pre-selected VR games to try out. This allows to observe possible changes in responses regarding user requirements and interaction ideas based on the such provided VR experience.

The VR games were carefully selected in advance from existing multiplayer games, focusing on showcasing body-based games or activities, and presenting different game types. As one example, "Beat Saber" was chosen, a music game where boxes have to be destroyed to the beat of the music. The second game is "Eleven Table Tennis", a realistic table tennis game that allows two players to compete against each other. In addition, the game "Mash Me Up" was chosen, which allows to try out various mini-games, such as air hockey, snowball fight or beer pong. The last game selected was "Hand Physics Lab"; while this is the only game without a multiplayer mode, it features hand-tracking control and thus demonstrates further possibilities in VR. In this game, child-friendly puzzles are solved, such as marble mazes or the coloring of eggs. To ensure the interview sessions remained within a reasonable length, and still provide a good overview, participants could play two games, while the other two games were subsequently shown as demo videos.

## **4. Initial Insights & Discussion**

### **4.1. Sample**

So far, interviews have been conducted with 14 participants (9 male, 5 female), between 20 and 29 years old, all university students (eight studying Human-Computer-Interaction), with all except two from abroad. They described themselves as quite tech-savvy, on average a 8.1 on a scale from 1-10 ( $SD = 1.6$ ) and eleven participants had prior experience with VR.

### **4.2. Distance relationships**

When asked about loved ones living far away from them, eight relationships with family members were mentioned, three friendships, and three participants were in long-distance relationships. The large majority of these contact persons are living on another continent than the respective participant, are usually either the same age or older than the participant, and less tech-savvy ( $M = 4.8$  on a scale of 1 -10;  $SD = 2.6$ ).

First insights from the interviews reveal that all of the participants except one desire more contact with their relatives and friends. Contact over digital media usually takes place almost every day, but meeting in person is only possible approximately once a year. The distance makes it difficult to stay in touch and participants even stated: "I feel like I'm losing a friend because we can't do activities together" (P5), "[we] don't connect that deeply anymore" (P12), or that the physical distance leads also to emotional distancing (cf. P13). This highlights the relevance of our project idea.

### **4.3. Activities during face-to-face interaction**

With regards to typical activities during in-person interactions, the conducted interviews show that the focus is particularly on social activities (mentioned by 12 of the participants), often in a more quiet setting that also enables conversation, for example going for a walk or simply talking. The focus tends to be more on “enjoying the moment” instead of extensive activities. This also seems to be the case for the activity “cooking”, which was mentioned by nine of the participants. Activities with little body movement are usually favored, especially for interacting parties with a larger age difference (young adults-parents / young adults-grandparents). This was often related to movement restrictions in older age, or to age-related differences in interests.

However, participants also mentioned movement-related activities, especially when they were directly asked about it and when talking about interacting with people at a similar age. Nine participants mentioned sports like table tennis, basketball or cricket, seven reported outdoor activities like hiking, going for a walk, swimming or bird watching. Four participants mentioned some form of “playing”, e.g. card games, playing with a dog or “playing horse with [their] nephew” (cf. P1). Three respondents reported that they like to dance or go to concerts with the other person. Only one respondent stated that he does not carry out any movement activities with the person living at a distance (parent).

Participants were only able to mention very few cases of interactions where they felt particular close with the other person, three were not able to think of anything that falls into that category at all. Six students reported that they feel close when having (deep) conversations, two of them explicitly refer to conversations during a shared meal. Going for a walk was also mentioned by two participants in this context.

### **4.4. Activities during current remote interaction**

The current remote interactions are limited to (video) phone calls or text messages. With regards to video calls, which were mentioned by all of the participants, six stated that they or the other person often carry out other additional activities during the call, like running errands, dance moves, or going for a walk.

With regards to using the mentioned remote communication media the limited interactivity was criticized, as well as the missing personal or physical aspect (both aspects mentioned by 4 participants). For example, they state that “the connection doesn’t really satisfy you” (P1), that “the personal aspect is missing” (P4), or that they are “frustrated that [they] cannot properly express [themselves] just over the phone” (P5). One person mentioned that the quality of the conversation is reduced by distractions at both ends (e.g. if someone is doing the dishes on the side). In contrast, four participants indicated that the currently used communication media is sufficient for them. For example, two of the interviewed persons in long-distance relationships argued that one learns to live with it and that they are used to it.

### **4.5. Opinions on virtual reality and the project idea**

So far, the majority of the participants was enthusiastic about our project idea: “great, the games strengthen the feelings/ emotions which you normally just have while doing stuff in person” (P8), “love it, through synchronisation/ doing stuff in time one can relate better” (P9).

Compared to the media currently used, such an approach would strengthen the bond between people living far away (cf. P1) and increase the feeling of still being part of each other's lives (cf. P9). Nevertheless, the participants criticize the (expected) complex setup process for such technology, which would make spontaneous use impossible, as well as the requirement of a large space for interaction in order to be able to participate in VR interactions: "without a proper setting one could be worried to run into something while wearing the HMD" (P3). The need for a strong internet connection, which might be especially problematic in some countries, was also highlighted.

#### **4.6. User requirements & ideas for possible interactions**

Initially, the interviewees could primarily imagine using such social VR activities with people their age or younger (e.g. friends or younger siblings). Parents and grandparents were only considered as potential players after participants had experienced the demos. They often argued that older people might struggle due to movement restrictions, being less interested in new technologies and having difficulties with the setup. These worries seem to have been alleviated at least partly after experiencing a demonstration of the interaction possibilities in VR.

The interviews indicate that the user group involved so far (mostly international students that want to keep in touch with family and friends) would for the most part have the intention to use such social VR activities. However, this interaction still would need to be scheduled in advance and many participants stated that it would not be a substitute for face-to-face interactions, nor should or can it replace the current media. For fast contact initiation or for longer conversations (e.g. discussing life problems), the phone contact is still preferred.

The ideas of the participants are very diverse and range from sports, cultural activities and board games to video games with different levels. Ten participants named at least one sports activity (rowing, table tennis, workouts, etc.). Also, music or rhythm games like dancing or artistic possibilities such as painting were mentioned.

On the other hand, several participants requested activities that they wouldn't be able to experience in real life, due to financial, geographical or physical restrictions, for example sky diving or visiting the Mount Everest. In this context, travelling in general was mentioned several times. Some participants even expressed that they wish for virtual environments to be totally different from reality: "Make things that are not accessible in real-life instead of copying games that are already there in real-life, think outside of the box, seize opportunities of VR, e.g. exploring the inside of a human body" (P2).

When it comes to (board) games, the responses showed two directions: on the one hand, action games such as horror or zombie games, on the other hand, more relaxed, smaller games such as Tic-Tac-Toe or Jenga were mentioned. Two participants also suggested games that could be described as "cozy games", in which you could have your own farm or garden and manage it freely. Such slower games and games with little movement were also suggested for older people. In some cases, the activities themselves seemed to lose importance as long as it was possible to interact with the person: "activities where you enjoy the moment" (P10). On the other hand, two participants stated that they would not want to simply "hang out" in VR, but that they would like to have some form of activity. Therefore it seems to be important to find a reasonable compromise in terms of gameification, difficulty, and cognitive and physical requirements.

When asked for suggestions for social VR activities for very young people, games were recommended that support their development, e.g. math games or interactions to improve motor skills. Overall, the interviews indicated a preference for cooperative games, as highly competitive games would lead to everyone "playing for [them]self" (cf. P3), instead of focusing on interaction with the other person.

In terms of further requirements, four participants mentioned that games should not require too much physical space, as some flats might not be big enough for this. Some also expressed the need for an audio connection to be able to talk throughout the game and that they would want customisable avatars (e.g. inserting a picture of your own face) since this would provide a more realistic experience (cf. P3). An easy, intuitive setup and troubleshooting were highly requested in several interviews.

As the targeted usage scenarios also include interaction of grandparents and grandchildren, further requirements have to be considered for VR interactions. As mentioned, particular focus should be placed on a simple setup with clear and simple instructions (simple words, bigger text, easy interface) (cf. P2). Furthermore, it should be possible to customise the extent of required movements, enabling less actual movement for a comparable movement in VR (movement length / intensity settings), or entirely different movements (to compensate for physical impairments or differences in strength and endurance). This includes speed settings that can compensate for different reaction times. In addition, impaired eyesight and hearing should be taken into account (cf. [13, 14]).

Another issue mentioned was the accessibility of VR, with many issues already highlighted in the literature, such as the size and weight of HMDs (too large for small heads), HMD adaption to different hair styles or the wearing of glasses, simulation sickness, or the compatibility of VR interactions with mobility aids or physical impairments [13, 14].

#### **4.7. Conclusion**

So far, the interviews highlighted the relevance of our project idea. Distance has led to a decrease in the desired contact with their beloved ones, resulting in less feelings of closeness and connection. The current media cannot compensate the lack of real interaction. The use of such an approach would be conceivable with any person the participants know, confirming the previously selected user groups. Desired interactions comprise sports and rhythm games as well as activities that differ from reality. However, participants would suggest slower games (or the possibility of a slower version) and games with little movement for interaction with older people. Taking into account such user groups, the concept should rather be geared towards "enjoying the moment". Furthermore, the setup is the participants' main concern. Accordingly, special emphasis needs to be paid to simple and clear instructions to counteract this fear. In addition, physical limitations, e.g. restrictions regarding movement, hearing or vision, which occur particularly with increasing age, should be taken into account by providing individual adaptations. Further interviews are to provide a deeper insight into the perspective of further user groups and deliver results regarding the requirements analysis as a basis for future development.

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