Matchmaker: Interpersonal Touch in Gaming

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Abstract. Acts of interpersonal touch – a touch shared between two people – are used by couples to communicate in a simple and emotionally intimate way. In this paper, we argue that the intimacy afforded by acts of interpersonal touch can be used in computer entertainment to support enjoyable and engaging activities for couples. To support this notion, we have developed *Matchmaker*; a two-player, cooperative tabletop video game based on themes of love and romance. *Matchmaker*'s gameplay is directly controlled by a set of collaborative tabletop interaction techniques, as well as by acts of interpersonal touch between its players. In this paper we present a detailed description of *Matchmaker*'s design and the results of an exploratory user suggesting that *Matchmaker* is enjoyable to play and that its use of interpersonal touch contributes to players' enjoyment.

Keywords: Games, gaming, touch, Matchmaker, tabletop.

1 Introduction

> *Though mother may be short on arms,*
> *Her skin is full of warmth and charms.*
> *And mother's touch on baby's skin,*
> *Endears the heart that beats within.*
> --Harry F. Harlow, "The Elephant" [6]

This short poem comes from psychologist Harry Harlow's seminal 1958 paper, "The Nature of Love" [6]. In this paper, Harlow presents the results of a study which investigated the effects of skin-on-skin contact in newborn macaque monkeys. Through his research, Harlow established what has since become common sense: that a touch shared between two people (or in Harlow's study, a baby monkey and a terrycloth doll) can create a meaningful emotional bond.

Touching is one of the most emotionally-significant ways in which social creatures interact. Whether it's a baby kitten nuzzling its sibling, a young couple sharing a hug, or a father resting a reassuring hand on his daughter's shoulder, the merest act of interpersonal touch establishes an emotional connection between its participants. In fact, human beings are so emotionally invested in the act of touch that we have established strict cultural norms that dictate under what circumstances it is socially permissible to touch another person. When an act of touch violates these norms, it can be

Fig. 1. *Matchmaker*: A two-player tabletop video game utilizing interpersonal touch.

very uncomfortable for those involved. Consequently, the effects of interpersonal touch can run the gamut of human emotions. Depending on the context in which it is delivered, an act of interpersonal touch has the potential to be welcoming and reassuring, or awkward and invasive.

Because of its potential to arouse such unpleasant emotions, interpersonal touch has been largely ignored in the design of human-computer interfaces. But we believe that there are situations in human-computer interaction where interpersonal touch is not only appropriate, but even desirable; it all depends on establishing the proper context. One area where interpersonal touch can be especially appropriate is within the context of a video game. Video games offer consequence-free environments which are capable of evoking strong emotions from their players; by couching interpersonal touch within a game, we can allow the act to remain light-hearted and unthreatening while still retaining it's emotional impact [7]. Games such as *Dance Dance Revolution* and *SingStar* have demonstrated how activities which may otherwise be uncomfortable or embarrassing (such as dancing or singing in front of a crowd) can become a source of amusement when they are integrated into a social game. Similarly, we believe that a well-designed game can cultivate an environment that encourages couples to act affectionately, changing interpersonal touch from an arbitrary and stilted interaction technique to a fun and logical extension of play. To demonstrate these ideas, we have created *Matchmaker*: a cooperative, two-player tabletop video game which utilizes interpersonal touch between players (Figure 1).

2   Related Work

Although *Matchmaker* is the first video game designed around interpersonal touch, it is not the first time that games and touching have ever crossed paths. In her "Intimate Controllers" project, Chowdhury created a set of wearable game controllers for couples: a bra for the woman and a pair of boxer shorts for the man [2]. These special undergarments controlled a collocated game of *Pong* presented on a large screen; as a player touched his partner's left side, his paddle would move to the left and as he touched his partner's right side, his paddle would move right. Though Intimate Controllers has some superficial similarities with *Matchmaker*, these two projects are

actually quite different in their approach. In Intimate Controllers, the focus is very much on overt, sexual intimacy – so much so that players are actually required to disrobe in order to play. Far less importance is placed on the "gaming" aspect of the project (though *Pong* is an iconic game, it is arguably neither exciting, nor intimate, which we feel may make it a lesser choice as a game for couples.) In contrast, our game *Matchmaker* was designed especially for interpersonal interaction. With *Matchmaker*, we attempt to cultivate emotional intimacy in a more subtle way by encouraging teamwork and the pursuit of a shared goal.

Methods for detecting interpersonal touch over tabletop interactions has been previously implemented using the Mitsubishi Electric Research Laboratories (MERL) DiamondTouch. DiamondTouch is a front-projected, touch-sensitive tabletop computing surface which uses an electrical capacitance system to detect touches from up to four unique users simultaneously. [4]. To interact with the DiamondTouch, each user must sit on a conductive pad which is connected to the host PC. When a user touches the table, a circuit is formed between the tabletop, the user's body and the conductive pad. By analyzing the signals coming from its receiver-pads the DiamondTouch software can identify exactly where on the table each user is touching.

Although it was not explicitly designed for the task, the DiamondTouch can be adapted to sense when two users are touching each other quite easily. When two users make skin-on-skin contact, they will begin to conduct electrical signals between themselves. When two users touch each other, and either of them touches a point on the surface of the DiamondTouch, it will appear as though both users are touching that point simultaneously. Such events can easily be as a consequence of interpersonal touch. This technique was first suggested in [4] and is the method we use to detect interpersonal touch in *Matchmaker*.

CollabDraw by Morris et al. is a tabletop drawing application which used the DiamondTouch to allow four people to collaborate simultaneously on a single illustration [9]. As a part of its collaborative toolset, CollabDraw employed "cooperative gestures" which made use of interpersonal touch. Though CollabDraw pioneered the use of interpersonal touch as a human-computer interaction technique, its application was very poorly received by the groups of coworkers who were selected to test the system. Participants complained of "sweaty hands" and the general awkwardness of touching their coworkers. Morris concluded that while interpersonal touch may be unpleasant for formal tasks, the technique may still have use in applications such as computer entrainment.

Zimmerman proposed a novel view of interpersonal touch interaction, by using the human body as a "biological conductor" for the transmission of modulated electric signals produced by on-body devices [10]. In Zimmerman's Personal Area Networks (PANs) signals sent by an emitter on one body can be transmitted through touch to a receiver on another, allowing an exchange of digital data. To demonstrate the PAN concept, a prototype system was created which would allow one person to transmit an electronic business card to another via an ordinary handshake.

Several psychological studies suggest that the mere act of interpersonal touch can create positive emotions in those involved. In [3] an experiment was performed wherein restaurant waitresses would briefly touch the hands of clients as they were returning the clients' change. Their tips were then compared to the tips received by a control group, who did not make physical contact with their clients. The results

showed that diners who made physical contact with their waitress tipped higher than those who had not. The authors concluded that this simple act of touch had increased patrons' satisfaction with their service. A similar result was reported in [5], where library clerks were instructed to subtly touch patrons' hands as they returned the patrons' library cards. After checking out, these patrons were approached by members of the research team (posing as library workers) and asked to fill-out a questionnaire rating their satisfaction with the library and its clerks. This satisfaction data was compared to data for a control group of non-touching clerks. The authors concluded that the addition of touch had significantly increased female patrons' satisfaction ratings, regardless of the gender of the library clerk. Differences in males' responses were less marked, showing only a small increase in satisfaction.

Could the positive effects of interpersonal touch carry over to video games as well? In "Why we play games: Four keys to more emotion without story" Lazzaro presents the results of a study designed to identify and categorize the positive emotions that players experience while playing video games [8]. Lazzaro encapsulated her findings into four keys, which she calls "the four most important pathways to emotion in games." One of these keys is the People Factor – the social interaction between players that occurs in and around games. We believe that encouraging players to interact through the medium of touch can emphasize social connections, thus heightening players' enjoyment via the People Factor.

3   Matchmaker

In designing *Matchmaker*, our goal was straightforward: to create a game which made effective use of interpersonal touch. Hand-holding naturally emerged as the preferred mode of interpersonal touch because it's a simple, cooperative gesture. Because holding hands is most often seen as a sign of affection between couples, we designed *Matchmaker* as a romantically-themed game whose cutsey trappings would complement the tender appearance of its hand-holding players.

Fig. 2. Matchmaker's main game screen

Fig. 3. Two players create a match by dragging their selected Peeps together

Matchmaker's game screen is presented as a window to the world of the Peeps (Figure 2). When the game begins, Peeps will begin to stream into the playing field from off-screen, wandering in and out of the screen in a disorderly, ambling fashion. The players must use these onscreen Peeps to create their matches. Making matches is simple. Players can "grab" a Peep by touching it with their finger as it wanders by. When a Peep has been selected, a colored halo surrounds it, indicating that it is now under the player's control. Selecting a Peep gives the player the power to drag it to any place on the screen. When two players drag their selected Peeps together, a match will be created if the two Peeps are "compatible" (Figure 3). In *Matchmaker*, a Peep is defined by two characteristics: its color (red, orange, yellow, green, blue or purple) and its gender (male or female). Two Peeps are compatible if and only if they have the same colors and opposite genders. Each player is allowed to select only one Peep at a time; this prevents players from being able to match Peeps by themselves and forces them to work together with their partner.

When a match is made a pleasing chime will play, the matched Peeps will disappear from the playing field, and two new Peeps will be created (off-screen) to take their place. If two incompatible Peeps are dragged together, no match will occur. Instead, a buzzer will sound, and the affected Peeps will simply wander away.

If a Peep is not matched up within a certain amount of time it will become lovelorn. When a Peep becomes lovelorn it will start to cry and lose its color, becoming grey (Figure 4). While lovelorn, a Peep cannot be matched up, even with other
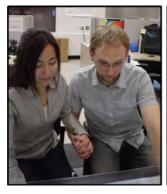

Fig. 4. A pair of lovelorn Peeps

Fig. 5. Touching the table while holding your partner's hand activates the Power of Love

lovelorn Peeps. Although players can temporarily afford to ignore lovelorn Peeps, over time more and more of the Peep population will become lovelorn, making it extremely difficult to create further matches.

The only way to "cure" a lovelorn Peep is through the Power of Love. Players can activate the Power of Love by making physical, skin-on-skin contact with their partner – typically through holding hands – and having either player tap the affected Peep(s) (Figure 5). This will cure the Peep, restoring its original color and permitting it to be matched up once again. Peeps which have been cured in this way are still susceptible to become lovelorn again if enough time elapses.

While players are holding hands, they cannot perform normal operations such as selecting, dragging and matching Peeps; they can only cure lovelorn Peeps through the Power of Love. Though this may seem punitive, we created this limitation in order to give the game strategic depth. If the Power of Love was not mutually exclusive with other game actions, players could simply hold hands with their partner throughout the entire game and in doing so, rob the act of any special significance to gameplay.

Matchmaker is divided into a series of six stages, each of which is more difficult than the last. The goal of each stage is to make a set number of matches within a specified time limit. Players advance through the stages in a linear fashion; when one stage is completed, they move on to the next. If the players fail a stage, they are given the opportunity to restart the game from the beginning of that stage.

As the game introduces more and more colors of Peeps, it becomes increasingly difficult. In the first stage, Peeps come in only two colors: red and green; this ensures that opportunities for matching compatible Peeps are plentiful. However, by the end of the game, there are six distinct colors of Peeps which significantly lowers the likelihood of two compatible Peeps appearing onscreen at once. As opportunities for making matches decrease, partners must learn to work quickly and to coordinate their actions in order to succeed.

In *Matchmaker*, all gameplay functions are performed through the DiamondTouch tabletop; no other peripherals are required to play. Users select Peeps by touching them with their fingers, and drag them by moving their fingers over the surface of the table. As previously stated, *Matchmaker* detects interpersonal touch through the

DiamondTouch using the method first described in [4]. Although the DiamondTouch can only recognize interpersonal touch when at least one participant is touching the surface of the table, this is not problematic for *Matchmaker*, where interpersonal touch is used only to activate the Power of Love.

4   Evaluation

We conducted an experiment in which we invited four couples to play *Matchmaker*. Following these play sessions, questionnaires and interviews were administered to help us understand how players feel about the game.

4.1   Aims

In evaluating *Matchmaker*, we sought to explore two general topics. The first of these topics dealt with *Matchmaker*'s entertainment value, irrespective of its use of interpersonal touch. This required us to ask questions such as: is *Matchmaker* playable? Is it fun? What do players find enjoyable about the game and what about it do they dislike? Though these questions may seem trivial, we believe them to be of the utmost importance; if *Matchmaker* is fundamentally unenjoyable as a video game, then it would make a poor case-study for examining the value of interpersonal touch in games.

Our second area of inquiry was: how does the inclusion of interpersonal touch contribute or detract from the experience of playing *Matchmaker*? Is interpersonal touch a valuable component of *Matchmaker*, or would the game be more enjoyable without it? What specifically about interpersonal touch to players like or dislike?

4.2   Participants

Although *Matchmaker* can be played by anyone, it was designed with couples specifically in mind. So, when it came time to recruit participants for our study, we specifically targeted partners who were dating or married. In total, four couples were recruited; three heterosexual couples, and one homosexual male couple, making for a total of three female and five male participants. Participants were either lab members, or associated with lab members and varied in age from 18 to 37. Seven out of the eight participants could be considered "gamers", each having spent at least one hour playing some form of digital game in the week before the study.

4.3   Procedures

Before starting the experiment, the administrator would introduce himself to the participants and outline the purpose and requirements of the study. Special attention was paid to ensure participants understood that they would be required to hold hands during the experiment. Participants were also informed of their rights, particularly the right to terminate the study at any time if they felt uncomfortable. Participants were then asked to complete a pre-test questionnaire designed to reveal their past experience with the skills they would be using during the experiment – playing video games, interacting with a tabletop computer, and engaging in interpersonal touch.

Once the questionnaires had been completed participants were seated side-by-side in chairs at the head of the DiamondTouch and informed that they would now be playing a game of *Matchmaker*. Participants were instructed to play to the best of their abilities and as though the observer was not present. In order to simulate a natural playing experience, the administrator would not address the participants past this point until the experiment had concluded. Instead, in-game instructions were used to provide players with information on how to play the game and how to proceed. As the participants played through the game, the observer was responsible for noting any interesting occurrences, patterns or behaviors that he witnessed from the players.

As we have mentioned previously, *Matchmaker* is broken into six stages, each of which is more difficult than the last. Participants were asked to play until one of two conditions was met: either all six stages were completed and the game was won or the participants failed to complete a single stage three times in a row.

Once gameplay had concluded, each participant was issued a post-test questionnaire. The purpose of these questionnaires was to determine the participants' feelings towards *Matchmaker* while the experience of playing was still fresh in their minds. Participants were instructed to fill out their post-test questionnaires silently and independently of one another, to protect their responses from possible conformity biases.

Following the post-test questionnaires, the experimenter would conduct a debriefing and an unstructured discussion with the participants in order to explore any questions which arose during the testing period.

5   Results

Having run only eight participants, we must be cautious about drawing any general conclusions; with a sample of this size, we view our study as strictly exploratory. Nevertheless, we were strongly encouraged by the results we obtained.

Observations of our participants' behaviors suggest a favorable impression of *Matchmaker*; smiling, laughing and joking during gameplay was common among all couples. Spontaneous expressions of delight from our participants (such as "oh, wow!") also contributed to our impression of *Matchmaker* as an exciting and engaging game. These positive responses are especially surprising when one considers how few couples made it through the entire game; of our four participating couples, only one managed to complete the entire game.

In fact, the game's difficulty was a popular topic in our players' post-test questionnaires. When asked what he disliked about *Matchmaker*, one male participant wrote: "[It gets] too difficult too quickly." Two players commented that the Peeps moved too fast, while other participants wrote that Peeps became lovelorn too quickly, or that the stages ended too soon.

Our participants' enthusiasm towards *Matchmaker* is likely due in part to *Matchmaker*'s themes and presentation style. Not only did participants agree strongly with the statement "I liked *Matchmaker*'s themes of love and romance" but many participants commented favorably on *Matchmaker*'s polished and "professional" appearance. One participant compared the Peeps to the iconic "Miis" used by the Nintendo Wii, while another praised the game for its "cutsey [sic] feel".

5.1 Tabletop Interaction

Players' feelings towards the DiamondTouch were mixed. On one hand, many participants remarked how easy it was to interact with the touch-sensitive surface. In the words of one male participant: "The multitouch surface made it easy to play; [you] just drag the Peeps together." A female participant commented that *Matchmaker* was very "accessible" because it requires only simple skills like touching and dragging, in contrast to the complex, multi-button control schemes used by many modern games.

However, *Matchmaker*'s tabletop interaction also came with a very tangible drawback; two of our eight participants wrote that playing *Matchmaker* had hurt their fingers. The cause of this pain was apparent from observation; many players were "stabbing" the tabletop with their fingers as they played. This phenomenon is likely related to the Peeps' excessive movement speed – players would often lunge with their fingers to grab important Peeps before they could escape off-screen. Although a firm touch is no more accurate than a soft touch, most participants did not seem to recognize this and, in their excitement to grab Peeps, they were prone to these painful stabbing gestures.

5.2 Interpersonal Touch

Of all the Likert-scale statements we posed to participants, "I feel that *Matchmaker* made use of interpersonal touch in a significant way (i.e. the game would not be the same without it)" received the most highly varied responses; on the whole, our participants tended to agree, but the couples who responded most favorably were those that had progressed farthest into the game. We suspect that players became more appreciative towards the importance of interpersonal touch as they spent more time using it within the game.

When asked how the use of interpersonal touch affected their perceptions of *Matchmaker*, participants were largely positive in their responses. In the words of one participant: "I felt like I was sharing my love in a [silly] but fun way." Another participant responded: "[Interpersonal touch] really made the game more collaborative. Both players really needed to work together to be successful."

However, the use of interpersonal touch in *Matchmaker* was not an unqualified success. One couple did not immediately understand that matches could not be made during periods of interpersonal touch. A member of this couple conveyed his displeasure in the post-test questionnaire, saying: "It's counter-intuitive to have to let go [of my partner's hand] to match up couples." Another couple experienced a similar problem; in this case, the female participant would often touch her partner without any forewarning, preventing him from selecting Peeps until she let go. In his post-test questionnaire, he expressed his dissatisfaction when he wrote: "It was frustrating trying to coordinate touches when you notice a pair [of compatible Peeps] and your partner doesn't."

Although we are mindful of such concerns, this is one aspect of *Matchmaker* which we are not likely to change. Cooperating with your partner is crucial to succeeding at *Matchmaker* and learning to communicate when and how interpersonal touch should be used is a significant part of this cooperation. In the words of one insightful participant: "[Interpersonal touch] made the game more challenging in an interesting way. It was less about the actual act of contact, and more about the coordination challenge."

6   Discussion

Since *Matchmaker* was first developed, it has been demonstrated to literally hundreds of people. Watching these new players' first reactions has shaped our understanding of how potential users relate to *Matchmaker*, and exactly how, where, and with whom *Matchmaker* is most effective.

Games have long been used as a method of breaking the tension in new or awkward situations, and *Matchmaker* is no exception. The quintessential example of *Matchmaker* acting as an ice-breaker occurred during a tour of our laboratory by an official review committee. A group of serious and formally dressed officials had gathered around the DiamondTouch table when our demonstrator asked for players. Two distinguished men volunteered and as they sat, our demonstrator briefed them on the game: "At certain points, this game will require you to briefly hold hands with your partner. Are you both okay with that?" A quiet hush fell over the attending crowd. How would these professional men handle this distinctly unprofessional situation? After a second of silence, one man grinned broadly, turned to the other, and said: "I'm game if you are, Tom" From that point on, the table was all smiles; from the observers to the players themselves, everyone laughed and cracked jokes and they enjoyed the absurdity of the two platonic business associates playing this romantic game together.

Although *Matchmaker* was designed to evoke images of love and romance, we never imagined that it could be used to woo potential romantic partners. Yet, since the game was developed, no less than two members of our group have brought their partners to the lab for exactly this purpose – to play *Matchmaker* with their romantic interest before they began dating. Although this behavior does not ascribe *Matchmaker* with any intrinsic worth, it does suggest that *Matchmaker* is a nonthreatening way to demonstrate playful affection and to introduce physical intimacy to new couples.

Anecdotes such as these reveal *Matchmaker* as an innocuous way to break the ice and to introduce touching into a relationship where participants may be afraid to make more overt romantic gestures. With this in mind, we feel that *Matchmaker* installations could be very popular in locations frequented by younger couples, such as movie theatres and arcades. One can easily imagine a young couple agreeing to play "that silly match-making game" with the ostensible purpose of killing time before their movie, yet with each partner fully expecting guiltless physical contact in the guise of a simple game.

We suspect that *Matchmaker* would also work quite well in situations where individuals are actively seeking to cultivate new romantic relationships, such as bars and singles-events. *Matchmaker* is short, fun and non-committing, making a quick round of *Matchmaker* an ideal "litmus test" for screening potential partners, similar to the practice of speed-dating. If two partners feel a connection while playing, then that's justification enough to continue a dialogue afterwards; after all, a physical connection has already been established. If, however, the players did not connect, then it's easy for their relationship to end with the game; once the round is over, the players can politely part and seek out new partners.

One of *Matchmaker*'s greatest attributes is the way in which it gives interpersonal touch a socially-legitimate pretext; by surrounding the act of touch with a

goal-oriented framework (i.e. a game) we engage players' minds, drawing their attention away from the base physical act and towards an enjoyable cooperative activity that they can share with their partner.

7   Future Work

Both *Matchmaker* and the broader topic of interpersonal-touch-in-games are ripe for future exploration. In the immediate future we intend to revise *Matchmaker* to make it easier for first-time players, in accordance with the feedback we received during our study. Subsequently, we intend to revisit our original study with a greater number of participants so that we can better understand how players feel towards *Matchmaker* and its use of interpersonal touch.

Although the study we have presented here suggests that interpersonal touch has some bearing on a couple's enjoyment of *Matchmaker*, it remains to be seen exactly how important the interpersonal interaction is compared to (say) it's attractive graphical presentation or its romantic theme. To address this issue we may develop an alternate version of *Matchmaker* in which the Power of Love is activated without the use of interpersonal touch. A controlled study comparing these two versions of *Matchmaker* would allow us to quantify how (if at all) the removal of interpersonal touch would affect couples' enjoyment of the game.

8   Conclusions

Interpersonal touch is an extremely potent form of human interaction which has the potential to arouse both pleasant and unpleasant emotions. Many previous investigations into interpersonal touch have failed to consider the contexts in which acts of touch were occurring, and faltered for this very reason. But, by coupling touch-interaction with an unthreatening, consequence-free environment (such as that of a video-game) it is possible to harness the positive powers of touch to bring couples together and to enhance their game-playing experience through cooperation and socialization.

In this paper we have presented *Matchmaker*: a two-player, cooperative tabletop video game which detects and reacts to events of interpersonal touch between its players. *Matchmaker* plays up the positive aspects of touch by using it as a tangible symbol of love and cooperation. These themes are reinforced in-game through the use of cute characters, and heart-iconography.

Data gathered from a controlled study and from numerous demonstrations suggests that *Matchmaker* is an enjoyable game whose use of interpersonal touch contributes strongly to its experience. We believe that *Matchmaker* provides a lighthearted and fun way to overcome awkwardness and to introduce innocent physical contact in new relationships.

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