Enhancing Evaluation of Potential Dates Online Through Paired Collaborative Activities

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ABSTRACT
Online dating systems are the most common way people meet their marriage partners online. Nevertheless, online daters struggle to evaluate personality traits of potential partners using profile pages and private messaging in these systems. Meanwhile, Multiplayer Online Games (MOGs) have emerged as a popular way young people find romantic partners for relationships in the physical world. We conducted two interview studies – one concerning evaluation behavior in online dating systems (n=41) and the other concerning collaborative activities in MOGs (n=35). Insights from these studies reveal the weaknesses in evaluation tools native to online dating and suggest that collaborative activities could potentially address evaluation challenges in online dating. The paper concludes with a discussion of a series of design concepts for online dating in order to improve users' abilities to evaluate their potential romantic partners for in-person meetings.

Author Keywords
Online dating systems; Multiplayer Online Games; collaboration; evaluation; personality traits

ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces - Interaction styles

General Terms
Human Factors; Design; Measurement.

INTRODUCTION
Technology, spearheaded by online dating systems, has impacted how people seek romantic intimacy. As of 2013, one in 10 single Americans had used an online dating system, an increase from just one in 30 in 2008 [27]. Online daters largely share the desire to meet their potential

romantic partners face-to-face and enjoy their relationships in the physical world [14]. To achieve this they spend their time on these systems evaluating other users for face-to-face meetings.

Within today's online dating systems, users employ two means to evaluate their potential partners: profile pages and private messaging. Research has indicated that online daters struggle to evaluate their potential partners [38, 39, 40], particularly the subjective and tacit personality traits that are vital to romantic attraction [10]. Previous research has suggested that first dates between online daters often go poorly because their personality trait evaluations are inaccurate [38, 39]. In this paper we explore how the evaluation capabilities in online dating can be enhanced.

To address this, we looked into other online contexts that facilitate romantic intimacy. A recent survey study [15] showed that online communities, which include Multiplayer Online Games (MOGs), are the second most popular way people meet their marriage partners online. MOGs are virtual game environments such as *World of Warcraft, Everquest*, *League of Legends*, *Final Fantasy, Star Wars Galaxies*, and *Audition*. MOG players typically need to collaborate with one another to complete tasks necessary for progressing through the game. However, these collaborations can also be romance-facilitating, with players using these collaborative activities to explore their romantic compatibility [36, 37]. As a result, in-game partnerships sometimes blossom into romantically intimate relationships in the physical world [24].

In this paper we draw insights from two studies concerning people's explicit and implicit attempts to find romantic partners in two contexts: online dating systems and romance-facilitating collaboration in MOGs. Findings from these two studies suggest that collaborative activities could help address evaluation deficiencies experienced by users of online dating systems. Based on these insights, we present and discuss a series of design concepts for incorporating collaborative activities into online dating

environments that could improve users' abilities to evaluate their potential romantic partners for in-person meetings.

BACKGROUND

The research reviewed in this section revolves around the online evaluation of potential partners for romantically intimate relationships in the physical world. Moss and Schwebel describe romantic intimacy as being indicative of the "commitment and positive affective, cognitive, and physical closeness one experiences with a partner in a reciprocal relationship" [23]. Romantic intimacy, under this definition, comprises marriage and long-term romantic relationships between committed partners face-to-face.

Evaluation in Online Dating Systems

Online dating systems are "Internet services designed to facilitate interactions between potential romantic partners" [18]. The most common way people meet their marriage partners online is through online dating systems [15] – a trend facilitated by systems like *eHarmony* and *match.com*, which specialize in connecting potential marriage partners. Many online dating systems, like *OkCupid* and *Plenty of Fish*, also cater to a variety of other relationship goals such as short-term or casual dating and platonic friendships.

After discovering a potential partner in the online dating system, a user evaluates that person for a face-to-face meeting [14, 29]. Users evaluate two types of information about their potential partners: searchable attributes and experiential attributes [10]. Searchable attributes are objective, demographic qualities such as height, weight, and age, which can be unambiguously conveyed and verified. Experiential attributes, in contrast, are subjective and tacit, and are "aesthetic, holistic, emotive, and tied to the production of sensation" [10]. These include personality traits such as confidence and sense of humor. Because of their subjective nature, experiential attributes must be experienced personally in order to be evaluated (e.g., Mary may consider John's sense of humor to be funny and playful, but Samantha considers it childish).
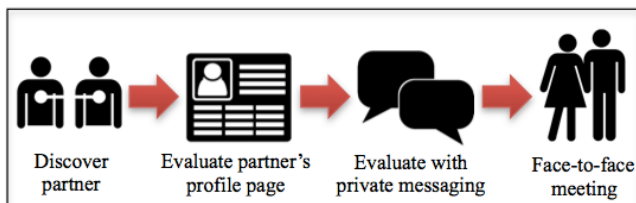

Figure 1: Online dating evaluation process

There are two standard components within an online dating system that users employ to evaluate each other. The first is public profile pages, and the second is private messaging. In most online dating systems, all users are required to have a profile page, which serves as the first source of information a user has about a potential partner. The content of profile pages can vary from system to system, but users are typically allowed to populate their profiles with pictures of themselves (profile pictures), searchable attributes, and answers to open-ended questions (such as "describe your ideal first date").

Pictures have been found to be the biggest determinant of attraction on profile pages [8, 16, 29, 32]. Searchable attributes, such as height, also factor into evaluations through profile pages [19, 34]. Research has indicated that online daters often exaggerate searchable attributes on their profile pages in an attempt to appear more attractive [7, 32]. Thus profile pages are often depictions of one's "ideal future self" instead of one's actual self, which may explain why online daters are wary that their fellow users lie [11].

Experiential attributes are integral to the evaluation of potential romantic partners [10, 14, 38, 39, 40], and open-ended questions on profile pages are often read to evaluate these traits. Women review open-ended answers to find men who are genuine, trustworthy, and extroverted, while men look for attributes such as femininity and self-esteem [8]. Previous research has shown, however, that users struggle with the evaluation of experiential traits through profile pages [10], leading to uncertainty in online evaluations.

After viewing each other's profile page, two users can engage in private messaging. This is the second opportunity for online daters to evaluate each other for a face-to-face meeting. Previous research on Warranting Theory has shown that online daters engage in private messaging as an interactive uncertainty reduction strategy to seek cues that they hope will "warrant" or authenticate information found in profile pages [6, 12]. Yet despite their warranting efforts, users still find it difficult to validate experiential attributes through private messaging [38, 39, 40]. This previous research [38, 39, 40] has found that:

1. Private messaging is more important than profile pages for evaluating experiential attributes, and is a required step before meeting another user in-person.
2. Online daters often do not trust their evaluations of experiential attributes, which leads some to meet other users faster than they are comfortable with.
3. Online daters usually find their impressions of experiential attributes to be incorrect once they meet the respective user in person.

This research shows that online daters struggle to evaluate experiential attributes through private messaging. However, it does not explain why private messaging fails to satisfy users' evaluation needs because such research focused on how users attempt to self-present and evaluate instead of how private messaging facilitates those attempts.

Evaluation in Multiplayer Online Games

Multiplayer Online Games (MOGs) – as a form of online communities – are the second most popular way married couples have met online in the past decade [15]. MOGs are computer games through which multiple geographically distributed users can engage and interact with one another in real time over the Internet [25], making them inherently social environments. The design of many of these games encourages players to work together or collaborate in teams – often called clans, tribes, or guilds – in order to progress through the game [28]. MOG players typically interact with

one another using in-game multimodal communication channels such as voice chat, instant messaging, and in-game email. Research suggests that MOGs "have evolved into places for people to meet up, find romantic partners and maintain relationships" because of their collaboration and communication capabilities [20].

Several studies have investigated romantic intimacy in MOGs such as *World of Warcraft* and *MapleStory* [20, 24]. These studies depict MOGs as collaborative virtual environments where a player's actual self (versus their ideal self) naturally comes out through collaboration, coordination, and teamwork.

Collaboration in MOGs is often task-driven and functional at first [35], with players evaluating each other's potential utility: skills, weapons, and general advantages that a player could offer to increase chances of success in the game. Romantic intimacy is usually not a pre-existing goal for players.

However, task-driven collaboration can evolve into romance-driven collaboration in MOGs [20, 24, 37]. Task-driven collaboration can spark romantic attraction between players by developing trust and interdependence, and elucidating the ability to work together as a team [24, 36]. In many of these game environments players can explore any budding romantic feelings through in-game, non-competitive collaborative activities like having a picnic in a castle or building a virtual garden together [24, 37]. Continued participation in competitive and non-competitive collaborative activities can foster genuine emotional bonds between partners that often escalate outside the game and turn into face-to-face romantic relationships [20, 24, 37].

RESEARCH QUESTIONS

The overarching research questions for this paper are:

1. Why does private messaging fail to meet the evaluation needs of online daters?

2. How do MOG players evaluate the experiential attributes of their potential romantic partners online?

3. Can evaluation methods in MOGs be adapted to improve evaluations in online dating systems, and if so, how?

STUDY 1: EVALUATION BEHAVIOR IN ONLINE DATING

We conducted a semi-structured interview study with 41 users (20 male, 20 female) of a popular, free online dating system in the United States. The objective of this study was to understand how online daters attempt to evaluate and self-present experiential attributes within such systems. We searched for interview participants using the online dating system's search feature based on a combination of location (within 25 miles of the lead researcher's university), gender, and ethnicity. The online dating system had eight different ethnicity choices that users could identify with, which yielded 16 different combinations of search criteria (2 genders x 8 ethnicities).

We created a profile page on the system on which our research intent was clearly indicated, and sent a private message with an interview invitation to the top six profiles returned for each ethnicity/gender search combination every week for eight weeks. This led to 96 users (48 male, 48 female) being messaged each week, resulting in 864 unique users being private messaged with an interview invitation. Of these requests, 41 resulted in an interview. Twenty-eight interviews were conducted in-person at places such as coffee shops and restaurants, while 13 were conducted online using Skype video chat for logistical reasons. Participants mostly self-identified as heterosexual, with seven identifying themselves as gay or bisexual. Our participants were aged 19-37.

The interviews ranged from 22 to 72 minutes in length. All interviews were voice recorded and summarized in writing within 24 hours by the first author, who was also the interviewer for this study. A grounded theory approach [13] was used by the first author to code the interview data and identify emergent themes and concepts. The interview codebook underwent three iterations to reflect emergent themes from our open coding process. This research yielded three publications [38, 39, 40], showing that online daters struggle to evaluate experiential attributes through private messaging. However, these publications do not explain why private messaging does not satisfy users' evaluation needs. For this paper, we re-coded our interview data around concepts pertaining to private messaging as an evaluation tool. In this section we present new insights based on this re-coding to explain why private messaging is a deficient evaluation tool. Our findings are presented with interview quotes that illustrate themes identified during the re-coding process. Pseudonyms are used instead of participants' real names for the sake of their privacy.

1. Users distrust evaluations based on information explicitly provided by a potential partner

Private messaging allows participants to ask specific questions to potential partners for evaluation purposes. However, potential partners can consciously weigh their answers to these questions and give answers that they think will positively influence a user's evaluation of them. This made the participants unsure whether their private messaging partners were trying to have a genuine conversation or were merely saying things that they thought would make them appear more attractive.

Amanda, 19: *"Most of these guys [that I exchange private messages with], I'm wary of their intentions. I think they just want sexual favors."*

Janet, 23: *"Some guys try too hard to be funny. They end up just coming off as creepy."*

Most participants, especially men, reported that they did use private messaging to emphasize experiential qualities they thought were attractive, but they did not want to lie. Yet the ability to consciously engineer one's self-presentation through private messaging always made

intentional deception plausible. As such, when participants discovered that they had misinterpreted experiential attributes about a partner, many assumed the misinterpretation was due to intentional deception.

Pamela, 23: *"Then you meet them and you find out they lied because they're not like you were expecting."*

Participants had little choice but to base their evaluations of experiential traits on information that a potential partner explicitly provided. They were unable to develop ways to consistently validate experiential attributes because no available information was immune to deception. This negatively affected the confidence they had in their evaluations.

Linda, 21: *"I'm not too confident [about my online evaluations]. A person online, you never know how they really are."*

2. Private messaging provides no opportunity for deception-free observation

The primary purpose of a private messaging conversation for our participants was either to evaluate a potential partner for an in-person meeting or to self-present in a way that would make a potential partner want to meet in-person. This made private messaging conversations feel awkward and inorganic because they were not natural conversations, per se, but rather thinly veiled attempts at evaluation and self-presentation. As a result, participants struggled to feel "*chemistry*" or romantic compatibility with a potential partner before meeting in-person.

Madhan, 25: *"I wouldn't even call it a 'conversation' anymore. My [private messaging] routine has become so specific. First, I'll start with a generic 'copy & paste' message that has gotten responses for me in the past. Then I'll include something personal about the girl to show that I've read her profile."*

Yvette, 30: *"[Before meeting in-person] I really have to vibe with you. That's by having a natural conversation, but it doesn't happen a lot."*

Several participants remarked how the online dating evaluation process is distinctively different from how they evaluate potential partners offline. In physical world settings – such as nightclubs, bars, and parties – evaluation of a potential romantic partner is never the primary or explicit activity. Evaluation of potential partners takes a secondary role to dancing, drinking, or socializing with friends – activities that enable people to plausibly deny that romantic evaluation is the purpose of their interactions. These activities provide an opportunity for deception-free evaluation through the observation of a potential partner without having to directly question and overtly evaluate them. Some participants explained that they feel overwhelmed by these physical world environments where music can be too loud and attention spans can be short. These participants believed online dating was an environment more conducive to expressing their personalities.

Ian, 37: *"I like fuller and deeper [private] messages. I don't want the interaction to feel like in a bar. My personality doesn't work well there."*

However, private messaging is a communication tool that makes self-presentation and evaluation too explicit in online dating systems. Because there are no additional activities or tasks to distract them from the pressures of overt romantic evaluation, male participants were less inclined to have a real conversation – in which personality traits may reveal themselves naturally – and more inclined to send premeditated private messages as a form of personalized advertisement of experiential traits. (Female interviewees were less likely to advertise themselves like this because they tended to receive many more messages than men.)

Edward, 24: *"Sure, I'll re-use messages that have worked in the past. I bring up Obama and politics a lot because it makes me look smart."*

This is not to say that people are completely truthful in offline dating or that daters in the physical world lie less than online daters. Rather, this finding emphasizes that offline social environments and private messaging differ substantially as evaluation methods. Bars, clubs, and parties offer a myriad of distractions that make evaluation of potential romantic partners less overt and thus less susceptible to manipulation. However, these distractions can overwhelm some people and stifle their willingness to express themselves. Private messaging, in contrast, alleviates the distractions that can feel overwhelming, but makes evaluation the primary focus and affords no opportunities for deception-free observation or information that users believe was not manipulated by the potential partner. There is currently no evaluation tool in online dating systems that can provide experiential attribute information that cannot be manipulated to engineer an intended impression.

3. Information richness does not improve evaluations

Private messaging relies on text alone to communicate. Text has been claimed to be a relatively impoverished medium, in that social cues such as facial expressions and tone of voice are lacking [5]. It is temping to conclude that the deficiencies of private messaging can be solved with more information-rich tools such as voice and video chat. Four of our participants mentioned that they require phone calls and/or Skype video chats before meeting a potential partner in-person as a way to acquire non-verbal cues that are lost through private messaging. However, a majority of our participants indicated reluctance to use voice and video chat because such tools invade their privacy and create awkward situations (such as awkward silences during conversations, or wearing pajamas during a video chat). Text messaging was the typical mode of communication after exchanging phone numbers.

Courtney, 27: *"We'll exchange [phone] numbers to arrange a date, but I'll only use text messaging. A phone call is just weird. Once I start talking I can go on and on and on. It's embarrassing."*

Marissa, 19: *"There's no way I'd do a video chat. I don't want them to see what I'm doing!"*

Furthermore, the few participants who engaged in communication through richer channels before meeting still found most of their evaluations to be inaccurate once validated in-person.

Jeremy, 30: *"I require three in-depth phone calls before meeting in-person. [...] But still, they're not exactly the person you were expecting."*

Limitations

Several limitations of this study should be noted. Most online daters are in their mid-20s to mid-40s [27], but our participants were mostly in their 20s and early 30s, meaning that older online daters were not represented in our sample. Furthermore, all participants were located in or near a large east coast city. Our findings may not be representative of online daters in other geographic areas. Moreover, an interview study alone is not sufficient to verify the validity of participants' responses, or to track how participants' thoughts and behavior change over time.

STUDY 2: EVALUATION BEHAVIOR IN MOGS

We conducted a semi-structured interview study with 35 players (25 female, 10 male) of the MOG *Audition*, which attracts more than 300 million players worldwide [26]. This is our first publication for this interview study. *Audition* is a non-violent dancing game in which players can pair up with a partner with an opposite sex avatar to perform "dance battles" against other player pairs by synchronizing their keyboard strokes. For example, during a dance battle (Figure 1), couples press the arrow keys and spacebar on their keyboards in accordance with arrows on the screen, which are synchronized to the rhythm of a song being played. The greater accuracy and coordination they exhibit in pressing the right keys with their partner, the higher their scores. Players find available dance partners in virtual "dance rooms" irrespective of their offline location, meaning partners are usually geographically dispersed and rarely know each other beforehand.

Romance is taken literally in *Audition* through an in-game marriage system. Two opposite sex avatars can formalize a long-term collaboration by getting "married" in the game. In-game "marriage" between same-sex avatars is not allowed, however some homosexual players use cross-gender play (e.g., a biologically male player creates a female avatar) as a way to circumvent this restriction. In-game marriage is a significant achievement in *Audition*, requiring prolonged collaboration to practice for and complete a "wedding party" dance task. Because it costs real money (at least $5.60) for the opportunity to complete this dance task, players often coordinate their real-world

schedules so they can meet in the game and practice dancing together in preparation for this task.

Completion of this dance task is signified with traditional marriage artifacts such as a wedding party, a love license, and a virtual wedding ring (Figure 2). After a couple gets married in-game they can continue participating in dance battles together to achieve higher couple levels and amass more aesthetically pleasing virtual rings. Sometimes collaboration between dance partners extends beyond the game's dance theme and can cross the boundary between the game world and out-game worlds [37]. For example, a couple can build and decorate a virtual garden together in the "couple farm." Couples can also design matching clothes, poses, and accessories for their avatars in the "photo studio," another in-game location. Outside the game, couples usually collaborate to compose love stories and post them to online message boards, or work together to design their message board signature. These various collaborative activities (in-battle and out-battle, in-game and out-game) provide opportunities for evaluating multi-faceted experiential attributes.

Figure 2: A couple dance battle in *Audition*

Audition was chosen for this study for two reasons. First, collaboration in *Audition* is done only in pairs. Because research concerning MOGs has investigated collaboration primarily in groups (e.g., a *World of Warcraft* dungeon raid with as many as 40 teammates), little information is available regarding the dynamics of collaboration in pairs, such as in-game marriage partners, in MOGs. Second, in-game marriage is becoming popular in the MOG domain, but *Audition* is one of the only MOGs in which marriage is tied directly to progress or achievements in the game. *World of Warcraft* – the focal point of most intimacy-related MOG research – does not have an official marriage system, instead letting players role-play weddings independent of their progress through the game. *Audition* is one of the only MOGs to make marriage an actual achievement in the game, allowing it to seamlessly meld collaboration for utility and collaboration for virtual intimacy.

Figure 3: A wedding party (left), and a love license with ring (right) in *Audition*

We recruited our participants by posting a message on the two largest English-language message boards for *Audition* (forums.redbana.com and forums.jordantrudgett.com), inviting all players who had used the in-game marriage system to an interview. The interviews investigated players' motivations for getting "married" in *Audition* and the dynamics of their relationships with in-game marriage partners. Central questions during the interviews included "What does your *Audition* marriage mean to you?" and "How did collaboration influence your in-game marriage(s)?" We did not provide definitions of "marriage" or "collaboration" so as to encourage participants to narrate the meaning of *Audition* marriage in their own words. Several participants were in romantically intimate relationships with their in-game marriage partner, but this relationship status was not explicitly sought out in the recruitment process.

We interviewed all *Audition* players who responded to the message board posts within a month of their response to our invitation (N=35). Before being interviewed, all participants emailed us their informed consent. Semi-structured interviews were then conducted via text chat in Skype (which our participants preferred over voice or video chat). Forty-nine percent of all participants (N=17) had played *Audition* for 6 to 8 years, 46% (N=16) had played for 3 to 5 years, while 6% (N=2) had played for less than 2 years. On average, participants had married in *Audition* six times in five years. Thirty-one percent of all participants (N=11) had married 1 to 3 times, 52% (N=18) had married for 4 to 8 times, while 17% (N=6) had married more than 8 times. Of the 35 participants, 83% (N=29) self-identified as being in or having been in at least one "romantic relationship" with someone they met in *Audition*, but 18 of those had not met their partner in-person. Thus 11 out of those 29 satisfied our definition of a romantically intimate relationship, in that they had met their romantic partner face-to-face. Sixteen participants were aged 14-17 (46%), and 19 were aged 18-22 (54%). This age distribution is consistent with the general age distribution of *Audition* players, according to the age data that Redbana.com shared with us via an email request. Five participants self-identified as homosexual or bisexual. A majority of participants (N=31) were located in North America (U.S. and Canada).

A grounded theory approach was used for the qualitative analysis of the Skype interview chat logs [13]. Our findings from these interviews consisted of three main themes, which are illustrated below with representative quotes from the participants. The three themes explain how *Audition* players evaluate the experiential attributes of their potential romantic partners online via collaborative activities. Pseudonyms are used instead of participants' real names for the sake of their privacy.

1. Romance was not explicitly sought

Most participants reported that they did not have a pre-existing intention to meet a romantic partner through the game. Instead, romantic feelings for people they had met through *Audition* just "*came naturally*" (Samantha, 20) from spending time doing collaborative activities together in the game.

Rebecca, 19: *"We kind of just started off as a mutual goal for having the pretty rings and having the max ring [part of the level-up system in* Audition*]. Then we ended up talking a lot and flirting and it just sort of...happened."*

Matt, 19: *"I've never sought romance through playing this game. I just meet people then wind up liking them, and if they like me back a relationship starts."*

Even though the design of *Audition* is embedded with intimacy-related concepts like marriage, players had relatively little intention to construct a deliberate self-presentation in order to appear more romantically attractive. Because our participants used *Audition* just to have a fun, collaborative gaming experience, they had little motivation to present an "ideal" self. This allowed romantic compatibility between players to reveal itself naturally.

Cathy, 19: *"I don't use the game marriage to seek romance, the only reason I dated my [Audition partner] is because I was very close to him and I liked him as a real person."*

2. Collaborative activities let player pairs experience potential romantic compatibility

Our *Audition* players experienced a potential partner's personality traits via collaborative activities (e.g., dance battles) without having to consciously probe for experiential attribute information.

Tyler, 16: *"I believe what happens, happens. An in-game relationship should be like a real life one. You start out, get to know each other, dance together, solve problems together, fight, negotiate, and maybe fall in love. The coupling system allows you to learn about your partner."*

Emma, 19: *"[In-game marriage] is kind like online dating except more fun because you are in a game and there is actually stuff to do. It is like online dating but if you have nothing to do you can go on the game and be like let's dance together."*

Most of our participants did not consciously realize that they had been evaluating their dance partner as a potential romantic partner until romantic feelings had already

formed. They enjoyed the act of collaboration through dance battles, and used such collaboration as an implicit way to "*learn about*," or evaluate, their dance battle partner as a potential romantic partner.

However, some participants did consciously recognize the value of collaborative activities for developing romantic relationships. In-game dance battles, especially, served as a venue for developing trust and revealing emotional compatibility.

Andrew, 19: *"I like to know my [in-game marriage partner] more, even if it was through a game. It is like giving trust and that bond can grow to becoming friends or lovers. Collaborating would make it easier for a couple to be closer or chill down."*

Samantha, 20*: "Whenever I marry in Audition I would try to get to know them and spend more time doing things together, even though it is not as serious as real life marriage. Maybe that's why I usually develop feelings toward my [in-game marriage partners], and why I usually trust them."*

3. Collaborative activities alone do not complete the evaluation process

In-game collaboration alone did not escalate *Audition* partnerships to romantically intimate relationships. Most participants employed external communication methods to interact with their *Audition* partners during and outside of game play. These methods ranged in information richness from instant/text messaging, to phone calls, to video chat.

Anna, 17: *"Well, we play in game together. But we're usually Skyping at the same time. I mean we can watch movies on Netflix together [too]."*

Many participants were not adverse to, and indeed preferred, richer communication modes like video chat after they had developed a sense of familiarity and closeness with their partner through in-game collaboration. Since *Audition* players are usually geographically dispersed, meeting in-person was sometimes impossible. Video chats were perceived as the best alternative in these cases.

Anna, 17: "*It's not ideal that you can't be together in person but you make the most out of what you have. I videochat a lot with my [partner], and use Whatsapp to text him. Sometimes, I do use Facebook to contact him too."*

Michelle, 16: *"On birthdays we would Skype chat with voice and video chat since we live far away from each other. It's important to talk to each other on those days. We did the same for Christmas, anniversaries, etc."*

Participants recounted using these external communication methods to maintain and strengthen their emotional bonds when they could not be together in person. They no longer viewed their partners as mere in-game collaborators, but as romantic partners – often before ever meeting face-to-face.

Chris, 21: *"On special occasions we try to make it a day where it's just us and we spend time and talk to only each other on Skype. So that we can focus all our attention into making the special day that much more."*

Cathy, 19: *"We talk on Skype about how our days have gone. [...] We make it a point to catch up and inform each other how everything in our lives are going."*

Limitations

Three limitations of this study should be noted. We studied only one MOG, *Audition*, and our findings may not generalize to other MOGs. *Audition* players are mostly in their teens and early 20s. The way these players view and define "romance" may differ significantly from older adults. As with study 1, follow-up research is needed to verify the validity of the participants' responses and to track if and how participants' thoughts change over time, especially for participants who were still transitioning from adolescence into adulthood. In addition, all participants were volunteers recruited from online forums. Thus, there is a potential bias in a self-selected convenience sample.

DISCUSSION OF STUDY FINDINGS

Study 1 brought to light two main limitations of private messaging as an online dating system evaluation tool. First, online daters base their evaluations during private messaging largely on information consciously provided by their messaging partner, which limits the information's "warranting value" [6, 12] and makes online daters wary of deception. As a result, online daters do not believe they can authenticate experiential attributes without an in-person meeting. Second, as the evaluation process for romantic intimacy is explicit, private message exchanges often become thinly veiled attempts at self-presentation and evaluation with little opportunity for deception-immune information to be conveyed. This makes it difficult for real personalities and romantic compatibility to be elucidated. Study 2, in contrast, revealed that *Audition* players form romantically intimate relationships with each other because collaborative activities within the game allow them to experience each other's personalities implicitly without the interference of conscious self-presentation attempts.

These results are understandable considering that romantic attraction is not predicated solely on demographic or definable attributes. External factors – the context in which two potential partners initially interact – also influence resultant attraction [1, 21]. Collaborative activities provide such contexts, and their merits for facilitating romantic attraction are supported not just by MOGs, but by encounters in the physical world. For example, Lewandowski and Aron [21] found that participation in an arousing activity with a stranger in a gym setting – such as running together with ankle weights on – significantly increased romantic attraction for the activity partner. Participating in challenging or "exciting" tasks – like physically intensive games – together with a stranger also increased romantic attraction [21].

Admittedly, the motivations of online daters differ from those of MOG players. Because MOG players are not looking for romance, they have relatively little motivation to deceive or otherwise attempt to manipulate their self-presentation. Yet the abovementioned studies, along with the findings reported in this paper, indicate that evaluation of potential romantic partners is influenced by the context or activities occurring during interactions, not just by the personalities of the potential partners. These observations suggest that online collaborative activities could be a promising introductory context for facilitating romantic attraction in online dating.

DESIGN CONCEPTS

In this section we consider how collaborative activities could be implemented as a supplemental evaluation tool for online daters. Such collaborative activities would not replace the traditional evaluation methods of profile pages and private messaging, but would serve as an additional tool for evaluation. Based on the relevant MOG literature and our second study, we identify what we call *paired collaborative activities*, or activities designed for collaboration between two potential romantic partners. A paired collaborative activity is a *shared experience* between two users (the users do it together); it involves a *common goal* (the two users are working with each other towards the same achievement, not against each other); and it requires *reciprocity* (the two users need to work together to achieve mutual success).

Paired collaborative activities as a private messaging supplement

Paired collaborative activities could be added to online dating systems as a complement to private messaging. This would allow online daters to experience tacit experiential attributes through a paired collaborative activity and then use them to guide conversations through private messaging. Conversely, paired collaborative activities could be used to validate evaluations of experiential attributes gathered through private messaging. Such activities would not necessarily be complex gaming environments like MOGs, but rather activities that are readily understood by all users.

One of the ways this could be implemented is through a drawing game akin to *Pictionary*. One partner would be given a secret word by the system that they have to draw. The other partner would then have to guess the secret word based on the drawing within a limited amount of time. For example, while collaborating in a *Pictionary*-like game Sally finds Bill's drawing of George Washington to be funny and clever because he drew the Washington Monument with George Washington's face on it. She experiences Bill's sense of humor through the paired collaborative activity, and then uses his drawing to spark a private messaging conversation about traveling ("ha ha the Washington Monument! Have you ever been to Washington D.C.?").

Paired collaborative activities with explicit incentives

MOG players are often motivated to work together to achieve specific goals or rewards [24], such as virtual rings in *Audition* and skill levels in *World of Warcraft*. These rewards are explicit incentives for collaborating. Explicit incentives could be used in online dating systems to distract from overt evaluation motives that often spur online daters to act unnaturally in an attempt to consciously engineer the way they are evaluated.

Research into Warranting Theory posits that "the less information is perceived to be controllable by the person to whom it refers, the more weight it will carry in shaping impressions" [6]. Information gathered through paired collaborative activities about a potential partner's experiential attributes is relatively uncontrollable compared to information gathered through private messaging. Explicit incentives would serve to encourage initial and prolonged participation in paired collaborative activities, which would be helpful to users who want to authenticate experiential attribute evaluations through extended participation in the activity. These incentives could come in the form of unlocked system features or physical world activities.

Online dating systems often use a "freemium" business model, meaning users have access to the system's core functions for free, but must pay a one-time or monthly fee to access additional features. *OkCupid*, for example, requires users to pay a monthly fee in order to view time stamps of when their private messages were read and to see which users found their profile page attractive. Under this design concept, such features could be unlocked through prolonged participation in a paired collaborative activity with the same partner. Users would thus have a plausible motivation to engage in a paired collaborative activity aside from overt evaluation.

Instead of (or in addition to) unlocked system features, designers could use physical world activities to incentivize prolonged participation in a paired collaborative activity and alleviate an awkward transition from private messaging to an in-person meeting. For example, prolonged participation in a paired collaborative activity with a partner could yield coupons for coffee shops or restaurants that the users can only redeem if they go together. This would extend collaboration to physical world settings in a seamless fashion that would help avoid the awkwardness that can ensue when online daters try to escalate their communication off the system [38, 39, 40]. Online daters would no longer have to risk rejection when trying to escalate to an in-person meeting because the system would be broaching the date idea, not the user.

Romance-driven MOGs

Currently romance is not a pre-existing goal or motivation for playing MOGs, yet our second study shows that players often develop romantic feelings for their collaboration partners nonetheless. This design concept for romance-driven MOGS would entail MOGs promoting romance as an explicit goal for playing the game. As demonstrated by

Frost [10], online daters typically do not enjoy their time in online dating systems and their only motivation for participation is the expectant reward of a romantic relationship in the physical world. MOGs, however, are built for enjoyment and fun. Introducing romance as a primary goal for participating in innately fun and enjoyable MOGs would encourage daters to spend more time in the game/system evaluating partners and letting those partners evaluate them, therefore lessening the chances of inaccurate evaluations once two daters meet in person.

MOGs enable people in geographically dispersed locations to collaborate together in-game, but they do not necessarily let players choose their collaborators based on geographic proximity. MOG players are often logistically unable to meet romantic partners they encounter through these games because they live far away from one another. A romance-driven MOG could better facilitate in-person meetings by emphasizing or suggesting in-game partners who are geographically nearby, similar to how the mobile dating app *Tinder* suggests potential partners based on spatial proximity (e.g., "6 miles away").

Romance-driven MOGs could also encourage in-person meetings by making them a paired collaborative activity. This could be facilitated through augmented reality [9] – an approach popularized by many iPhone and Android games in which the physical world and virtual world are melded into a cohesive gaming experience. For example, in the iPhone game *Zombies Everywhere!*, players use their smart phone's camera to see virtual zombies transposed into the physical world that they must defeat using virtual weapons. Some of these games also encourage collaboration between players in-person, such as *Find the Future,* which encourages library-goers to collaborate to find specific books in the New York Public Library.

A romance-driven MOG could use augmented reality to facilitate paired collaborative activities in the physical world. For example, potential romantic partners could go on a scavenger hunt together in which they use their smart phone's camera to see rare in-game items hidden in various physical world locations. Once an item is discovered, players can take a picture together at the location to confirm that they found the item.

CONCLUSION

Online dating systems are a leading tool for satisfying the need for romantic intimacy through technology [15], and they continue to grow in popularity as the social stigma surrounding their use has all but dissipated [27]. However, our first study showed several reasons why current system components like private messaging fail to satisfy users' evaluation needs. In contrast, our second study found that multiplayer online games (MOGs) facilitate meaningful personality trait evaluation because their collaborative activities serve as a prime mechanism for experiencing in-game partners without interference from conscious self-presentations. These collaborative experiences sometimes

trigger romantic attraction between players, which can culminate in romantically intimate relationships in the physical world.

Inspired by our findings, we presented and discussed a series of design concepts for incorporating paired collaborative activities into online dating systems as novel evaluation tools. Our future work will involve implementing and testing how these design concepts influence evaluations and romantic attraction between online daters. Specifically, we are interested to see how overt romantic motivations affect use of collaborative activities, and what utility collaborative activities can provide online daters who have no prior experience with online games.

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