Full Length Article

Virtual intimacy: Propensity for physical contact between avatars in an online virtual environment

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A R T I C L E   I N F O

A B S T R A C T

Physical contact in human interactions conveys important social cues and plays a role in health and well-being. Although popular social technologies are limited in transmitting the physical aspects of human contact, avatars in online multi-user virtual environments can be used to visualize the physical characteristics of social interactions. Naturalistic observations of physical contact between avatars were performed in IMVU, an online virtual chat room platform where users control the physical interactions of their avatars by selecting among available animated poses. A third of the available poses examined across different user-generated chat rooms enabled physical contact between avatars, but only about one in ten of the avatars observed used these intimate poses, most commonly when dancing or sitting. While more female avatars were observed in non-intimate behavior, the number of males and female avatars observed in intimate interactions was relatively equivalent, with most intimate dyads being of heterosexual composition. Engagement in intimate interactions was not related to the presence of other avatars or their total number. The findings provide insight into the propensity of users to engage in physical contact via their avatars and have implications for the development of social technologies that facilitate virtual intimacy.

1. Introduction

Interpersonal "social" touch plays a fundamental role in non-verbal communication, particularly in exchanging intimate emotions such as love and sympathy (App, McIntosh, Reed, & Hertenstein, 2011; Morrison, Loken, & Olausson, 2010; van Erp & Toet, 2015), as well as in social affiliation and bonding (Dunbar, 2010). Exchanging human touch is also known to have benefits for socioemotional and physiological functioning, such as increased relationship satisfaction and reduced hormonal and cardiovascular responsiveness to stress (Ditzen et al., 2007; Field, 2010; Grewen, Girdler, Amico, & Light, 2005; Morrison et al., 2010). However, with today's widespread use of information technologies for social interactions, much of everyday human contact is mediated through digital means that rely on different communication parameters. In digitally-mediated interactions, non-verbal cues are primarily communicated through the visual modality, omitting the exchange of touch. Although various haptic devices have been created that can be used to mechanically transmit tactile information and incorporate sensory aspects of touch into digitally-mediated exchanges (Bailenson, Yee, Brave, Merget, & Koslow, 2007; Rantala, Salminen, Raisamo, & Surakka, 2013; Saadatian et al., 2014; Tsetserukou, 2010), this technology has not yet gained traction in popular digital applications (van Erp & Toet, 2015). A more commonly used approach to digitally represent human touch is by visualizing interactions in 3-dimensional (3D) online spaces, such as multi-user virtual worlds, using avatars that approximate human appearance (Gilbert et al., 2014; Lomanowska & Guitton, 2012b; Lortie & Guitton, 2011; Pace, Bardzell, & Bardzell, 2010).

Although the visualization of touch is limited with respect to the type of sensory information being transmitted, visual information provides relevant cues about the social context of touch. For instance, the identity of the interaction partners is related to the degree of touch to different body parts exchanged in typical human interactions (Suvilehto, Glerean, Dunbar, Hari, & Nummenmaa, 2015), and also affects how touch information is encoded by the brain's somatosensory cortex (Gazzola et al., 2012). As well, observing different emotions in facial expressions of others can influence the perception of pleasantness of gentle human touch

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(Ellingsen et al., 2014). Furthermore, studies in the field of social neuroscience have demonstrated that merely observing someone being touched stimulates similar brain responses as directly felt touch (Bolognini, Rossetti, Fusaro, Vallar, & Miniussi, 2014; Keysers, Kaas, & Gazzola, 2010), even enabling the discrimination of the degree of pleasantness of touch (Morrison, Bjornsdotter, & Olausson, 2011). In light of this research, it is possible that the approximation of non-tactile, visual aspects of human touch through contact between avatars in virtual settings may be relevant as a means of simulating some of the functions and benefits of social touch. However, little is known about the way in which virtual touch is exchanged in typical interactions between avatars. Previous research related to the physical aspects of interactions within virtual environments demonstrates that proximity to other avatars is indeed a factor in the way that avatars position themselves in relation to each other (Lomanowska & Guitton, 2012a; Yee, Bailenson, Urbanek, Chang, & Merget, 2007). The goal of the present study was to specifically examine how virtual physical touch between avatars is expressed in this context.

To study the interpersonal behavior of avatars, we conducted naturalistic observations in the online virtual environment of IMVU (www.imvu.com). IMVU is a freely-accessible 3D chat room platform composed of thousands of user-generated virtual rooms where users can interact through customizable human-like avatars. IMVU is a popular online virtual destination, with over 50 million registered members, 10 million unique monthly visitors, and 3 million monthly active users across the world, as reported by the company (IMVU FAQ, 2017). IMVU identifies the age demographic of their core members as young adults between 18 and 24 years old, but also caters to older users (IMVU FAQ, 2017). Previous studies that collected demographic information from users showed that the largest proportion of users (70%) were under 25 years of age (Kress, Getz-Kikuchi, Price, Karanian, & Nass, 2011), but older individuals, including seniors, were also present (Kress et al., 2011; Siriaraya & Ang, 2012). With respect to gender, approximately 60−65% of polled users identified as female (Kress et al., 2011; Siriaraya & Ang, 2012). A small proportion (<1%) also identified as transgender (Kress et al., 2011). A prominent demographic feature of IMVU is the identification of the user's country of origin in their profile, with approximately 89 countries represented among users at any one time. Overall, IMVU comprises a relatively diverse population of users and provides an attractive environment for the study of natural human interactions in virtual contexts.

Similarly to other well-studied virtual worlds, such as Second Life, the IMVU platform is designed to allow users to choose and customize a 3D avatar, as well as create and decorate virtual spaces by purchasing items from a catalog of user-generated virtual goods. Users can engage in a variety of activities by visiting chat rooms designed according to different themes (e.g., dance clubs, beaches) and socializing within these chat rooms with other users. IMVU also includes social networking features that allow users to create personal profiles and connect with other users across the platform. Although the IMVU platform shares many of the same elements as other virtual worlds, a unique aspect of IMVU is that avatar movements are constrained by pre-determined animated poses available in each chat room. A variety of poses are typically available for users to choose for their avatars, including different body postures such as standing, sitting or lying down, different dynamic features, such as swaying or dancing, as well as interactive features, such as embracing. This aspect of IMVU makes the platform a valuable model to study avatar interactions and lends itself particularly well to precise and reliable observation of instances of avatar physical contact. We took advantage of these features of IMVU to examine the typical physical interactions that avatars engage in within public online virtual spaces. We focused our observations on the poses that users chose for their avatars within various chat rooms and quantified the type and frequency of poses that represented interpersonal physical contact.

2. Methods

2.1. Virtual environment interface

The online virtual environment of IMVU (www.imvu.com) is freely accessible by creating an online user account. Upon entering the IMVU platform for the first time, the user creates an avatar which then gives them access to thousands of available 3D chat rooms. Chat rooms of interest can be selected through a search feature. The listed chat rooms are generally publicly accessible, unless access is restricted by the chat room creator. The maximum occupancy of a chat room is 10 participants at any one time. Each user of IMVU is represented by a 3D customizable character, or avatar, and a username (name of their avatar). When a user chooses to enter a chat room, their avatar is visualized on the computer screen within a 3D space representing the chat room. Once inside, the avatar can choose one of the animated poses available in the chat room (e.g., standing, sitting in a chair) by clicking on one of the small yellow pose dots used to represent the location of each pose in the chat room. Some of the available poses enable two or more avatars to interact together (e.g., a couple dance, an embrace). Users can communicate with others who are present inside a chat room using a text-based chat feature simultaneously displayed on the bottom of the screen and in "bubbles" above each avatar's head.

2.2. Data collection

A naturalistic observational approach involving quantitative measures was used to evaluate the physical interactions between avatars and the features of the virtual environment in which these interactions took place. Neutral observer avatars were used to enter the virtual environment and collect the data (Bardzell & Odom, 2008; Guitton, 2012a, b; 2015). This type of virtual ethnographic approach (Boellstorff, Nardi, Pearce, & Taylor, 2012) provides an effective and unobtrusive means of obtaining insights into the activities and behaviours of avatars and has been widely used to examine social behaviors in similar virtual worlds (Bardzell & Odom, 2008; Ducheneaut, Yee, Nickell, & Moore, 2006; Guitton, 2012a, b, 2015; Lomanowska & Guitton, 2012a, b). Data were collected between December 2015 and June 2016. All procedures were approved by the University of Toronto Human Research Ethics Board.

Seventy-three different IMVU chat rooms were included in the observations. To select chat rooms for observation, the main page of the IMVU chat room search engine was used. A table of random numbers was generated using an online randomization tool (www.random.org) and was used to select the page of the chat room search engine and a specific chat room on each selected page. As many of the IMVU chat rooms are empty at any one time, the initial search parameters excluded empty chat rooms. To reduce the influence of different time zones and days of the week on chat room selection, the search strategy was employed at 6 different time periods over different days of the week. Chat rooms were only included in subsequent data collection if they were publicly accessible and had no entry restrictions.

Four different observer avatars (2 male, 2 female) chosen from the standard avatars available upon creating an IMVU account were used in observations. The activities of avatars in each chat room were observed on multiple occasions during the observation period. A repeated observation strategy was used to provide a reliable and consistent measure of the use of intimate poses by