Metaphors for Social Relationships in 3D Virtual Worlds

Gilly Leshed and Poppy Lauretta McLeod
Department of Communication
Cornell University
Ithaca, NY 14850 USA
gl87@cornell.edu, plm29@cornell.edu

ABSTRACT

A number of conceptual metaphors have been previously suggested for identity management, including, for example, theatre stage, onion layers, and identity segments. Based on an analysis of 30 in-depth interviews with Second Life residents, we examine the extent to which these metaphors can be used to explain experiences of social relationships in and across virtual and material worlds. The data suggest that these metaphors are relevant to social interactions in and across virtual and material environments: individuals perform on a stage to and with others, they gradually reveal layers of themselves, and they distinguish between segments of their identity in different social situations. At the same time, these metaphors do not explain all experiences, pointing to future research on virtual environments, social relationships, and identity management.

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General terms

Human Factors, Theory

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Identity, social relationships, virtual worlds, Second Life, metaphor.

INTRODUCTION

My first partnership, I entered when I was two weeks in here, and we were married for 10 months, a very long time for here. In that time we grew to know each other very well and eventually she fell in love with me in RL. Problem is, she is a married woman with a family and we were to be a fantasy relationship, me a Dark elf, she a pixie. But the boundaries were blurred eventually, and it moved into RL, to the extent that we had to split to prevent further issues with her family. I did love her though. So, it is important, depending on the relationship, to keep

very distinct and set boundaries. (Connor, May 2008)

At this point in time, millions of people around the world regularly participate in 3D virtual worlds and games such as Second Life, The Sims, and World of Warcraft. As a result, new experiences are emerging for meeting and getting to know other people, becoming closer, and sometimes breaking apart. In this paper, we add to a growing body of literature in HCI and CSCW on social interactions in 3D virtual worlds [e.g., 7,11,26,28,42]. Specifically, we analyze how participation in 3D virtual worlds contributes to understanding issues of social relationships in multiple material and virtual worlds: when do relationships remain in one world and when do they cross over? Why and how do people keep these worlds separate or blur them together?

We use the term *material* rather than *real* world because as we learned from our data (and from others such as Turkle [38]), the virtual world is a legitimate part of reality for many users. Virtual and material worlds are ways to interact and engage with others in different contexts. In the material world an individual's physical body resides, and his or her brain processes the experiences, emotions, and knowledge gained through participation in the virtual environment with a virtual avatar. Our findings suggest that virtual and material worlds are ways to represent mutual sides, layers, pieces, or views of a person's *real* identity. As one of our interview participants eloquently said, *"we are all as real as the person at the keyboard."*

The primary contribution of this paper is an analysis of how well three classic metaphors of identity management—theatre stage, onion layers, and segmentation—developed before the advent of 3D virtual worlds, helps illuminate experiences of social relationships in and across virtual and material worlds. Our focus on social relationships was guided by considerable evidence in social psychology that identity management is inherently a social process: individuals define who they are through their interactions with others, and their perceptions of their own identity in turn help shape their social interactions and behaviors [33].

METAPHORS OF IDENTITY MANAGEMENT

It has long been recognized that metaphor has an important social scientific role in both individual cognition and in social relations. In 1980, Lakoff & Johnson argued that our "ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature" [17,

p. 3], and the use of metaphor for system design is well-established in the HCI and CSCW literatures [e.g., 3,6,24, 29,38,41]. The explosion of social interactions as a primary Internet use, for example, through social media and virtual worlds, prompts attention to the metaphors that underlie conceptualizations about relationship development through these media. Examining the explanatory power of metaphors of social relationships will provide guidance for theoretical development and future research directions, as well as pragmatic issues related to system design.

Various metaphors of identity management have appeared in the literature, and many more are conceivable. Our intention is not to produce an exhaustive survey of such metaphors, but rather to focus on few that have received widespread attention in the social sciences as representative. The question of the applicability of pre-Internet metaphors to understanding identity and social relationships today is especially significant in 3D virtual worlds, with unique embodied experiences in immersive environments, unlike other technology-mediated settings. Through qualitative analysis of interview data on the ways in which people describe their social relationships in and across virtual and material environments, we ask, to what degree can these metaphors be generalized to experiences in this brave new world?

Theatre Stage

All the world's a stage, and all the men and women merely players —William Shakespeare, As You Like It

Perhaps the most well-known metaphor of identity management comes from Goffman's *The Presentation of Self in Everyday Life* [14]. Goffman analogizes everyday social interactions to theatrical performances. An individual is like an actor performing on the stage of a theatre, with the other individuals in his or her social context acting as the audience watching the individual, and as co-actors in the drama. Individuals take on various roles, depending on the situation in which they are performing and the audience with which they are interacting. Through mundane, everyday interactions with others, they negotiate who they are: whether the audience is clapping or booing will shape their perceptions of self as well as future interactions with that audience. Through these social interactions, individuals develop patterns of actions in an attempt to establish a consistent positive impression others form of them.

Furthermore, each individual is not only a performer, but also the audience for other co-actors on the same stage. Thus the interaction between all individuals within that context is an n-dimensional negotiation process, in which all serve as performers and spectators, simultaneously shaping and being shaped by performances and responses to construct their self identities and social relationships.

For example, a bus driver and passengers perform to each other their identity roles: the driver drives the bus through a predefined route, greets passengers getting on and off the bus, and responds to questions about upcoming stops. The passengers get on and off the bus, greet the driver, pay with a card or cash, and find their seat.

Through the theatre stage metaphor, the development of social relationships can be seen as highly structured through the social norms that evolve as individuals consciously and unconsciously seek to achieve the goal of painting a positive picture of themselves. Goffman's metaphor of theatrical performance on a stage has been widely used to explain self identity and social interactions in online environments, including online dating sites [15], social networking sites [18,31,32], blogs [20], and online games [23].

Onion Layers

Life is like an onion; you peel it off one layer at a time, and sometimes you weep. —Carl Sandburg

Altman & Taylor [1] conceptualized social penetration theory to characterize the ways in which individuals develop relationships with one another. One's identity is analogous to an onion, in which personality is conceived as a series of layers. The outer layers present biographical information, physical appearance and public behaviors, intermediate layers include attitudes and opinions about various issues, and at the core layers there are fears, hopes, and beliefs. Whereas external layers of an individual are open, common, and available to the public to interact with directly, internal layers are more intimate and private, such that individuals are less willing to engage in social exchange in these layers.

The onion metaphor analogizes the process of interpersonal relationship development to a pin penetrating through the onion layers. Individuals developing a relationship with each other reciprocally exchange information about themselves in a gradual, orderly, and linear manner, layer-by-layer, from the surface to the core. They continually estimate the rewards and costs of disclosing a deeper layer to others: becoming closer, open, and trustworthy but also exposing vulnerabilities to one another.

Going back to our bus driver, initially, the passengers may only know his name as indicated on his badge. Similarly, the bus driver only knows external details about the passengers: where they get on and off, what they wear, etc. Over time, the driver and regular passengers may start recognizing each other and exchange details about themselves. The bus driver may tell a passenger carrying a musical instrument about his own music activities with a local jazz band. After a while, the passenger learns about the driver's band upcoming performance and they talk about rehearsals and performances. The driver and passenger now know more about each other than at their initial encounter, through mutually sharing their experiences and passion for music.

Studies that have used social penetration theory as a basis for understanding the development of relationships in online environments have borrowed different aspects of the onion metaphor. Most common have been self-disclosure (deciding which layers to reveal) and reciprocity (mutually

revealing deeper layers), in domains such as microblogging [27], online support groups [39], and online dating [13].

Segments

'Who are you?' said the Caterpillar.

This was not an encouraging opening for a conversation. Alice replied, rather shyly, 'I – I hardly know, Sir, just at present – at least I know who I was when I got up this morning, but I think I must have been changed several times since then.' —Lewis Carroll, Alice in Wonderland

Tajfel's social identity theory [34] points to the idea that each individual manages not one single identity, but a number of distinct identities across the social contexts they take part in. An important aspect in an individual's self concept is derived from their perceived membership in various social groups, as opposed to their unique personal attributes. Culturally accepted norms of behavior associated with these social groups affect the ways in which their members interact with other individuals within and between these groups.

Segmented identity can be seen as various roles performed in different social contexts, and therefore complements the theatre metaphor. Similarly, the onion metaphor acknowledges the variety of categories such as family, work, religion, and hobbies in an individual's identity that can be penetrated deeper into core layers of one's identity. In other words, the segments metaphor is congruent with the previous two metaphors, illuminating the breadth, rather than the depth, in social interactions in various social contexts.

When roles are incompatible, such that it is difficult to meet the norms of multiple roles at the same time, individuals attempt to construct boundaries between the segments of their identity. As a result of this segmentation, one may develop relationships with others that do not cross between the different social contexts in which they operate. This is associated with a more complex identity structure [30]. Back to our bus driver, who is also a musician and a husband, his wife does not like it when he plays music with his band over the weekend instead of spending time with her. He therefore protects their intimate relationships by staying away from telling his wife about his music activities.

Farnham & Churchill examined the concept of segmented identity in the ways that people share information online, finding that segmenting is easier using email than in social networking sites [12]. Bargh et al. [2] and McKenna et al. [21] show how the Internet may allow individuals to express aspects of their identities ("the true self") that offline might be considered counter-normative. McLeod & Leshed [22], in analyzing identity management in virtual worlds, suggested a variation of the segments metaphor – a jigsaw puzzle wherein the pieces represent different segments of identity and together contain the whole picture. The deepening of online friendships can be compared to fitting the pieces of each other into a frame and seeing the images of each other become increasingly recognizable.

After describing three metaphors of identity management and how they may relate to the formation and maintenance of social relationships, we now turn to ask: given that these metaphors were established on an assumption that all (or most) interactions are face-to-face, to what extent can experiences of managing social relationships across material and virtual worlds be explained with these metaphors?

We examine this question in the context of Second Life: an online 3D virtual world in which users, called Residents, interact with the world and with others through avatars. Second Life was launched in 2003 by Linden Labs and as of Q4 2010, had over 750,000 residents spending more than 105 million hours in-world (see http://lindenlab.com/about). The variety of interactions available for Second Life residents includes interacting with other residents, playing games, building objects and environments through scripts, property management, shopping and selling, and exploring the world, among others. We believe that Second Life is particularly appropriate for the goal of this research, because it affords life-like experiences through its 3D embodied interactions (unlike online interactions such as forums) and its lack of game rules (unlike multiplayer games such as World of Warcraft).

SECOND LIFE INTERVIEW STUDY

Our analysis is based on data from in-depth interviews carried out in Second Life in the spring of 2008. Our methodological approach resonates with other studies in which the researchers participated in the virtual world with their own avatars [e.g., 4,7]. With our recruitment technique, we had no access to participants' material life name or other identifying information besides general demographics. We hoped that by giving participants control over the boundaries between their Second Life and material life identities in the interview they would be open with us about their experiences. For example, five participants talked about BDSM experiences, and we suspect they would not have shared this with us if interviews were held outside of Second Life.

Participants

Thirty Second Life residents were recruited and scheduled via a third-party Second Life market research company that specializes in Internet sampling and research. This company had access to participants' material life identifying information in order to compensate them for their participation, but this information was not shared with us.

Fifteen participants were female in their material life, and their material life age ranged from 21 to 68 years (median=35). According to quantcast.com, these distributions are roughly representative of Second Life users. All participants were US-based, and their Second Life age ranged from 3 months to almost 4 years (median=14 months).

Participants reported a range of activities that occupied their time in Second Life. A minority (n=5) described their time spent in Second Life as primarily work-related, such as managing property or working at a Second Life company.

The rest described their primary activity as recreation, such as being with friends, shopping or going to parties, or a combination of recreation and work. Even for the few who spent most of their time in Second Life working, social relationships, professional or personal, were a central focus.

Interview Procedure

The researcher's avatar met with the participant's avatar at the set time at the entrance to a conference room in Second Life. The participant was invited to seat their avatar at a table inside the conference room and was given a Second Life notecard containing information about Informed Consent. Once the researcher's avatar received the participant's electronically signed consent form, the researcher conducted the interview via private instant messaging text.

The semi-structured interview included open-ended questions about how the participant sees and manages boundaries between Second Life (*SL*) and real life (we used the commonly used terms *real life* and *RL* in the interview rather than *material life*); how they make decisions about sharing different kinds of information about themselves in various situations; how and why they start, develop, maintain, and discontinue relationships; whether they know people in both worlds and the details of how and why this came about; and alternative avatars they use, what for, and how they are similar to or different from their current avatar. We ended the interview asking participants more general questions about how they spend their time in Second Life. Each question was followed with probing questions until we thought we received a full depiction of the participant's point of view. Interviews lasted approximately 90 minutes after which participants were given L$1500 (Second Life's currency, approximately $6 U.S.) for their participation.

Data Analysis

We saved the text of the interview conversations to files outside of Second Life, and gathered additional information about each participant from their Second Life profiles, voluntarily added by participants and publicly available to all Second Life residents.

To analyze the data, we carefully read the collected materials, marking parts that seem relevant to issues of identity management and social relationships. The metaphors were not part of the interview protocol design; rather, we wanted each participant to express freely his or her own perspectives. The idea to use these metaphors as a lens for analyzing and interpreting the data came from a combination of reading the literature and our initial examination of the transcripts. We therefore coded and organized the data according to the three metaphors, whether consistent with or conflicting any of them. This analysis was repeated iteratively until we exhausted the data.

In the analysis presented below we changed avatar names but kept gender identification. Given a relaxed norm in Second Life chat, we edited interview quotations to remove typos and other errors only enough to clarify meaning.

DIFFERENT LOCI OF RELATIONSHIP

We found that relationships participants discussed could be situated in three loci: relationships that are confined to the Second Life environment; relationships that start in Second Life and extend outside of Second Life; and material life relationships that sometimes extend to Second Life.

Within Second Life Primarily

Most participants described maintaining some boundaries between participating in Second Life and their material life. Robert, for example, describes his material life identity as being disabled, retired, and living an isolated ranch, in contrast to being a healthy and dominant person in Second Life's Gor community[1] who goes out dancing a lot. To maintain these boundaries, participants set limits on the information they disclose about their material life while interacting with others in Second Life, when they disclose it, and to whom. These boundaries play a role in that most relationships remained within the virtual world. That is, participants described their Second Life relationships as separate from the relationships they maintain with material life acquaintances, friends, and family:

> It all depends on the person, I'm not going to tell someone I just met all my personal info, but I have known people here for over a year that know more about me than some of my family. I however would never meet someone from SL in RL or have any contact with them outside SL or other IM systems. (Candace)

Candace's description illustrates the segmentation between her virtual and material life relationships. But on another level, from Candace's account transpires her view of her Second Life relationships as somehow deeper and more sincere than those in her material world.

What contributes to these differences? On the one hand, individuals reciprocate with each other in sharing personal information in order to develop and nurture meaningful relationships, as has also been observed in World of Warcraft [28]. But in order to maintain the boundaries between material life and Second Life, the kind of information that is disclosed is different. Shari says: *"I talk about my life in character-revealing ways, though not, I think in identity revealing ways."* That is, individuals share experiences, emotions, and who they are from the inside, as Connor says: *"my passions, likes and dislikes, food I like, hobbies, that sort of thing,"* while holding back information such as material life name, contact details, occupation, and age.

All participants reported that sharing personal experiences helps strengthen connections with others and happens naturally and gradually over time. Connor says: *"at some point a relationship becomes real; you dream about it you eat it*

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[1] A community based on the fantasy, science-fiction alternative world from the novels of John Norman. This community has a controversial reputation of sexual slavery and violence involved in the role-playing.

you live it. Just like in RL. And the emotions are real. If someone makes you angry, it is RL anger, not avatar anger. We are all as real as the person at the keyboard." This suggests that what begins as superficial staging of one's avatar for others' avatars over time internalizes to genuine, meaningful personal relationships. Indeed, 12 participants reported even getting married in Second Life, which involves paying Linden Labs a nominal fee for having official "partner" status listed on both avatars' profiles.

Participants reported that, as they get to know each other over time, they mutually and gradually exchange information about material life details such as their city, occupation, age, and marital status. Greta says: *"I have found that it is much easier to make friends and form strong bonds with people when you're willing to open up a bit... even if it's with something as trivial as rl age and marital status."* Participants acknowledged the value of sharing material life identity information in order to build trust and strengthen their relationships, as Gerome says, *"it can make you feel like a closer friend to somebody."*

This process by which participants described connecting with others through progressively exchanging deepening information, is in line with the central idea of the onion metaphor. Moreover, participants' accounts suggest some consistency in the pattern of what information is exchanged and in what order. It is this order, however, where the onion metaphor, as conceptualized by Altman & Taylor, breaks down. Our data suggest that the order of what are the external layers and what is on the inside seem to be altered when moving from face-to-face to the virtual world. In Second Life, external layers include avatar characteristics such as name, appearance, places encountered, and public profile details (a number of participants told us at the beginning of the interview that they looked at our profile, a common practice when meeting someone for the first time). Participants then described readily moving to layers of their personality and life stories that in material life relationships would be considered less accessible. And for many participants, at the deepest layers lie details that serve as external layers in the material world, such as age, name, and location. Although the metaphor of gradually revealing layers may hold well, the arrangement of the layers may not.

Furthermore, in some cases, even the gradual process of penetrating through deepening layers breaks down. Some reported revealing material life identity details early in the relationship, and few even offer such details in their public profile. Diane says that publicizing her city and occupation in her profile reminds others *"that there is a person behind the pixels."* This seems to contradict the onion metaphor, if material life identity details lie at internal layers in Second Life interactions. Our data suggest that one may wish to expose a deeper layer and become vulnerable as an expression of readiness to engage in developing friendships.

Alternative Avatars

23 of the 30 participants reported that they had more than one avatar, with 17 of them using 1-2 *alt avis* (alternative avatars), and the other six using 3 or more alt avis. Alt avis were often reserved for exploring different activities or communities such as BDSM, furries, unattractive physiques, and gender swap. Angela, for example, whose primary avatar is an outgoing, friendly female, has an alt avi that is *"male with a very bad comb over. He's not in the best of shape and likes to ogle women."* In line with the segments metaphor, alt avis therefore allowed participants to enact different aspects of their identity with different avatars in various social contexts.

Alt avis were often created to escape the social life in Second Life that could sometimes be overwhelming, because once logged in, your friends can see that you are online and want to contact you. Fiona's primary avatar is constantly *"bombarded with IM's as soon as she logs in and I wanted an alt so I could spend time in world without all the IM's."* Therefore, alt avis were often designated for non-social activities such as building and working, as Angela says: *"I don't want the alts to maintain friendships and stuff like that. They're usually used to get stuff done."* This is because maintaining social relationships is time consuming:

> I created another avatar and used her for about a week - just because I sometimes felt overwhelmed by all the people I know in SL wanting to visit and chat. I thought she could be my explorer avatar and go running around the sims and go surfing and all the things I want to do that I have a hard time freeing myself up for in this Avatar's life. But...she kept meeting people too, so it seemed silly and pointless and she retired. (Frances)

Participants often reported keeping their Second Life friends from knowing about their alt avis, segmenting their activities between their social and non-social avatars. This is also in line with the theatre metaphor, in which individuals attempt to control the boundaries between the front stage and the backstage. On the front stage they perform to their Second Life friends a positive, outgoing role with their primary avatar, keeping the non-social alt avi for backstage activities with no audience they feel a need to perform to.

In other cases, alt avis were reserved for specific social relationships. For example, Kira's primary avatar is a slave in Second Life's Gor community. She uses an alt avi for a more conventional intimate relationship outside the Gor community with *"one particular person when we both want to get away and not be bothered,"* keeping it secret from her primary avatar's Gor master. In such cases, the segmentation is not between a social and an asocial avatar, but between social selves, each reserved for separate social relationships. But despite this segmentation, Fiona explains about having 4 avatars, *"I honestly believe wherever you go there you are,"* and Greta says: *"I am my avatar... I don't pretend to be someone I'm not."* Ultimately, all the segments belong to one person, one identity.

From Second Life to Material Life

The exchange of material life information is not necessarily an indicator that a Second Life relationship will follow into the material life. For a number of our participants, the judicious choice of what material life information to share or not was actually a deliberate strategy for maintaining the boundary between the two worlds. For example, Angela discloses her material life full name because it is *"such a common American name that it would be tough to find me even if you wanted to,"* but Shari, a political activist in material life, never gives out her material life name because she is afraid to be *"googled."* In such cases, the segments of one's identity are carefully kept apart from each other despite some overlap in the information shared across them.

Sometimes however, providing enough material life details led participants to the point where they felt that they "knew" each other in material life as well as in Second Life. This kind of natural progression of allowing a Second Life relationship to breach the boundary was fairly common, and felt to many a comfortably inevitable step. Most of our participants (25 out of 30) said there was at least one person who they met in Second Life with whom they have mutually revealed material life contact information.

In a small number of cases, the extension of Second Life relationships into the material life was pragmatic. For example, Harry owns a Second Life sim through which he promotes his material life business, and he maintains transparency between the two in order to promote his business and to make a living. Deanna, who has a Second Life job, needs to be able to contact her colleagues outside of Second Life: *"we need alternate ways to reach each other. For example if there was a meeting and I didn't show in world someone might call to find out why."* In line with the theatre metaphor, the role played by these individuals involves constructing an image of a reliable person who does not hide behind the avatar. Such roles therefore call for extending the information they provide about themselves across the border between the virtual and material worlds.

In most cases, however, feelings of strong personal bonds motivated individuals to extend Second Life relationships to material life. In these cases, the onion metaphor is useful in explaining descriptions of reciprocal trust building processes, spending a lot of time together, and long conversations. Frances says: *"In all cases they are people that I met and knew for many months with whom I sensed a connection of some kind. In some cases, they were open with me about their lives, so I was more open about mine. Usually there was a slow revelation of facts and a building of trust."* Developing a relationship involves gradually peeling more and more layers over time until eventually individuals get to the core where their Second Life identity and material life identities converge.

People who became close enough to reveal their contact information outside of Second Life wanted to be able to talk to one another over the phone, see each other through a webcam, stay in touch through social networking sites and email, and sometimes meet in person. Kevyn, for example, found that one of his Second Life friends plays the same multi-player video game he did, and they exchanged information so they could find each other in the game and play together. John described his Second Life wife's upcoming visit and that they would also be meeting other mutual Second Life friends in the material world.

John's example illustrates a common finding that relationships that extended from the virtual to the material world were often more intimate than simple friendships, including romantic partnerships and Second Life family ties (e.g., siblings or children) [see also 28]. Angela, for example, says that her Second Life partner has her cellphone number and they talk occasionally: *"He went through a messy divorce last year and his family didn't approve of the divorce, so I helped talk him through some things."*

Not surprisingly, we also saw cases in which extending romantic relationships from Second Life to material life can be problematic. This was most often seen when the Second Life partner was married in material life to someone else:

Kira: *I spend a lot of my time with him and we are the closest. And we will most likely meet in rl.*

Researcher: *But you did not share addresses yet?*

Kira: *addresses? hehe well he has not asked and I wont ask him for his because ... well, this is private and research. He is married in rl. I know the area he lives in. I know about his neighbors and I do have the address for his beach house. But i would never think to ask him about his primary home where he lives with his family.*

Through the lens of the segments metaphor, in all these cases the relationships reach a point where individuals feel that they want to include their relationship partner in other segments of their lives, to deepen and strengthen the bond with one another. Some even perceived marital status in the material world and in the virtual world as independent of each other. The virtual physicality of avatars' bodies assists in creating a sense of separation between all that happens in the virtual environment from that of the material. The segments are more than mere pieces of one's identity; they are compartments into which the carefully segmented parts of identity, with the respective social relationships, can be placed. The degree of permeability of the partitions between the compartments varies across people and over time. Moreover, the segments can sometimes collide.

At the same time, the segment metaphor has its limits. One important limitation is reflected in the perspective many participants shared, that all the segments belong to the same person. The life that the avatar leads in the virtual world – the friendships or enemies made, the activities joined, the emotions felt – is also experienced by the material world person. Though technology provides an easy means to technically segment between the virtual and material

worlds, those segments are no cleaner cut than are the segments that everyone constructs in everyday material life.

From Material Life to Second Life

Participants also told us about how some relationships extended from the material life to Second Life. The way this direction happened was different in nature than extending Second Life relationships to material life. Drew described how he tells everyone about his Second Life *"escapades,"* and his children and one close friend know that in Second Life he is a young gay male. However, they do not have Second Life accounts themselves: *"I try to convince people to try it out, but there is a lot of resistance in a lot of people."* In other words, whereas behind every avatar there is a person, the opposite is not true; very few people in every participant's material life are also Second Life residents.

This asymmetry was also illustrated in the consequences participants described of Second Life residents finding out their material identities in contrast to material life acquaintances finding out their Second Life avatar identities. Some participants feared potential stalkers or worse – murderers – hiding behind Second Life avatars, and this was one reason for the gradual and reciprocal trust building process before exchanging a key piece of material life contact information such as address or phone number. In the opposite direction, however, participants were mostly unconcerned about people in their material life finding out their avatar name and contacting them in Second Life. Participants said that many people outside of Second Life do not understand what Second Life is and its appeal or think it is a waste of time:

> Harry: *...so many have no clue about SL other than the sex stories they read about [...] They know I am involved but would not understand enough to have it make sense to tell them my name. I have told people that in SL I am 6'11" as compared to 5"4" in RL. They laugh. [...]*
>
> Researcher: *What do you perceive the consequences to be of people in your RL finding out your SL identity?*
>
> Harry: *Shock, distain, and confusion until they hear what I am doing here. Then they are amazed and impressed*
>
> Researcher: *What do you think leads them to the first set of reactions?*
>
> Harry: *I assume it is because the only things they have heard about SL are the horror stories.*

Our findings illustrate how people segment their lives and play different roles in the virtual and material worlds. Some participants used terms such as bizarre, insane, immoral, deviant, and sinful to describe how their participation in Second Life would be considered according to the social norms in their material life. In these cases, they chose to keep the social circles in their material life from knowing that they even participated in Second Life. In other cases, sometimes when family and friends saw them spending many hours at the computer and even watched them interacting in Second Life, they couldn't keep their Second Life

interactions secret. Still, they often did not tell others in material life about the depth and significance of their Second Life experiences and interactions:

> I would not reveal that I have a partner. I'm not sure how it might be perceived. I think it just might be best not advertised. I'm comfortable with it, but others might find it…. questionable. I'm having trouble finding the right word or words. I don't want to hurt anyone. I don't want anyone to think less of me. (Thomas)

This separation between material life and Second Life is congruent with the segments metaphor. It is also in line with the theatre metaphor, in that on the material life stage individuals attempt to conceal some of their virtual life behaviors. For example, the material life audience may consider sexual activity in Second Life to be strange or objectionable. This may be a reason for individuals to attempt to control the boundaries between these two stages. For example, Candace, a stay-at-home mom, says she does not log on to Second Life when her husband is home.

Fourteen participants talked about material life relationships that extended to Second Life. These were often people who introduced the participants to Second Life, or that participants introduced them to Second Life. Sometimes, material life relationships were given a new form in Second Life. Irene describes her interactions with her best friend: *"we joined together in sl same time =) I think I found it first, told her about it, she said let's go in, so we registered. She and I live near each other in sl, shop together, hang out everyday in sl."* In other cases, these were material life partners, as in Walt's case whose material life wife is also his Second Life wife. Similar to friendships, romantic relationships can take new forms once they extend from the material to the virtual world:

> My husband typically ends up dating my good friends... and becomes friends with my boyfriends... we have a unique relationship... very open minded. We don't believe in jealousy. We set up ground rules and follow them... one of which being no sl love ever makes it to rl. Email and IM's through yahoo are fine, but no meeting in rl and no phone calls... (Greta)

In another case, Diane told us about her Second Life boyfriend and her material life husband: *"My hubby knows about the SL guy, and is ok with it. [...] He knows I would never leave him for anyone else."* She goes on to describe that she feels *"like being married to two men, good grief. Sounds odd, I know. But I love them both, each has his own place in my life."* The situation became *"very mixed up"* after Diane's husband joined Second Life, although they did not reveal that they are a material life couple. Once her Second Life boyfriend found this out, it became an issue, and they separated for a long time, but later secretly connected again, and Diane says: *"well, now things are just odd for us."*

These examples illustrate how relationships can be reshaped when shifting between the material and the virtual:

people discover new ways to interact, and as a result find layers or aspects of themselves and of their partners they did not know of or did not have a chance to experience otherwise. Through the lens of the onion metaphor, layers can grow and change over time as people interact with one another and develop meaningful relationships across contexts. Similarly, from the perspective of the segments metaphor, when segments of their material and virtual lives come together or intersect, one's life experiences and social relationships can be positively enriched, or, as in Diane's case, become convoluted, confusing, and dysfunctional.

DISCUSSION

The three metaphoric lenses we used—theatre stage, onion layers, and segments—were developed in times when the ways of identity and relationship management that exist today were scarcely even conceived. It is not simply the reduced cues or new modalities of interactions that merit questioning the applicability of these metaphors. The ability to construct one or more bodies separate from the material body and the total immersion individuals experience as they socialize with others are unique characteristics of 3D virtual worlds that set these environments apart from other mediated contexts in which these metaphors have been previously applied. The foregoing analysis illustrated that these metaphors are nevertheless relevant to the mediated relationships in 3D virtual worlds – to a point.

Our data illustrate how the theatre metaphor can illuminate the ways in which individuals attempt to present themselves favorably in any specific context through choices they make in their interactions with others. For example, one may maintain a reputation of an outgoing, social personality with their primary Second Life avatar and keep alt avis for norm-violating activities. People conceal from others in their material world Second Life activities that may raise questions about their performance as a moral person in the material world. These performances are constantly negotiated and co-constructed with others they interact with in both the material and the virtual worlds.

But the theatre metaphor emphasizes that everything that is happening on stage is make-believe. If "all the world's a stage," and people are acting behind masks, then where is the true person, and where do true interactions and relationships happen? Boon & Sinclair [5] argue that "Second Life necessitates a commitment to the unreal" (p. 20), and that it is impossible ever to know through their avatar how authentic someone is. But to many of our participants, their interactions within Second Life are not less real than outside of Second Life. One interesting research question suggested here is what factors may be related to the extent to which people perceive virtual world experiences as "real." Factors related to the virtual environment [10,35], the individuals themselves [19,37], and the interaction between the two [9, 36,40] are all fruitful avenues for future research.

We also saw that the onion metaphor can explain many aspects of relationship development in Second Life, particularly in regard to the gradualness of personal information disclosure. But, the somewhat strict order of disclosure prescribed by social penetration theory for face-to-face contexts, where physical appearance and public behaviors serve as external layers and thoughts, feelings, and experiences lie beneath them, may not be so applicable. It is not just that in a virtual environment the onion is turned inside out, but instead, the very idea of layers nested within each other, along with the necessity to penetrate one before the next can be reached, is challenged.

We do not argue that the phenomenon of rapid disclosure of intimate information invalidates the onion metaphor within the context of relationships online. To the contrary, the onion metaphor helps highlight the circumstances under which the inner core can be laid bare, when new layers of avatar appearance and behaviors are available, and thus also calls further upon the theatre metaphor. This point is consistent with the analysis presented by Nach & Lejeune [25] suggesting that the vulnerability associated with loss of control over one's identity is an important challenge for Internet use in general, and for the process of relationships development in particular. Another important avenue for future research therefore would be to examine coping strategies for how people maintain control over their identity across contexts, and the factors related to those strategies.

Finally, the segments metaphor is evident through the division of material life and Second Life relationships, and within Second Life through the use of multiple avatars for different social purposes and aspects of the self. Interacting through virtual worlds provides more segmentation than was traditionally afforded, for example, in separating between one's family and work life. The usefulness of the segments metaphor is shown under circumstances in which segments are incompatible with each other or when they are brought together and then clash, for example, when separate romantic relationships in the material world and in Second Life are exposed to each other. This metaphor suggests that incorporating ideas developed about social identity complexity [30] would be a promising direction for future research on relationship development in virtual worlds.

Moreover, while all of the segments traditionally belong to one person, technically, more than one person can manipulate the same avatar (one participant, Irene, told us that she and her niece share an avatar; this was also described in [4]). The theatre metaphor applies here in thinking about different actors taking on the same role: although each actor uniquely interprets the role, there are qualities inherent to the role to be conveyed irrespective of the individual actor. The segmentation thus extends from not only the different parts of an individual's identity but also across different individuals. How well would the onion metaphor explain a situation of multiple occupants of a single persona when, each time one penetrates through the layers a different identity would be uncovered? Future research examining multiple individuals inhabiting a single avatar would make valu-

able contributions to theories of identity management and social relationships in virtual worlds.

Because each of the metaphors provided a different lens for examining our data, it is clear that there is not one single metaphor that best explains experiences of relationships in and across virtual and material worlds. A conceptual metaphor helps understand certain issues in concrete situations, but one needs to be cautious about what it marginalizes or when it distorts what we see. In such cases, turning to a different metaphor, combining metaphors, or updating a metaphor to hold in new situations not previously conceived may be needed. For example, combining the onion metaphor with the segments metaphor could clarify cases in which in different circumstances layers and their order may vary. In this new "onion garden metaphor," an individual grows a variety of onions, each with its own unique set of layers, but all nurtured from the same soil. Furthermore, the onions grow, mature, and sometimes eventually perish.

At the technical design level, our work highlights how system design might be ingrained with specific theoretical assumptions of how individuals should interact with and through the system. The endless choices of body shape, skin type, hairstyle, and clothing in Second Life are grounded in the theatre metaphor in that individuals should carefully choose the appearance they perform to others in the community. This capability, as well as the very idea of virtual avatars separate from the material body, also supports the segments metaphor, as individuals can construct avatars that are almost identical to or completely different from their material life physical appearance. We therefore encourage designers of systems that support social interactions to think deeply about the metaphors that underlie the systems they create: what they support, what they leave out, and how they are congruent with the goals of the system.

CONCLUSION
In this paper, we presented an analysis based on interviews with 30 Second Life residents about the ways in which they develop social relationships in Second Life and extend them between Second Life and their material life. We examined how well three conceptual metaphors—theatre stage, onion layers, and identity segments—could be used to explain our interview findings. We found that although these metaphors were developed well before 3D virtual worlds existed, to a large extent they are relevant to interactions in and across virtual and material environments: individuals in our study perform on a stage, choosing what to present to and with others; they gradually peel off and reveal layers of their identity to others; and they discriminate between segments of their identity in different social situations. Within these experiences, individuals meet others, bond with them, become closer, and sometimes break up.

We also found ways in which each of these metaphors ceases to explain our findings. This does not necessarily mean that a metaphor is useless. Instead, different metaphors can complement each other, be combined, or a specif-

ic metaphor could be updated for new situations that were not available when these metaphors were introduced.

Our contribution is twofold. First, we added to the growing body of literature in HCI and CSCW descriptions of individuals' experiences in managing identities and developing social relationships in 3D virtual worlds. Second, we examined the application of conceptual identity management metaphors to these experiences, pointing to strengths and weaknesses of these metaphors in explaining social relationships in and across virtual and material worlds.

REFERENCES
1. Altman, I. & Taylor, D. 1973. *Social penetration: The development of interpersonal relationships*. New York: Holt, Rinehart and Winston.

2. Bargh, J.A., McKenna, K.Y.A. & Fitzsimons, G.M. 2002. Can you see the real me? Activation and expression of the "true self" on the Internet. *J. of Soc. Issues*, *58*, 33-48.

3. Blackwell, A.F. 2006. The reification of metaphor as a design tool. *ACM ToCHI, 13*, 490–530.

4. Boellstorff, T. 2008. *Coming of age in Second Life*. Princeton, NJ: Princeton University Press.

5. Boon, S. & Sinclair, C. 2009. A world I don't inhabit: Disquiet and identity in Second Life and Facebook. *Edu. Media Int.*, *46*, 99-110.

6. Brahnam, S., Karanikas, M. & Weaver, M. 2011. (Un)dressing the interface: Exposing the foundational HCI metaphor "computer is woman". *Interacting with Computers, 23*(5), 401-412.

7. Brown, B. & Bell, M. 2004. CSCW at play: *There* as a collaborative virtual environment. *Proc. CSCW'04*, 350-359.

8. Cheal, C. 2007. Second Life: Hype or hyperlearning? *On the Horizon*, *15*, 204-210.

9. Correa, T., Hinsley, A.W. & de Zúñiga, G. 2010. Who interacts on the Web? The intersection of users' personality and social media use. *Comp. in Human Beh., 26*, 247-253.

10. Demetrious, K. 2008. Secrecy and illusion: Second Life and the construction of unreality. *Australian J. of Comm.*, *35*(1), 1-13.

11. Ducheneaut, N., Yee, N., Nickell, E. & Moore, R.J. 2006. "Alone together?": exploring the social dynamics of massively multiplayer online games. *Proc. CHI'06*, 407-416.

12. Farnham, S. & Churchill, E. 2011. Faceted identity, faceted lives: social and technical issues with being yourself online. *Proc. CSCW'11*, 359-368.

13. Gibbs, J.L., Ellison, N.B. & Heino, R.D. 2006. Self-presentation in online personals: the role of anticipated future interaction, self-disclosure, and perceived success in Internet dating. *Comm. Research, 33*(2), 152-177.

14. Goffman, E. 1959. *The presentation of self in everyday life*. New York: Anchor Books.

15. Hancock, J.T., Toma, C. & Ellison, N. 2007. The truth about lying in online dating sites. *Proc. CHI'07*, 449-452.

16. IJzerman, H. & Semin, G.R. 2009. The thermometer of social relations: Mapping social proximity on temperature. *Psych. Science*, *20*, 1214-1220.

17. Lakoff, G. & Johnson, M. 1980. *Metaphors we live by*. Chicago, IL: University of Chicago Press.

18. Lampe, C., Ellison, N., & Steinfield, C. 2007. A familiar face(book): profile elements as signals in an online social network. *Proc. CHI'07*, 435-444.

19. Landers, R.N. & Lounsbury, J.W. 2006. An investigation of Big Five and narrow personality traits in relation to Internet usage. *Comp. in Human Beh., 22*, 283-293.

20. Mark, G. & Semaan, B. 2009. Expanding a country's borders during war: the Internet war diary. *Proc. IWIC'09*, 3-12.

21. McKenna, K.Y.A., Green, A.S. & Gleason, M.E.J. (2002). Relationship formation on the Internet: What's the big attraction? *J. of Soc. Issues*, *58*, 9-31.

22. McLeod, P.L. & Leshed, G. 2011. As long as they don't know where I live: information disclosure strategies for managing identity in Second Life. To appear in A. Peachy & M. Childs (Eds.). *Reinventing Ourselves: Contemporary Concepts of Identity in Virtual Worlds*. New York, NY: Springer.

23. Meredith, A., Griffiths, M. & Whitty, M. 2008. Identity in massively multiplayer online games: a qualitative pilot study. *Proc. iiWAS'08*, 543-546.

24. Meyer, I., Zaluski, V. & Mackintosh, K. 1997. Metaphorical Internet terms: A conceptual and structural analysis. *Terminology*, *4*, 1-33.

25. Nach, H. & Lejeune, A. 2010. Coping with information technology challenges to identity: A theoretical framework. *Comp. in Human Beh.*, *26*, 618-629.

26. Nardi, B. & Harris, J. 2006. Strangers and friends: collaborative play in World of Warcraft. *Proc. CSCW'06*, 149-158.

27. Oulasvirta, A., Lehtonen, E., Kurvinen, E. & Raento, M. 2010. Making the ordinary visible in microblogs, *Pers. and Ubi. Comp., 14*, 237-249.

28. Pace, T., Bardzell, S. & Bardzell, J. 2010. The rogue in the lovely black dress: intimacy in World of Warcraft. *Proc. CHI'10*, 233-242.

29. Palmquist, R.A. 1996. The search for an Internet metaphor: A comparison of literatures. *ASIS Annual Conference Proceedings*.

30. Roccas, S. & Brewer, M.B. 2002. Social identity complexity. *Pers. and Soc. Psych. Review, 6*(2), 88-106.

31. Sas, C., Dix, A., Hart, J. & Su, R. 2009. Dramaturgical capitalization of positive emotions: the answer for Facebook success? *Proc. BCS-HCI'09*, 120-129.

32. Silfverberg, S., Liikkanen, L.A. & Lampinen, A. 2011. "I'll press play, but I won't listen": profile work in a music-focused social network service. *Proc. CSCW'11*, 207-216.

33. Stryker S., & Burke, P.J. 2000. The past, present, and future of an identity theory. *Soc. Psych. Quart., 63*(4), 284-297.

34. Tajfel, H. 1982. Social psychology of intergroup relations. *Ann. Review of Psych., 33*, 1-39.

35. Takatalo, J., Nyman, G. & Laaksonen, L. 2008. Components of human experience in virtual environments. *Comp. in Human Beh.*, *24*, 1-15.

36. Thatcher, A., Wretschko, G. & Fridjhon, P. 2008. Online flow experiences, problematic Internet use and Internet procrastination. *Comp. in Human Beh.*, *24*, 2236-2254.

37. Tosun, L.P. & Lajunen, T. 2010. Does Internet use reflect your personality? Relationship between Eysenck's personality dimensions and Internet use. *Comp. in Human Beh.*, *26*, 162-167.

38. Turkle, S. 1995. *Life on the screen: Identity in the age of the Internet*. New York, NY: Simon & Schuster.

39. VanLear, A.C., Sheehan, M., Withers, L.A. & Walker, R.A. 2005. AA online: the enactment of supportive Computer Mediated Communication. *Western J. of Comm., 69*(1), 5-26.

40. Webster, J., Trevino, L.K. & Ryan, L. 1993. The dimensionality and correlates of flow in human-computer interactions. *Comp. in Human Beh.*, *9*, 411-426.

41. Weller, H.G. & Hartson, H.R. 1992. Metaphors for the nature of human-computer interaction in an empowering environment: Interaction style influences the manner of human accomplishment. *Comp. in Human Beh.*, *8*, 313-333.

42. Yee, N., Ducheneaut, N., Nelson, L. & Likarish, P. 2011. Introverted elves & conscientious gnomes: the expression of personality in World of Warcraft. *Proc. CHI'11*, 753-762.