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Virtual strategic positioning to create social presence: reporting on the use of a telepresence robot

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This qualitative cross-disciplinary research examined to what degree social presence was achieved through the use of a telepresence robot by one of the authors, in her capacity as a keynote speaker at an international research symposium. We explored if and how social presence was a factor in her ability to strategically position herself as a notable researcher whilst in 'telepresence mode', with the aim of understanding whether one could exercise the same degree of agency in telepresence mode as compared to appearing in person. We were also interested to know how those attending the symposium experienced having a tele-present delegate in their midst. The research used an analytic framework based on Hassenzahl's (2014) ideas of "experience design" and his description of the "user experience" and evaluated the tele-present person's ability to strategically position in a virtual environment by applying the analytical lens of Positioning Theory (Harré & van Langenhove, 1999). Findings indicated it is possible to establish a high degree of social presence whilst in telepresence mode. This relates to both the telepresence robot product and the phenomenon of telepresence as experienced by the user and symposium attendees. However, while the user was able to position herself successfully all indicators were that social competencies also played a significant role in her being able to interact in telepresence mode. Attending international conferences using telepresence robots is potentially attractive for economic and time-saving reasons, but little is understood about how delegates experience telepresence and whether conference attendance

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objectives can be achieved. We demonstrate how social presence is achieved both through the capabilities of the telepresence robot, but also through a combination of the amount of symbolic capital possessed by the user and the user's social competencies. This has implications for decision-making in terms of who is likely to be able to successfully operate in tele-present mode at such events.

Keywords: positioning theory; social presence; strategic positioning; telepresence

INTRODUCTION

Some readers may have seen the Big Bang Theory episode where the character, Sheldon, decides he is too valuable to the world to risk having his physical self-exposed to any danger, so will only appear as a virtual presence in the world – as a 'Double Tele-presence Robot'. When a knee injury grounded Author One from flying for six months, and travel by sea was impractical and expensive, this robot-Sheldon came to mind as a way of being able to fulfil an invitation to travel from Australia to Belgium to give a keynote address at an international research symposium, in a virtual capacity.

Telepresence describes "a recent collection of high-end technologies that seek to provide dispersed team members with the experience of being assembled in the same physical space" (Skopp, Workman, Adler & Gahm, 2015). Applying the work of Teubner, Adam, Camacho and Hassanein (2014), where they explored the relationship between the construction of social presence and trust in online environments, it was thought that having the telepresence robot would increase the degree of social presence (e.g. Fulk, Steinfield, Schmitz and Power, 1987; Lim, Hwang, Kim, and Biocca, 2015) Author One (The User) would have at the symposium. It was further envisaged that such an increase in social presence would result in the building of rapport and trust, and thereby facilitate opportunities for ongoing collaboration and exchange with symposium attendees.

Although the definition of a robot is a contested issue, Robertson (2014, p. 574), drawing on the work of Beer, Fisk and Rogers (2014), defines a robot as "an aggregation of different technologies—sensors, software, telecommunication tools, actuators, motors, and batteries—that make it capable of interacting with its environment with some human supervision, through tele-operation, or even completely autonomously. The different levels of robot autonomy influence the way that humans and robots interact with one another". The

‘Double Telepresence Robot’ (DTR) used in this study consists of an Apple iPad on a mobile self-balancing base, that uses “a combination of information from a gyroscope and an accelerometer to maintain its balance while moving” (Grand Valley State University, N.D.). Using a Wi-Fi connection and Bluetooth that connects to the iPad’s audio and video functions, the robot “provides a human operator with social presence in a remote environment as would a telecommunication system, such as a telephone or videoconferencing system, while also providing independent mobility through teleoperation of the robot” (Tsui & Yanco, 2013, p. 227). A telepresence robot thus enables users to exercise a degree of agency in a remotely located place by allowing the user to not only be ‘present’ via a video call, they also have the mobility to be more actively involved in social episodes.

This paper reports on the experiences of the telepresence robot user (Author One/User), the remote site robot manager (Author Two/Remote Manager), and the academics who attended the research symposium. Firstly, through sharing these experiences the authors aim to further understanding of the advantages and disadvantages of using telepresence robots and thus contribute to the emerging literature on this subject. Secondly the authors, being from communication, information technology and social science disciplines respectively, all have an interest in examining the phenomenon of “social presence” and how this relates to interpersonal and strategic positioning in technology-mediated environments. Thirdly, Bourdieu’s symbolic capital ideas are used to theorise the lived experience of social presence via the cue of a telepresence robot. This work contributes to the academic knowledge relating to social presence and digital persona, whilst also extending “positioning theory” (Harre & van Langenhove, 1999) to consider positioning in virtual environments.

Specifically, the paper applied an analytical framework based on Hassenzahl’s (2014, n.p.) ideas of “experience design” and his description of the “user experience” to address the research questions. Hassenzahl (2014) developed a model that incorporated questions of “why, what and how” that was then overlaid with the two social constructs of “experience” and “product”. In Hassenzahl’s model, he has “experience” associated with the “why”; a combination of “experience” and “product” associated with what; and the construct of “product” associated with “how”. The analytical framework was also influenced by Tsui et al.’s (2015) subsequent application of Hassenzahl’s work, particularly in defining “why, what and how” clearly for the purposes of this project. As such, our analytical framework had three dimensions:

- Dimension 1 Why: Examined the motivation to use the social telepresence robot.

- Dimension 2 What: Examined the function(s) that people can do with the device
- Dimension 3 How: Determined how the design of the device and its interface was used and experienced

Each dimension was examined using data collected from three sources. Firstly, an autoethnographic discussion between the DTR user (Author One) and the remote site robot manager (Author Two); secondly data from qualitative interviews; and, thirdly a short non-representative survey of six academics who attended the research symposium (total attendees n=20). The following research questions are addressed in this paper:

RQ1 To what degree did the use of a telepresence robot increase the social presence of the user over using an interface such as a Skype presentation?

RQ2 How useful was the application of "positioning theory" (Harre & van Langenhove, 1999) to determine the success of otherwise of strategic positioning in virtual environments?

RQ3 To what degree did the analytic framework based on Hassenzahl's (2014) ideas of "experience design" and his description of the "user experience" as answering three questions: "why, what, and how", overlaid with the social constructs of "experience" and "product", help guide the analysis and reporting of this research?

LITERATURE - THEORETICAL MILEU

Social Presence

Social presence consists of "one's sense of self and one's perspectives of others" (Oztok, Zingaro, Makos, Brett & Hewitt, 2015, p. 20) and can be viewed as "a psychological state in which a user of technology experiences virtual presence of other social actors when receiving a certain social or communication cue" (Lim et al., 2015, p. 160). Edwards, Edwards and Edwards (2015) found in their study that when people knew that they would be interacting with a robot instead of a human conversational partner, their expectations of social presence were significantly lower than for those facing a human partner. This is notable as in this study, participants were alerted to the fact that Author One would be attending the conference by telepresence robot and not in person.

Early research on telepresence was primarily concerned with reproducing movements of the human hand (Minsky, 1980; Strengers, 2015). Research in the domain of human-computer interaction and electronic commerce found that displaying images of human faces played a central role in boosting users' perceived levels of social presence. This is related to two fundamental presence-enabling mechanisms of the human mind. First, social interaction has always been an important factor for survival and overall human success, with the face being the most prominent human feature (Lee, 2004a). Hence, the human face is an important emotional stimulus. Second, the human mind tends to "accept any incoming information as true, unless there is a strong counter-evidence" (Lee, 2004b, p. 497). Teubner et al. (2014) showed that even graphical elements that only resemble facial features—rather than showing actual photos of human faces—can induce higher levels of social presence. The idea of the human face in aiding the creation of a high degree of social presence was also highlighted in their work on online avatars. These researchers referred to the 1987 definition of social presence by Fulk et al. namely, "social presence can be defined as the extent to which a user experiences other users as being psychologically present" (Teubner et al., 2014, n.p.) and their study found the closer the avatar resembled a real human face, the more social presence and trust was generated.

One of the central arguments relating to the use of telepresence robots and the construction of social presence is whether social presence should be conceived of and measured as a property of a medium, or a phenomenal state of the users. For example, Beer, Fisk and Rogers (2014, p. 91) state, "'successful social interaction' may be assessed by the quality of remote presence (the feeling of the operator actually being present in the robot's remote location". Others argue that proper measures of 'social effectiveness' may be dictated by the quality of the system's video and audio input/output, as well as communication capabilities, such as lag time or delay, jitter, or bandwidth (for example see Steinfeld et al., 2006). In the main, however, people are far less critical of telepresence technologies when compared to teleconferencing and videoconferencing (Strengers, 2015). Strengers (2015, p. 594) argues this is because the human face is of "critical importance" and "the foundation for telecommunication technologies such as telepresence, which focuses on creating lifelike, omnipresent and high definition digital replicas of people's faces". This focus on the face informed the selection of the Double Telepresence Robot (DTR) which also has controls for mobility and height adjustments, allowing participants to match eye levels during physical co-presence. Such 'presence' has been shown to encourage feelings of "intimacy and trust, as

well as insincerity and fear, power and control' (Urry, 2004, p. 29); factors also considered important in the context of a study based around a research symposium.

All of these results can be traced back to the way the human mind actually processes human faces, namely through a brain region referred to as fusiform face area (Kanwisher, McDermott, & Chun, 1997; Tong, Nakayama, Moscovitch, Weinrib & Kanwisher, 2000). This area is activated when humans see faces, photographs of faces (Kanwisher et al., 1997), and even graphical elements that resemble key features of human faces such as cartoons (Tong et al., 2000). For instance, Hassanein and Head (2007) have shown that simply by displaying images of human faces on an online shopping website, users perceived higher levels of social presence and found the website trustworthy. Hence, anything that looks like a face, is also processed as a face, whether it appears in the physical world or on a computer screen, and if there is a face, other human beings have to be psychologically present. This, ultimately, was the desired effect being sought by Author One at the symposium.

Positioning theory and the concept of virtual strategic positioning

Positioning theory has as its main purpose the examination of how rights and duties a) to say and do certain things, and b) to refrain from saying and doing certain things, are distributed among a group of people through discourse moment by moment (Harré, 2013). In positioning theory, the term 'position' refers to "the momentary clusters of rights and duties to speak and act in a certain way" (Van Langenhove, 2011, p. 67). In combination with the speech acts and the storylines of a conversation, the positions form a mutually influencing triangle. 'Positions' in this context are characterised by the adoption of several theoretical devices by which a person and other speakers are presented as standing in various kinds of relations to each other. The positions are thus the parts being performed by the participants. Positions and the accompanying permissible repertoires of acts are linked to the storylines. The actions (including speech) of the participants are given meaning by the storyline and the positioning of those involved. Being positioned in a certain way carries obligations or expectations about how to behave. Positions may also carry rights, such as the right to intervene or to speak. As such, Positioning Theory opens perspectives for detailed analyses of discourses and it is now widely used as an analytical tool to study all kinds of social situations, including that of appearing in telepresent mode.

Even so, until this paper, positioning theory has not addressed how rights and duties are attributed to individuals who are telepresent in a social interaction through a robot

interface, or indeed via 'virtual positioning'. People who take part in a conversation via a robot interface using telepresence might find themselves in a double position: on the one hand, they take a position as a person with the rights and duties that come with that, but on the other hand they might also be positioned as a 'robot' to which perhaps other rights and duties apply. Part of that duality might be reflected in the physical positions the robot interfaces takes in the room, another part might be related to how the participants in the room will engage with the person or on some occasions ignore her. In other words, there might be instances in which the interface is treated as if it is a person, in other instances it might be treated as a machine without personhood properties.

RESEARCH APPROACH

The Double Telepresence Robot (DTR) was sent to and from the symposium in Bruges, Belgium, from Australia by air courier at an equivalent cost (with insurance) to an economy class airfare for a person. The research participants were those people physically attending the inaugural Positioning Theory Symposium held July 2015 on the premises of the United Nations University – Centre for Regional Integration Studies (UNU-CRIS), Belgium (n= 19), and one telepresence robot remote attendee based in Australia (n=1). The overall approach was influenced by the work of Tsui et al. (2015) who investigated the operation of telepresence robots in providing opportunities for people with special needs to participate in remote activities with friends and families.

Data was collected from three sources and analysed using qualitative methods of thematic and positioning analysis informed by the analytical framework (Hassenzahl, 2014; Tsui, Dalphond, Brooks, Medvedev, McCann, Allspaw, Kontak & Yanco, 2015). The first data source was autoethnographic reflective discussion (James, 2012; Sparkes, 2000) between two of the authors; one who had attended the conference in physical form (and had performed the role of DTR Remote Manager – Author 2), and the other who had attended in telepresent mode using the DTR interface from Australia ('the User' – Author 1). Their discussion was recorded and professionally transcribed for analysis purposes. The second data source was via semi-structured interviews (Robson, 2011) conducted by Author 2 on-site in Belgium during and immediately after the symposium (n=9). In line with the qualitative approach, the researchers have used "thick description", which, according to Ponterotto (2006, p. 542):

> Accurately describes observed social actions and assigns purpose and intentionality to these actions, by way of the researcher's understanding and clear description of the context under which the social actions took place. Thick description captures the thoughts and feelings of participants as well as the often complex web of relationships among them.

Excerpts of the transcripts of interviews and discussions is provided so that readers can view insights into the "a psychological state in which a user of technology experiences virtual presence of other social actors when receiving a certain social or communication cue" (Lim, Hwang, Kim, & Biocca, 2015, p. 160). Of course such findings cannot be extrapolated to larger populations, but they can inform future research in terms of survey questionnaire and interview schedule design.

The third data source was a small non-representative survey component introduced by way of a post-symposium online survey of participants. The survey was hosted on the Survey Monkey platform and the link to the survey was emailed to all symposium participants within one week of the symposium finishing. In total 19 emails were sent and eight responses were received (42% response rate). The respondents to the survey were not identifiable as the response contained no identifying data. The survey sought to identify if any positive or negative elements emerged that were not captured in the interviews. The survey questionnaire was adapted for this exploratory study from that developed by Jaafar, Darmawan, and Mohamed Ariffin (2014), as it aligned with the theoretical framework dimensions of why, what and how. It included questions on factors relating to the use of, and experience with, the DTR such as perceived usefulness; perceived ease of use; perceived risk; attitude; and behaviour intention.

FINDINGS AND ANALYSIS

Dimension 1: Why use a telepresence robot?

The 'why' dimension explores the motivation to use the social telepresence robot. (Hassenzahl, 2014; Tsui et al., 2015).

Autoethnographic discussion findings relating to 'why'

Essentially the 'why' behind the project was to enable Author One to participate in the international research symposium and participate in social interactions with colleagues and

potential research collaborators as if she was there in person and, especially, to deliver her keynote presentation. Related to the social construct of "experience" (Hassenzahl, 2014), the User (Author One) reported that the aim in using the DTR had been met:

> *"I still was surprised by how much I got out of the experience in spite of having the robot. It was better than not going, it was better than being on Skype. The fact that I could sit and listen to all the other presentations, which I did, and ask questions in the breaks and all, was great"* – User.

The User further reported that the underlying motivation for attending was related to the desire to shore up her position as an emergent leading scholar in the field of 'positioning theory'. As a positioning theory scholar invited to deliver a keynote address, Author One stated she felt she had the right to attend in the most 'present' form possible, but she also felt a duty, as a member of the organising and scientific committees for the symposium, to be available for discussion, to attend as many presentations as possible, and contribute as much as she could.

> *"It's interesting to think about what would have happened had the symposium attendees all decided that they didn't want the robot in the room. Or even if they had of insisted it be turned off apart from my presentation. If someone had not trusted the robot for some reason, or taken a dislike to it, that would have completely derailed what I was trying to do"* – User.

This indicates that the rights and duties associated with the User's desired positioning were still negotiated as they would have been if she had been physically in the room. However, this was mediated by factors such as the robot's physical presence in the room. This can be seen to relate to the social construct of "product" (Hassenzahl, 2014). The User's ability to construct an active digital persona of herself that could exercise a high degree of agency in the virtual environment, that was likeable and professional, and that could also put people at ease whilst achieving her desired personal and professional positioning, seemed a key factor in ensuring success. This was, in essence, her ability to construct social presence. In addition, the User's high level of social capital (Bourdieu, 1991) at the symposium would have directly impacted the ability to achieve success/social presence. However, the User's experience also shows that in establishing such social presence in telepresent mode was a synthesis of the social constructs of "experience" and "product" (Hassenzahl, 2014).

The Remote Manager (Author Two) reported that she thought the exercise was successful in achieving the aims of the User, and that the desired social presence had been co-constructed by the User and the symposium attendees:

> *"…Even though you were a robot in the room, people talked about you as if you were there. If I'd taken the robot out of the room, people would have said, where's [User's name], because you were part of the conference. You were as much a part of the conference as anyone else because you had a physical thing there, representing you. People said it would have been great had you been able to see hand actions. See that's part of the action… So, people in the morning would say, is [User's name] with us? And people were disappointed when the robot didn't work properly at times."* – Remote Manager

These statements suggest that the approach of using the DTR has achieved, from the User and Remote Manager's perspective, Author One's goal of making participants at the symposium feel like she was socially present or 'actually there'. The Remote Manager's reflection however also reiterated that there was a synthesis of the social constructs of "experience" and "product" (Hassenzahl, 2014) within the "Why" dimension.

Interview findings related to 'why'

The 'why' question relates to the User's motivation to use the robot but also the remote attendees at the symposium and their motivation to interact with the robot. As stated above, a few participants expressed disappointment that [User's name] was not physically present and felt that the experience was less than optimal. One participant stated it was better than "missing out" (Respondent 5) altogether but that it was still 'missing out':

> *"There's something about being able to not just talk to people face to face but being able to wander the streets of Bruges and have a beer on a street corner right? Or bump into people at breakfast like we did this morning and have those kind of serendipitous conversations that I actually continue to mull over the rest of the morning. That's the kind of thing I think virtual appearances lack… when the technology was good enough I think you can have almost the same kind of interaction from talking to one another. But those serendipitous interactions they happen by chance right? So we can't plan them through technology and I don't know that you can drink beer yet, over Wifi"* – Respondent 5.

This is notable as the participant felt both the User and the participants were missing out on those serendipitous and 'aside moments' of the symposium. Most telepresence robots cannot readily navigate stairs or cobblestone streets and many regions do not have the blanket high quality Wi-Fi that telepresence robots require if they are to be navigated outside of specified area like a conference room. Notably Respondent 5's response was related primarily to the construct of "experience" whereas the majority of other responses were more focused towards "the product", that is, the DTR.

Respondent 1 reported that they thought it was "a wonderful solution to the problem of [User's name] not being able to come". The respondent stated further:

> *"I'm not sure if I hadn't been able to come whether you would've wanted to spend the money to get the robot but the fact the it was such a high profile person in terms of the symposium. I think it was money very well spent"* – Respondent 1.

This was interesting in that the expenditure was seen as justifiable in terms of the perceived status or value of the participant. It also raises questions, which were not canvassed in this study, related to whether the reception of one's participation via DTR is mediated by issues of status or perceived attendance value. For example, if a PhD student had sent herself/himself to the symposium using a robot would this have been permitted at the arrangement stage or welcomed at the execution stage?

Respondent 1 commented on the convenience of the DTR stating that she could see a future when telepresence robots would be available at conference venues and people could use them to attend virtually instead of having to send a robot somewhere at considerable expense, suggesting, "perhaps all universities could have 3 or 4 of them that people could use".

In response to being asked if attendees would use a telepresence robot if in a situation where they were unable to physically attend a conference or symposium there were a variety of responses. Respondent 2 stated, "I imagine so" but moderated that comment with "the need to ensure that excellent Wi-Fi was available to ensure the robot worked properly". Others stated:

> *"Maybe if I could be sure the technology was working okay and also I mean you've [the Remote Manager] been there for her to make things function. But I could imagine three robots in the room and three persons running around like you did in order to make everything work right so it could get disruptive"* – Respondent 6.

> *"I'd rather be physical. It wouldn't be my first choice"* – Respondent 1.

> *"Probably not. Maybe more if an event was organised in a way that everyone appears as a robot, like you're all the same. Like you're all in the virtual space, at a virtual conference"* – Respondent 3.

These findings were consistent with the survey findings below.

Survey findings

The survey findings asked about motivation and intention to use a telepresence device like a DTR if unable to attend an academic conference or event, using the behavioural questions as adapted from the work of Jafar et al. (2015).

Table 1: Survey findings related to 'why'.

Questions asked	Agree	Neither agree nor disagree	Disagree
I predict that I would communicate using a DTR if I could not physically attend an academic conference or event. (n=8)	50% (n=4)	37.5% (n=3)	12.5% (n=1)
I intend to communicate using a DTR if I could not physically attend an academic conference or event. (n=8)	37.5% (n=3)	25% (n=2)	37.5% (n=3)
I am likely to communicate using a DTR if I could not physically attend an academic conference or event. (n=8)	25% (n=2)	37.5% (n=3)	37.5% (n=3)
I am certain that I will communicate using a DTR when I cannot physically attend an academic conference or event. (n=7)	14.3% (n=1)	14.3% (n=1)	71.4% (n=5)

It can be seen that the general idea of perhaps using a DTR if the respondents could not attend physically was viewed in a generally positive light, however when the questions became more focused on certainty of use only one respondent indicated agreement with the statement, "I am certain that I will communicate using a DTR when I cannot physically attend an academic conference or event". Indeed, 5 out of 7 respondents disagreed with this statement. This result does not shed any light on whether it was usability, costs involved, sense of self-importance, or something else, but it suggests that respondents felt apprehensive about adopting such technology, even though the use of the DTR had stimulated consideration and curiosity.

Dimension 2: What can people do with a telepresence robot?

'What' lists the function(s) that people can do with the device (Hassenzahl, 2014; Tsui et al., 2015)

Autoethnographic discussion findings relating to 'what'

There was a technical issue associated with the smooth running of the DTR that posed some challenges for the User and the Remote Manager on the afternoon of the first day and the morning of the third day. The Wi-Fi signal at these times was not sufficiently strong as to

facilitate the full functionality of the DTR by the User. This impacted the audio functionality so that the User could not hear onsite in the Belgian venue, nor could the Belgian attendees hear the User. In spite of the sub-optimal Wi-Fi, the DTR controls for mobility and height adjustments mostly worked throughout, as did the visuals. Symposium delegates in Belgium could see the face of the User on screen and vice versa. The User reported feeling frustrated and disappointed at the initial lack of full functionality:

> *"It was extremely frustrating on the first day when the technology didn't work because I think we saw the potential of how good it could have been"* – User.

However the Remote Manager devised a 'work-around' solution and used the Facebook Messenger call function on her mobile phone, which was picking up the available Wi-Fi signal, to call the User in Australia. By placing the onsite mobile phone on 'speaker' an audio line of communication was opened that enabled sound to be communicated. It was clear that all people's "experiences" were being impacted by the "product" (Hassenzahl, 2014). On the second day, the Wi-Fi was augmented by the symposium technical staff in Belgium and the DTR worked throughout the day with full functionality. On the third and final day (only a half-day), the audio signal again dropped out. The same Facebook workaround was instigated but this time not without issues, including some uncertainty about appropriate 'etiquette' when using a telepresence robot as noted by the User:

> *"When the final keynote speaker was on and I tried to connect to you using the Facebook Messenger call and your mobile phone rang… I mean all those things that I would never do in a million years if I'd been in the room. I mean if my phone went off in the middle of someone's presentation I'd be mortified. When I dialled you to get the sound back and your phone went off it looked like it was your fault, that you hadn't turned off your phone. I didn't realise it would do that. Also, I'd put myself [as the robot] close to the final speaker so I could hear via the phone but then I realised he was being filmed and that I'd be in shot. I was unsure whether I should move away but then I thought of my face detracting from his presentation when being watched on YouTube and I moved myself away. It was so hard to read the situation via the robot"* – User.

The Remote Manager reported that this hadn't been an issue in the actual room:

> *"It didn't worry me, it wasn't that sort of a conference. I knew the presenter wouldn't mind. Even had he minded I would have apologised afterwards. He was very nice, that's the thing, I'd met him. Once you meet someone it's different. With the robot there's no real, kind of face-to-face interaction, of a real person with another real person. It's not just the speech acts, it's the actions, the body language…all of those things. We read all those signs when we interact with people and unfortunately that's harder to do with a robot"* – Remote Manager.

Both the User and Remote Manager expressed that they had given the telepresence robot a rigorous testing:

> "*It wasn't as if we were just doing it from across a city or interstate, we did it from one side of the world to the other*" – Remote Manager.

These findings suggest that the functionality of the robot device was a point of concern for the User and she was limited in her capacity to address the concerns due to her being unable to have reliable control and tacit knowledge of either her digital/virtual persona or the robot device in the symposium room. The Remote Manager however, reported little concern of anxiety on behalf of her own actions related to the robot or the functionality of the robot at the symposium. This may relate to the Remote Manager being physically on site with the robot and being able to 'read the room' and interpret verbal and behavioural cues from her fellow participants. She was able to more ably negotiate the positioning of herself and the DTR User moment-by-moment and thus was able to position herself effectively throughout the symposium event. The User obviously was limited in these attributes when using the robot, that is the "product", and such limitations would need to be factored into any future use of the robot if the "experience" was to be optimal.

Interview findings relating to 'what'

As 'What' lists the function(s) that people can do with the device (Hassenzahl, 2014; Tsui et al., 2015), it is perhaps unsurprising that the positive and negative issues around Author One actually using the robot and its functions were the strongest themes that emerged under this category. One attendee commented that when they received the email advising that Author One would be attending using a Double Telepresence Robot they were "actually looking forward to it".

> *"I was curious because I had read some pieces where people had done this kind of type of thing. There's an article in Popular Science, where one of the editors did this and tested several different models so I was curious to see how it would work here. The impact of Wi-Fi quality, the movement, the high level of engagement achieved was all really good"* – Respondent 5.

> *"Wasn't the ideal but at least she was there. And I think we were prepared because she had written an email and said that she was doing the robot and we all wondered 'what, how will it look' and so on."* – Respondent 6.

Respondent 1 reported that they didn't mind when the Remote Manager had to get up and move around the room to attend to the robot when the Wi-Fi signal was insufficiently strong to enable the user to move around as she wanted to.

> *"It didn't worry me any more than people having to get up to get a drink or go to the bathroom…Perhaps if it had been 200 people in a lecture theatre or something like that it might have been that but the fact it was an informal gathering"* - Respondent 1.

For some it was the fact that the robot could move around autonomously that made it stand out from other means of remote presentation like Skype.

> *"That fact that she [the User] could go up to people herself was really good. It was much like addressing a real person. Skype is okay but the quality of the Skype picture isn't always that good and the robot's picture was very good"* - Respondent 2.

> *"Well it works pretty well and the fact that the robot can turn around and actually face you is something totally different that using Skype. You couldn't do the same to Skype where you have one screen that is static and here you have the robot traveling across the room, turn around. That makes a huge difference to the level of interaction. At one point I noticed the robot was standing, sitting, whatever, next to me. (Name removed) was talking and Author One just turned her head, well her virtual head, and looked at me and we understood that it was a funny thing. It was quite amazing actually."* - Respondent 4.

These responses are consistent with the findings of Strenger (2015), that is, that people are far less critical of telepresence technologies when compared to teleconferencing and videoconferencing. Respondent 4 also commented that they saw a big difference in attending a conference in robot form to sitting in one's remote office just following a webstream of a conference from afar:

> *"For a couple of years now there is a trend at conferences and things like that, that you can tune in. My feelings are always if people stay at the office and just passively follow a conference they won't do the effort. There are so many other things to do. If you can be there virtually and be recognised as one of the participants of course I think it makes a difference"* - Respondent 4

The Remote User asked Respondent 4 if it related to the fact that the User had some agency, because she could control the robot. The answer was a definite "yes":

> *"Because of the small amount of autonomy she could actually go to somewhere in the room and say 'Hey lets have a private conversation'. I mean I noticed yesterday that she had chat with (Name removed). Which again through Skype and stuff like that it wouldn't be possible"* - Respondent 4

The technology being seen by attendees as "not working right" was prominent in responses. Few people made the distinction between the functionality capabilities of the robot and those being dependent on the quality of the Wi-Fi. They just saw that the robot was 'not working properly'. For example,

> *"I think it was much better than had she not been there at all but I noticed it was quite difficult, with the technical challenges. So I didn't see very much interaction and I didn't feel comfortable to go and say hello and try to interact so it was difficult. Maybe also because it's a quite new situation"* – Respondent 6.

The attendees who did realise issues were with the Wi-Fi rather than the DTR were accommodating of the Remote Manager's efforts to keep Author One's involvement to an optimal level. These findings indicate that attendees were focusing on both constructs of "experience" and "product", with the product aspect issues such as poor Wi-Fi connection impacting on experience related issues.

Survey findings relating to 'what'

These questions pertained to perceived ease of use (Jaafar et al., 2014) which relates to the DTR's function(s) and what people can do with the device (Hassenzahl, 2014; Tsui et al., 2015).

Table 2: Survey findings related to 'what'.

Questions asked	**Agree**	**Neither agree nor disagree**	**Disagree**
My interaction with The User through the (Double Telepresence Robot) DTR was clear and understandable. (n=8)	62.5% (n=5)	37.5% (n=3)	0%
I found communicating with The User through the DTR was easy. (n=8)	50% (n=4)	25% (n=2)	25% (n=2)
Interacting with The User through the DTR did not require a great deal of my effort. (n=8)	75% (n=6)	12.5% (n=1)	12.5% (n=1)

The survey results broadly supported the interview findings in that only a small percentage of respondents indicated any negativity towards the DTR's perceived ease of use from their perspective. This data gives some indication that the interviews being recorded in Belgium by the Remote Manager were not being unduly influenced by the presence of the interviewer,

that is, these data also show a range of views similarly spread to the views expressed in the interview accounts, and indicate that social presence was being achieved by the User as she intended.

Dimensions 3: How was the telepresence robot used and experienced?

'How' refers to the design of the device and its interface and how this was used and experienced (Hassenzahl, 2014; Tsui et al., 2015).

Autoethnographic discussion findings relating to 'how'

The User reported that she "definitely felt" that she had "a social presence" at the symposium with the key differentiator from 'attending' or 'presenting at' a conference by Skype being the mobility and sense of autonomy and agency experienced through the DTR:

> *"Certainly more [social presence] than when I've presented via Skype at international conferences. I think because I could move around and turn and face people who were speaking and adjust my height if they were sitting down. I felt more 'there' with the robot than I did when being just up on the screen. I think it was because I had that sense of agency, and I could walk around"* – User.

The Remote Manager reported that she felt that due to the fact the virtual attendee was mobile it "made all the difference" and that because of its mobility it made the robot presence seem "person-like". She further reported that it was when the virtual attendee began autonomously moving via the telepresence robot towards physical attendees that people noticeably reacted:

> *"The one thing that really 'freaked' people out was when you start moving. When you're just standing people don't seem to think too much but as soon as you start rolling towards them they go whoa! It's like you're alive"* – Remote Manager.

Both the User and the Remote Manager believed it was the 'human-sized' head image projected by the telepresence robot, and the sense of agency that the mobility controls gave the User, that was the key difference between static methods of virtually attending an event.

> *"I felt the ability to move up and down was important. I felt the ability to be able to come down to be face-to-face at sitting level was important, at least that's how it felt from my end. I'm not sure how important it was at the other end. I was kind of feeling more like I was really there"* – User.

> *"It was different from having someone there for a presentation on Skype. Because had you been on Skype we would have put you on a big screen and your head would*

> *have been blown up. The robot made it all a much more human scale, I think. Because it wasn't blown up it was much clearer. Your head was relatively human-sized"* - Remote Manager.

The Remote Manager further stated that people were really intrigued by the telepresence robot and that she thought it would be an option for academics who were aging or had disabilities. Another keynote speaker at the symposium, who was also the oldest academic attending at age 87 years, was particularly taken with the technology, thinking it was both "cool and novel".

Both the User and the Remote Manager reported that they felt pressure to ensure that the use of the DTR was a success in terms of the coming together of the technology, the ability for the User to deliver her keynote speech and to be able to interact, and, the reputation of their 'home' university and the symposium organisers. The Remote Manager said she "felt quite protective of the robot":

> *"I felt like I almost wanted to look after it and make sure it was all right and that everything was working ok. I was given the responsibility of making sure it was working and I did feel a quite high level of responsibility because I really wanted it to work. Because I wanted you [the User] to be able to participate fully in the conference. Also I wanted for the people there to be able to meet you and hear what you had to say. So it was like a responsibility to both parties – not just to you. I wanted you to be as full as a participant as you could be. Also, the other organisers were very excited about it. They were really keen for you, and other people were really keen, to make it work so I did feel quite a high level of responsibility" –* Remote Manager.

The User expressed experiencing feelings of powerlessness when things with the telepresence robot didn't go right and reported also that she felt uneasy with putting so much responsibility on the Remote Manager to fix things:

> *"It felt, having been recently confined to a wheelchair for nearly a month, it felt a bit like that. One of the things I hated about being in the wheelchair was the dependence I had on others to get something done and also the way people looked at you. You know, isn't she brave to be out of the house (laughs). I felt a bit like that in the robot situation. Yeah powerlessness. Not having that power to fully control the situation. I felt very sorry for the position I was putting you into in terms of having to worry about me."* – User.

However, the Remote Manager reported quite enjoying the experience and did not report the responsibilities as being onerous:

> *"I felt really bossy deciding what you could and can't do but I think that was part of the ownership I felt. I could pick you up and I felt I had the power to do that…It was like I had a child I was looking after. Like come over here this will be best for you. It was like that. I felt like the mother"* – Remote Manager.

Although participants seemed overall satisfied with their experiences with the telepresence robot, the Remote Manager reported that people expressed disappointment that the User couldn't fully participate; for example by going to the conference dinner or to conference drinks:

> *"People felt really sad that you [the User] missed out on that because although they felt you were really there, they really wanted you to be there for the other bits. And it was very inclusive conference, a very nice conference – collegial, supportive of everyone"* – Remote Manager.

These findings indicate how the "product", that is the DTR, was very influential on how telepresence was experienced by the User and also on the degree of social presence she was able to establish.

Interview findings relating to 'how'

The interviewees' responses in the main suggested that the social presence established by the User using the Double Telepresence Robot was significant.

> *"I mean at first you're thinking about the setup and what not but I don't think that when it was working you're not really thinking about Author One as being somewhere else or that it's just a flat screen or whatever. It's personal, you forget that part. I think the issue is the flipping in and out when there was a disconnect on the Wi-Fi. You know, the voice you couldn't hear or if the robot ran into the chairs and got stuck on a corner; like, those things make you aware that obviously if Author One was here she wouldn't be getting stuck on chairs in the corner. So yeah I thought it was interesting. When the technology gets a little better then it would be even more of a presence and it would more like Author One was there"* – Respondent 5.

Respondent 1 indicated that they did not get a sense of Author One as a person through the robot "at all" and reported, "it's the same feeling as when you're Skyping… It's a facade of like a person so it seemed like the Skype thing".

The interview responses also suggested that some people were unsure about the correct protocol or etiquette for interacting with a telepresence robot. Some attendees approached Author One (the User) in DTR form without issue but this was not universal. Respondent 7 said they would have approached the User after her keynote address had she been physically present in the room, stating:

> *"I wouldn't have talked to her if you [the Remote Manager] didn't introduce me… It has to be formalised kind of"* - Respondent 7.

One attendee thought it was evident that Author One was struggling at times, especially in the sense of navigating time, space and protocol:

> *"You see she had no sense of space and time she would say 'Can I ask the question now?' She wouldn't know if someone else had their hand up. When she came really close to us she said, "Am I coming too close?"* - Respondent 2.

Respondent 3 expressed doubt whether anyone would have paid Author One in robot form any attention at all without the Remote Manager being there, especially when the Wi-Fi was interrupting the sound transmission and other functionality. They suggested that "she needed like a sound so that we would know that she wanted to talk to us. Respondent 2 agreed, "it was awkward at times". Respondent 1 gave an example of what could be described as 'an awkward' moment:

> *"I saw at one point she wanted to turn to look at the PowerPoint but it was turning to *Name removed* and he was like pulling a face. She was trying to find the screen but she turned to him instead"* – Respondent 1.

It is unclear from these responses whether it was the robot or the fact it was a keynote speaker using the robot, or a combination of the two that may have been intimidating or created otherwise uncomfortable spaces for some attendees. These responses highlight the duality issue of appearing in telepresent mode, as well as the challenges of positioning oneself as a person and as a robot simultaneously.

Survey findings relating to 'how'

These questions pertained to perceived risk and (Jaafar et al., 2014) which relates to the DTR's function(s) and what people can do with the device (Hassenzahl, 2014; Tsui et al., 2015).

Table 3: Survey findings related to 'how'.

Questions asked	**Agree**	**Neither agree nor disagree**	**Disagree**
PR1 While communicating with The User through the DTR I felt my personal information	0%	25% (n=2)	62.5% (n=5)

or identity was at risk.			
PR2 I felt totally safe communicating about myself to The User through the DTR	75% (n=6)	12.5% (n=1)	12.5% (n=1)
ATT1 To communicate with The User through the DTR was a good idea.	87.5% (n=7)	12.5% (n=1)	0%
ATT2 To communicate with The User through the DTR was ideal.	12.5% (n=1)	50% (n=4)	37.5% (n=3)
ATT3 I liked communicating with The User through the DTR.	25% (n=2)	50% (n=4)	25% (n=2)
ATT4 Communication with The User through the DTR was pleasant.	25% (n=2)	62.5% (n=5)	12.5% (n=1)

Risk did not arise as an issue in interview responses. The range of results relating to whether the communications experience was ideal or pleasant correlates with the tone of the interview responses.

DISCUSSION

The analytical framework that was applied in this research (Hassenzahl 2014, Tsui et al., 2015) incorporated questions of "why, what and how" that was then overlaid by Hassenzahl's two constructs of "experience" and "product".

Dimension 1 Why: Examines the motivation to use the social telepresence robot.

In this project's situation of using a DTR 'in place' of Author One and intentionally trying to create social presence in a remote physical location, success or failure was paramount. For a period of time at the symposium it can be seen that the DTR's functionality and Author One's intentional agency were integrated to a high degree. The robot, of course, had no intentional agency but as the embodiment of Author One in that location, teasing out how agency was being enacted and how the positioning of Author One/robot was being negotiated is challenging.

Undertaking a qualitative positioning analysis (James, 2014) indicated that the desired positioning of Author One/The User at the symposium was mostly achieved by being telepresent (rather than just presenting by Skype). The User, by her actions and discourses (speech acts/actions) enacted through the telepresent robot, effectively established presence at the symposium. This meant that symposium attendees paid attention to her keynote address and, in the main, interacted freely with her as if she had been physically present. That is, attendees afforded Author One the right to speak and act as a full delegate. This resulted in

the building of rapport and trust, and facilitated opportunities for ongoing collaboration and exchange with symposium attendees.

It is also acknowledged that the attributes/qualities of Author One could have impacted how attendees responded to the DTR. As stated by Lallee et al. (2015, p. 139), "an agent must show social competences to be able to interact with humans in a meaningful way". What if the DTR User, or indeed the Remote Manager, had limited social skills or was shy 'in real life'? Would this have impacted their acceptance by attendees at the symposium? As was raised by an interview respondent, to what degree does the status and position of the User of a telepresence robot impact on its reception? It appears that the symbolic capital (Bourdieu, 1991) that one possesses 'in real life' is transferrable when one is attending in telepresent mode, however to what degree this occurs requires further research.

This also relates to 'positioning theory' in that central to the telepresence robot, is the right to position in certain ways and this is jointly determined by the User and those in the remote setting. The User claimed the right to be telepresent in the room and the attendees afforded her this right. The attendees, if they found the DTR/Author One to be disruptive or unpleasant or risky, may have denied the right to Author One's DTR and switched 'her' off.

Dimension 2 What: Examines the function(s) that people can do with the device

Clearly, and as our research suggests, the DTR was unable to reproduce "sensorial competency enabled through the physical co-presence of the body, such as the smells, sounds and tactile feel of a live brain, a new dress or an operatic song" (Strengers, 2015, p. 606). However, the ability to convey "the same meanings of respect and rapport" (Strengers, 2015, p. 606) as being 'face-to-face' was evident in some instances. This relates to the idea of social presence and although the same meanings may not have been achieved than would have been achieved in person to person interactions, the interview accounts and the survey results indicate substantial levels of achievement.

All indicators further show that the User must enact social competences to be able to interact through the telepresence robot with humans in a remote location in a meaningful way. Skopp et al. (2015), in proposing a theoretical model for distance collaboration modalities, discussed how in general, the more complex problem solving and meaning sharing is, the more important it is for technology to incorporate face-to-face type attributes if one wants satisfactory outcomes. However, they also raised that many nuances would also need to be taken into consideration. The research presented in this paper has described

examples of those nuances such as power relationships between attendees; the degree of social/symbolic capital that various parties possess; determining appropriate etiquette associated with being present in telepresent mode; negotiating 'personal space'; and, 'reading' the room in terms of the mood and overall tone.

Dimension 3 How: Determines how the design of the device and its interface was used and experienced

Strengers' (2015) assertion that people are far less critical of telepresence technologies when compared to teleconferencing and videoconferencing holds true in this study. The findings also align with research stating that it is the human face which is critical in creating social presence and trust in digital environments (Teubner et al., 2014), and that the face is "the foundation for telecommunication technologies such as telepresence, which focuses on creating lifelike, omnipresent and high definition digital replicas of people's faces" (Strengers, 2015, p. 594). All findings suggest that as Author One's face appeared to look like a face on the DTR, it was also processed as a face by the symposium attendees.

This project has answered many questions but leaves many others unanswered. What if the robot had of been larger? Smaller? Uglier? A different colour? It is interesting that Double Robotics, the company that produced the DTR, has designed the robot to be 'humanoid' to some extent, that is, the screen where the User's head is displayed is at the top of the robot and this 'head' can move up and down via controls for mobility and height adjustments that make eye-to-eye contact possible. This is in line with the research literature on the importance of the face in constructing social presence, and the importance of allowing participants to match eye levels during physical co-presence. If a less human design had been used, such as having the head appearing at 'thigh-level' and the controls at the top of the robot, it is likely this would this have negatively impacted the ability to create social presence.

CONCLUSION

Our research examined to what degree the use of a Double Telepresence Robot increased the social presence of the user over using an interface such as a Skype presentation. In describing in detail the lived experiences of a telepresence robot user, and those who interacted with the DTP in a way that aligned with the definitions presented of social presence, it seems clear

that a high degree of social presence was established. Although Edwards, Edwards and Edwards (2015) found in their study that when people knew that they would be interacting with a robot instead of a human conversational partner, their expectations of social presence were significantly lower than for those facing a human partner, indications are in this study that, in the same situation, participants' views were quite diverse. The reason for this is unclear and may have related to the fact that Author One, who they were advised would be attending via DTR, was a keynote speaker for the symposium, and was on the organizing and scientific committees for the symposium. Findings suggest that social presence was built to a significantly greater degree than would have been possible using an interface such as Skype at the research symposium. The use of the DTR by Author One resulted in her being able to build rapport and trust with other attendees who were physically present.

We also sought to examine how useful was the application of "positioning theory" (Harre & van Langenhove, 1999) to determine the success or otherwise of strategic positioning in virtual environments. The research showed that using the DTR at the symposium did not result in the right for Author One to position 'as if there in real life', which may not have been a key finding if this theory had not been applied. Author One found herself in the dual position of, on one hand, being in a position as a person at the research symposium attending in 'teleresent mode' with the rights and duties that come with that, and on the other being positioned as a 'robot' and grappling with how and whether other rights and duties applied.

There were instances in which the DTR was treated as if it was a person and other instances where it was treated as a machine without personhood properties. The research findings indicated this duality of positioning was directly related to factors such as the physical locations that the DTR took in the room, and how the participants in the room were engaging with the User through the DTR interface (or even on some occasions ignoring her). To reiterate, in positioning theory the term 'position' refers to "the momentary clusters of rights and duties to speak and act in a certain way" (Van Langenhove, 2011, p. 67). This project's findings showed that the DTR User's position was being dynamically negotiated moment to moment, and was dependent on multiple factors related to both the product attributes of the telepresence robot, and the experiences of the DTR User and symposium attendees. The fact that Author One was physically 12,000km away from attendees seemed to matter little when the DTP functioned fully. This supports the assertion that where there is a face other human beings have 'a duty' to be psychologically present, thus positioning the

person attending in telepresent mode as ‘present’ with the majority of rights that physically present attendees had.

The application of Positioning theory in this context allowed the various kinds of relations of the entities involved to be mapped, and it was the adoption of discourse devices by both the User in ‘telepresent mode’, together with those of the physically present attendees, that enabled social interaction to take place. Discourse devices reported in the data included getting and acknowledging attention with visual cues, verbal tone, being able to use and read body language to some degree such as nodding and facial expressions, and the ability to maintain eye contact. The positions of entities could also be seen as the parts being performed by the participants, with the findings showing that these positions and the ‘permissible repertoires of acts’ were dynamically negotiated throughout the symposium. This strongly indicates that being positioned in a virtual environment carries obligations or expectations about how to behave, including when a person in ‘telepresent mode’ has the right to intervene or to speak.

The final research question in this project related to the degree to which the analytic framework based on Hassenzahl’s (2014) ideas of “experience design” and his description of the “user experience” as answering three questions: “why, what, and how”, overlaid with the social constructs of “experience” and “product”, helped guide the analysis and reporting of this research. Using the user experience structure of asking “why, what, and how” provided a practical way to approach the qualitative data. It must be acknowledged that the use of Hassenzahl’s work by Tsui et al.’s (2015) assisted in us in this project, particularly in terms of defining “why, what and how” for the purposes of analysis. The approach was positive in that it did not focus overly on social presence being conceived of, and measured, as a property of the medium in use; that is the DTR.

The analytic framework also facilitated examining the phenomenal state of the users, an area that is less often the subject of analysis. This was further aided by Hassenzahl’s (2014) social constructs of “experience” and “product” which helped guide the analysis and reporting of this research. However, in Hassenzahl’s (2014) conceptual framework he overlaid the social construct of “experience” solely to the first dimension of “why”; that is ‘why use the telepresence robot?’. In our research, this did not hold in that the goals and motivations to use the DTR were shown to relate to a synthesis of both constructs, namely “product” and “experience”. In the “how” dimension, Hassenzahl’s (2014) conceptual

framework overlaid both social constructs of "experience" and "product", and this was supported by our research findings. In the final dimension, Hassenzahl's (2014) conceptual framework overlaid the social construct of "product" solely to the dimension of "what" and this was not supported by this research project's findings. How the design of the device and its interface was used and experienced were shown to relate to a synthesis of both constructs, namely "product" and "experience". These results suggest that the strict application of Hassenzahl's (2014) model may not be appropriate in similar research, but that the constructs within the model can be useful to frame overall analysis.

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