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FROM TEXT TO GESTURE ONLINE
A microethnographic analysis of nonverbal communication in the Second Life virtual environment

A transition from text-based computer-mediated communication (CMC) to online interaction that includes both textual and nonverbal discourse represents a new development in online communication and a significant challenge to prevailing models for the analysis of CMC. This paper presents results of a six-month-long ethnographic research of nonverbal communication (NVC) in the Second Life (SL) virtual environment. A set of 108 SL locations selected in a non-structured manner provided a wide range of communicative contexts for the analysis of naturally occurring user interaction. The study was focused on the analysis of proxemic and kinesic cues. The results have pointed to a significant difference between user-defined and predefined nonverbal cues, indicating that user-defined NVC has stronger potential to enhance online interaction.

Keywords Computer-mediated communication; virtual environments; nonverbal communication; Second Life; microethnography

Introduction

The lack of nonverbal cues in computer-mediated communication (CMC) has been an important area of investigation since the early days of CMC research, and it continues to be a significant research topic in contemporary studies. With the emergence of internet-based, 3D virtual environments and avatars as users' graphic representations, this research topic becomes increasingly relevant, highlighting a transition from text-based CMC to computer-mediated interaction that includes both textual and nonverbal discourse. This transition represents a new development in online communication, and a significant challenge to prevailing models for the analysis of CMC.

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This study presents results of a six-month-long ethnographic research of nonverbal communication (NVC) in the *Second Life* (SL) multiuser, 3D virtual environment. *Second Life* was introduced in 2003 and currently has more than nine million users (see: http://secondlife.com/). Numerous areas, that is, locations with a distinctive name and SL address, have been created within this environment, with various purposes – from educational, commercial, and/or political, to religious, recreational, and so on.[1] This study was conducted in 108 SL areas, and it involved a microethnographic analysis of nonverbal behavioural patterns observed in naturally occurring user interaction.

This analysis first yielded a categorization of nonverbal acts in SL. Such a categorization was necessary for two reasons. First, nonverbal acts a person performs in a computer-mediated environment inevitably differ from nonverbal acts achievable in a physical setting. However, in 3D virtual environments, a clear distinction between user-generated and computer-generated nonverbal acts has not been made, leading to potential erroneous interpretation of the users' nonverbal behaviour. Furthermore, neglecting a distinction between user-generated and computer-generated nonverbal acts fails to recognize a computer-mediated nonverbal act as fundamentally a new media object – a programmable numerical representation composed of digital code (see Manovich 2001, p. 27) – and the need for attention to design principles involved in the development of such objects. 'As in the case with all cultural representations, new media representations are also inevitably biased', Manovich observes. 'They represent/construct some features of physical reality at the expense of others, one worldview among many, one possible system of categories among numerous others' (ibid., pp. 15–16). New media objects are, thus, intellectual constructs, 'the result of choices and decisions guided by reasoning, sense making, and technical skills [of the object designers]', which influence computer-mediated communication through specific design choices (De Souza 2005, p. 4).

The categorization of computer-mediated nonverbal behaviour that this analysis yielded included four types of nonverbal cues, termed in this study as: Predefined, User-Defined, Blended and Missing cues. In further examination, the identified nonverbal cues have been observed in naturally occurring interaction among the SL users. Results indicate that User-Defined cues serve an important communicative function, analogous to the role of nonverbal cues in face-to-face interaction. Contrary to this, Predefined and Blended nonverbal cues are mostly stereotypical, gender and culture biased representations of nonverbal acts, aimed at simulating nonverbal behavioural patterns and/or processes observed in face-to-face interactions.

In the following, I first review literature on nonverbal communication in physical and virtual settings. I then turn to the methodological framework of this study, followed by the research results and an example analysis. The concluding part of this essay provides a summary of findings of this study.

Nonverbal communication in the physical and virtual settings

The field of nonverbal communication is broad, and encompasses various perceptual stimuli, created by both people and the environment. Nonverbal information can be conveyed through a variety of semiotic systems. As Umberto Eco (1972) points out in his analysis of the architectural sign, 'all aspects of culture are [not] only communicative processes but (a) they can be regarded as communicative processes; (b) they have a cultural function precisely because they are ALSO communicative processes' (p. 97; emphasis in the original). A definition proposed by Adam Kendon is more focused on human interaction. According to this definition, nonverbal communication refers to 'all of the ways in which communication is effected between persons when in each other's presence, by means other than words' (Kendon 1981,p. 3).

Being so diverse, the field of nonverbal communication is commonly differentiated into several code systems. The system of *kinesics* includes nonverbal acts executed by the human body such as gestures, postures and facial expressions. Eye behaviour, although part of the communicative functioning of the body, is sometimes considered a separate category of *oculesics*. *Physical appearance* includes nonverbal cues conveyed through the body endowments such as the body shape and size, skin colour and eye colour, and through the body adornments, such as clothing, makeup, tattooing and the like. The communicative role of touch in human interaction constitutes the code-system of *haptics*. *Proxemics* considers the perception and use of space, and focuses on communicative implications of spatial behaviour in human interaction. *Chronemics* considers the communicative role of time, while *objectics* refers to the communicative use of artefacts. Finally, *vocalics* refers to nonverbal communicative aspects of voice, and it includes elements such as tone, accent and loudness.

The study of nonverbal communication can be traced to the ancient rhetoricians (see Fögen 2001; Fredal 2001; Corbeill 2004); contemporary research on nonverbal communication encompasses a wide range of topics, theories and methods (for review see Kendon 1977; Sergestrale & Molnar 1997; Manusov 2005; Manusov & Patterson 2006).

Nonverbal communication has also been an important area of investigation in internet studies from the early days of CMC research. For instance, in *The Network Nation*, Hiltz and Turoff (1978) introduce some of the most important social and psychological aspects of CMC by highlighting the lack of nonverbal cues in online interaction. In further research, two main lines of thought have been developed with regard to nonverbal communication in text-based CMC. The 'cues-filtered-out' approach posits that the lack of nonverbal cues in CMC results in reduced social presence and in narrowing

of communicative abilities of online interactants (see Kiesler *et al.* 1984), while the social information processing theory argues that '[online] communicators deploy whatever communication system they have at their disposal' so that 'when most nonverbal cues are unavailable ... users adapt their language, style, and other cues to such purposes' (Walther *et al.* 2005, p. 37). Also relevant for understanding of nonverbal communication online is the research on emoticons (see Rivera *et al.* 1996; Walther *et al.* 2001; Riva 2002), as well as the early works of Donna Haraway (1991) and Allucquère Rosanne Stone (2000/1992), which inspired, respectively, a series of studies in 'cyborgology' and the analyses of representation of the human body in virtual environments.

The emergence of multiuser, 3D virtual environments has shifted the researcher's attention to the avatar-based nonverbal expression in CMC. This body of research can be broadly divided into two groups. One group consists of studies in the field of computer science, while the other group involves analyses in the social disciplines. The research in computer science provides useful insights into the process of designing software solutions for nonverbal communication in virtual environments. For example, Guye-Vuilleme *et al.* (1999) describe the procedure of developing an interface for *Virtual Life Network* virtual environment. The authors explain that they designed the predefined nonverbal acts in this environment to make it usable with desktop configuration. However, the authors also stress that a solution that includes predefined nonverbal acts can make interaction in virtual environments unnatural, since 'making the user responsible for handling the normally unconscious actions forces him/her to regularly analyse his/her feelings' (p. 6). Erickson and Kellog (2000) made a similar point. These authors explain that environments which include predefined acts exemplify the mimetic approach to digital systems design, the approach that 'tries to re-represent social cues from the physical world, as literally as possible, in the digital domain' (para. 48). Erickson and Kellogg opt for the abstract design approach, arguing that this approach enables users to employ nonverbal cues without mimicking them.

In the social sciences, several studies address the issue of nonverbal communication in multiuser, 3D virtual environments. Brown and Bell (2004) examined social interaction in *There* virtual environment employing the method of ethnographic observation. The authors found that embodied online presence was beneficial in coordinating users' activities, and that the nonverbal repertoire provided within the environment was often a source of discussion and experimentation among the users. Naper's (2001) analysis of *Patagonia*, a Norwegian virtual world within the *ActiveWorlds* virtual environment, focused on multimodal communication provided within graphic 3D environments, and addressed some of the changes in CMC induced by this multimodality. Talamo and Ligorio (2000) analysed the

construction of identity in *Euroland* – an educational area within *ActiveWorlds*. The authors identified six approaches to self-presentation through the use of avatars, pointing at interesting differences between students' and teachers' choices in creating an avatar representation. Finally, in one of the most recent studies of nonverbal communication in multiuser, 3D virtual environments, Yee *et al.* (2007) analysed the use of interpersonal distance and gaze in dyadic interactions in the *Second Life* virtual environment. The authors found that nonverbal social norms from the physical world are applied in interaction in virtual environments.

Method

The methodological approach employed in this study is based on the framework of virtual ethnography, which holds that understanding of online phenomena should not be based on presupposed, inherent features of technology, but on the analyses of individualized and contextualized online practices (see: Hine 2000, 2005; Dominguez *et al.* 2007). Thus far, virtual ethnography has been employed in the analyses of text-based forms of CMC. Therefore, the framework of virtual ethnography had to be adapted in this study to enable the investigation of nonverbal CMC. To achieve this modification, I used the method of microethnography.

Microethnography analyses naturally occurring communication by exploring 'the ways in which participants display contexts to one another through *embodied actions* such as gesture and postural configurations' (Streeck & Mehus 2005, p. 387; emphasis in the original). A microethnographic analysis focuses on minute elements of nonverbal behaviour, such as gaze and arm movement, observing these elements in regard to social and material surroundings, as well as in relation to co-occurring verbal discourse. As a qualitative method, microethnography is not focused on coding and counting of nonverbal behaviour, but 'seek[s] to understand and explain communicative behaviors through careful and thorough descriptions of their situated occurrence' (Le Baron 2005, p. 505).

In this study, microethnography was employed in the analysis of nonverbal communication in the *Second Life* virtual environment. The duration of in situ research was six months (October 2006–March 2007). The data were gathered in publicly available SL areas. Areas with controlled access had been excluded from the study due to my research decision to assume the role of a complete – non-interacting – and covert observer. A goal to analyse naturally occurring user interaction, uninterrupted by the researcher's presence, guided such a methodological choice. In line with this choice, asking for access privileges to the SL areas with controlled access on the premise of indented group participation would be unethical.[2]

From the set of publicly available SL areas, individual locations were selected for observation in a non-structured manner. Once logged onto *Second Life*, I would click anywhere on the map of SL locations, and teleport (i.e. relocate my avatar) wherever the click would take me. The selection of observational settings was non-structured because this research was not aimed at analysing a specific site, but at examining a specific type of online behaviour. A non-structured selection of observational settings yielded a wide range of communicative contexts – from Virtual Capitol Hill to strip bars, beaches, art galleries, bondage clubs, news agencies, religious sites, and so on.

Throughout the course of the research, I visited 108 publicly available SL areas, observing and recording naturally occurring interaction of approximately one thousand users. This dataset provided ample material for a microethnographic analysis of nonverbal behavioural patterns of the SL users in both dyadic and group interactions. Segments of naturally occurring communication were recorded with the recording system provided within the SL system. To secure the participants' privacy, user names and area identifiers have been removed from the study. To secure consistency with regard to the researcher's presence and the role of the researcher as the instrument of data collection, I used the stable avatar representation throughout the research (i.e. I did not change my avatar's physical appearance, clothing, or any other element), as well as the stable in-world view (i.e. I used the same view mode to observe the environment during each of my research visits).

The recorded data were repeatedly examined by using the Blaze Media Pro® software, in minute detail. Such a technique of data analysis is the core of microethnographic examination, and it is based on the assumption that 'human activities must be studied in a microscopic, movement-by-movement fashion and with attention to the sequential progression of interactional processes within which they take place' (Streeck & Mehus 2005, p. 388). The analysis focused on proxemic and kinesic cues, although other nonverbal code-systems – such as physical appearance, haptics and objectics – were also considered; a need to go outside the main focus stemmed from the fact that nonverbal code systems usually work together in conveying a message. A descriptive analysis of the recorded segments of user interaction was compiled by the author, and it included the following elements: description of the environment; description of the event (if applicable); description of participants (number, gender, physical appearance); and description of the interactional process(s). A focused analysis of the recorded material included the following aspects: functions of nonverbal discourse in the observed interactional event (e.g. structuring interaction, expressing emotion); nonverbal code systems employed (e.g. proxemics, kinesics, objectics), and co-occurrence of verbal and nonverbal discourse.

Results

Based on the analytic procedure described above, this study found that the repertoire of nonverbal communication provided within the current technological framework of Second Life can be divided into four categories of nonverbal cues: (a) user-defined cues; (b) predefined cues; (c) blended cues; and (d) missing cues.

User-defined cues are nonverbal acts that the user deliberately performs and individually encodes. For instance, when a user reduces his or her interpersonal distance from another user, this cue is user-defined; the user deliberately moves his or her avatar in a certain direction, and individually determines the distance and position at which his or her avatar will be placed relative to another user's avatar. User-defined nonverbal behaviour was observed in the use of proxemic cues, such as interpersonal distance and body orientation. The analysis showed that this type of NVC had an important role in: (a) communicating interactional intent; (b) structuring interaction; and (c) sending relational messages. Furthermore, user-defined NVC was closely related to co-occurring textual discourse. This type of nonverbal behaviour was not significantly related to the users' physical appearance (human or other) and gender, or with the communicative context. For instance, visitors in an art gallery and interlocutors in a bondage club demonstrated similar nonverbal behavioural patterns in signalling interactional intent and/or in structuring interaction.

Predefined cues are nonverbal acts that the user neither deliberately performs nor individually encodes. For example, when the user makes a pause in a textual exchange, the system detects his or her keyboard inactivity, and automatically sets the user's avatar to a spectator posture. It is the Second Life system – not the user – that generates a change in the user's body stance, and it is the Second Life system that selects a spectator posture as a nonverbal indicator of the user's inactivity. Predefined cues were observed in the use of kinesic cues, such as hand movement, gaze and posture. The analysis found that this type of NVC primarily functioned to show the status of the users' communicative activity, as in the example mentioned above, and to mimic interactional synchrony (e.g. when a user moves his or her avatar in a certain direction, the nearby avatars' heads automatically shift in the same direction to imitate the coordination of movements among the interlocutors, typical of interactions in the physical settings).

Blended cues refer to nonverbal acts that are user selected and system encoded. For example, the user can select to take a seat, but once he or she has done it the system will model the user's sitting posture. If the user selects to sit on an animated object, the system will generate his or her avatar's predefined nonverbal behaviour. For instance, if the user sits on a 'flirt bench', the system will animate his or her avatar to perform forward

lean, head nods and similar nonverbal acts precoded as nonverbal cues associated with the concept of flirting. This type of nonverbal behaviour represents a blend of user-defined and predefined cues, because the user chooses to perform a nonverbal act, which is also the case with user-defined cues, but the user does not encode the act, which is the case with predefined cues. The analysis showed that this type of nonverbal behaviour is highly context and gender dependent. For example, in the majority of examined areas, sitting postures intended for a male user are significantly different from the sitting postures intended for a female user. Certain SL areas – such as Virtual Capitol Hill – do not differentiate sitting postures on the basis of user gender, but often model those postures differently on the basis of a communicative context. For instance, a sitting posture intended for participants in the Virtual Capitol Hill discussion area differ significantly from the sitting postures intended for participants in the main Congress room.

Finally, *missing cues* refer to nonverbal acts that cannot be executed in SL. However, this category changes with the development of the SL system. For instance, when this research was conducted, vocalics were an example of missing cues. Afterwards, integrated voice chat was launched within SL, making the code system of vocalics possible in this environment. The analysis of data collected when the voice option was not available showed that vocalic cues, as well as facial expressions, were often substituted with ASCII emoticons.

Example analysis

The sequence presented here lasts one minute and 16 seconds. At the moment when the sequence was recorded, 20 users were present in the observed area. This analysis is focused on interaction among three users: a male avatar, P.B., a female avatar, M.L., and a male avatar, R.S.

In the beginning of the sequence, a female avatar – M.L. – is present in the area. After a while, a male avatar – P.B. – enters the area (0.26.267′). He starts walking around and passes by M.L. (0.29.533′; Figure 1).

After noticing M.L., P.B. pauses (0.29.800′) and turns back (0.30.400′). He positions his avatar at conversational distance from M.L., making a direct body orientation to her (0.31.600′). M.L. keeps her original position, which now entails conversational distance and a direct body orientation to P.B. A second later, the SL system detects that neither P.B. nor M.L. has keyboard activity, and sets their avatars into spectator postures (0.32.467′; Figure 2).

P.B. and M.L. remain in the same proxemic position – and without keyboard activity – for the next four seconds. During this period of time, the SL

FIGURE 1 P.B. passes by M.L.

system generates slight shifts of their bodies, heads and gazes in the following way:

M.L. – shifts right (0.34:000′)
P.B. – shifts left (0:34:200′)
M.L. – shifts left (0.34:400′)
P.B. – shifts straight (0.35.000′)
P.B. – shifts left (0.35.067′)
M.L. – shifts right (0.35.333′)
M.L. – shifts left (0.35.340′)
P.B. – shifts straight (0.35.467′)
P.B. – shifts left (0.35.800′)
M.L. – shifts straight (0.35.867′)
M.L. – shifts left (0.36.200′)

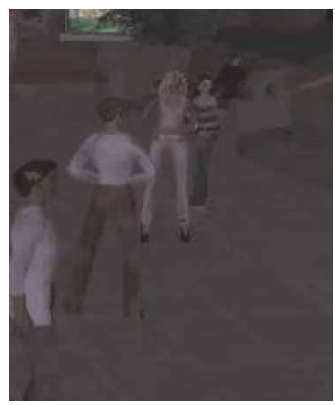

FIGURE 2 P.B. and M.L. in a spectator posture.

FIGURE 3 M.L. walking away.

P.B. – shifts straight (0.36.600′)
P.B. – shifts right (0.36.667′)
P.B. – shifts straight (0.36.933′)
M.L. – shifts straight (0.37.067′)
M.L. – shifts right (0.37.133′)

After this set of predefined shifts, M.L. walks away (0.37:200′; Figure 3).

At the moment when M.L. starts walking away, P.B.'s hands begin to move (0.37:867′), and his message appears on the screen (0.38:200′):

P.B.: hi

After sending the message, P.B. notices that M.L. is gone. He turns round and starts looking in the direction of M.L. (0.39:000′; Figure 4).

FIGURE 4 P.B. looking in the direction of M.L.

FIGURE 5 Users in the initial proxemic position.

M.L. turns back, approaches P.B., positioning her avatar at conversational distance from P.B.'s avatar again – and makes a direct body orientation to him (0.41.367′; Figure 5).

Milliseconds after the users have retaken their initial proxemic position, P.B. starts writing a message (0.41.761′), which, soon after, appears on the screen, revealing that P.B. is addressesing M.L. by using her first name:

P.B.: hi M (0.42.961′)

M.L. replies:

M.L.: hi (0.43.961′)

and the conversation continues:

P.B.: what u up to? *(0.47.095′)*
M.L.: nothing *(0.47.961′)*
P.B.: me too! *(0.50.761′)*

During P.B. and M.L.'s textual exchange, a male avatar, R.S., passes by. In his approach, R.S. bumps into M.L (1.05.161′; Figure 6).

R.S. pauses, turns back, and positions his avatar in front of P.B. and M.L., making a direct body orientation to these users (1.05.561′). Although R.S. is already at conversational distance from P.B. and M.L., he steps forward, becoming at intimate distance from M.L. (1.06.695′). There is no further textual exchange among the users, and the sequence ends.

In the beginning of this sequence, we see an episode of initiating interaction, i.e. a greeting process, between P.B. and M.L. P.B. passes by M.L., notices her, turns back, and stops in front of this female avatar. In so doing, P.B. employs a set of nonverbal cues typical of the first phase

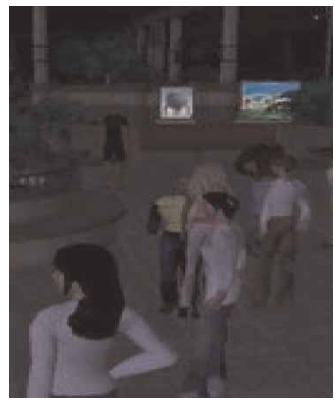

FIGURE 6 R.S. bumping into M.L.

of a greeting process, which Kendon (1977) identifies as the phase of *sighting, orientation, and initiation of the approach*. P.B. then positions his avatar at conversational distance from M.L., making a direct body orientation to her; M.L. keeps a proxemic position that entails conversational distance and direct body orientation to P.B. In those proxemic cues we recognize the explicit displays of interactional intent, typical of the second phase of a greeting ritual (*distant salutation*, ibid.), as well as a decrease of interpersonal distance, typical of the third phase of the same communicative process (*approach*, ibid.).

However, the observed episode does not proceed to the peak of a greeting ritual: the exchange of verbal greetings (*close salutation*, ibid.). On the contrary, M.L. leaves her proxemic position, and the observed greeting process discontinues. Two reasons could be offered as an explanation for this break of interaction. First, P.B. and M.L. were positioned at conversational distance – facing each other – for four seconds, but neither of them initiated textual exchange. Contrary to this, in the majority of sequences examined in this study, proxemic indicators of interactional intent proceeded to textual exchange in less than a second, in both dyadic and group interactions. The same communicative pattern can be identified in the interactive episode between P.B. and M.L. upon M.L.'s return to the initial position. M.L. places her avatar at conversational distance from P.B. and makes a direct body orientation to him, signalling thus her interactional intent. After this, P.B. initiates textual exchange within milliseconds. In light of this, M.L.'s departure from the original proxemic position can be understood as an indicator that her communicative expectations, developed within the SL environment, were not met. Whilst in face-to-face interaction a four-second pause would rarely have communicative significance, in the SL users' interaction this chronemic cue might assume a different meaning.

A second reason for the observed break of P.B. and M.L.'s interaction could be sought in the set of predefined cues that these users perform during the period of textual inactivity. As previously described, the SL system detects the lack of P.B. and M.L.'s keyboard activity, sets their avatars into spectator postures, and generates a series of P.B. and M.L's body, head and gaze shifts. These predefined, kinesic acts are intended to simulate the naturalness of users' nonverbal behaviour during the period of assumed communicative uninvolvement, recognized in the lack of keyboard activity. However, these system-generated and system-encoded cues actually connote interactional passivity (a spectator posture) and the lack of a shared focus of attention (P.B. and M.L.'s avatars shift in opposite directions). In this case, the SL system encodes and sends nonverbal messages on behalf of the users, regardless of their communicative intent, potentially leading to miscommunication between the interlocutors and interruption of the observed interactional event.

In the next segment of the analysed sequence we see the importance of user-defined cues again, as well as a close relation between this type of nonverbal behaviour and co-occurring textual discourse. At the moment when a greeting process between P.B. and M.L. discontinues, i.e. when M.L. walks away, P.B. sends a textual message. However, this message is ambiguous inasmuch as it is sent at the moment of M.L.'s departure, and without a clear identification of the intended addressee. P.B. then employs user-defined nonverbal cues – the rotary motion and the gaze directed towards M.L. – pointing clearly to the goal and intended receiver of his message. In this case, user-defined nonverbal cues supplement textual discourse, facilitating the process of message comprehension. After this, M.L. returns and P.B. addresses her again, this time using a clear identification of the intended addressee; that is, P.B. addresses M.L. by using her first name, and a textual exchange between these two users continues.

The last segment of the analysed sequence offers additional evidence about the importance of user-defined, proxemic behaviour. This sequence ends when a male avatar – R.S. – approaches M.L. and P.B. As show in Figure 6, R.S. bumps into M.L., invading her personal space. This confrontation could be regarded as accidental, since SL users sometimes run into each other unintentionally. However, after this incident, R.S. positions his avatar at intimate distance from M.L., thus invading her personal space again, which implies that the first incident was not accidental. Moreover, an analysis of R.S.'s proxemic behaviour throughout the entire sequence points to the same conclusion.

R.S. enters the observed area at 0.32.200′ and starts walking around, in different directions. Throughout this journey, R.S. repeatedly gets into proxemic confrontation with other users. First, he runs into P.B., at the moment when M.L. had walked away and P.B. was typing a message

(0.38.208′). Then, R.S. bumps into another male avatar, located in the left side of the area (0.45.800′). Seconds later (0.51.200′), R.S. runs into the third male avatar. Next, R.S. bumps into two male avatars, again in the left side of the area (0.52.994′). R.S.'s aggressive nonverbal behaviour continues, and a couple of seconds later he runs into a female avatar (1.01.016′). After this, R.S. bumps into M.L., in the previously described incident. Interestingly, R.S.'s encounter with M.L. and P.B. is the only instance in R.S.'s walk through the area when this user had paused and made direct body orientation to another user, potentially indicating his interactional intent. However, this intent – if it existed – was unsuccessful. Neither M.L. nor P.B. started communicating with R.S. On the contrary, R.S.'s arrival discontinued the previous textual exchange between M.L. and P.B, and the sequence ended.

The reason for this can be found in the fact that in his approach to M.L. and P.B., R.S. invaded not just M.L.'s personal space but also a distinctive interactional space that M.L. and P.B. had formed. This type of interactional space is known as *F-formation*, and it 'arises whenever two or more people sustain a spatial and orientational relationship in which the space between them is one to which they have equal, direct, and exclusive access' (Kendon 1977, p. 179). An *F-formation* has an important function in maintaining the specific identity and integrity of an interactional situation, as well as in helping the interactants sustain a focus of attention (ibid.). In other words, an *F-formation* creates an invisible, temporary border around a particular interactional situation, facilitating thus the interactive process. In the analysed sequence, this type of invisible, temporary border around M.L. and P.B. existed prior to R.S.'s arrival. The analysis showed that other users present in the area recognized this distinctive interactional space as a zone to which M.L. and P.B. had *exclusive* access. Those users selected to walk over a nearby 3D object instead of walking through M.L. and P.B.'s *F-formation*.

Conclusion

This research indicates that user-defined NVC has a strong potential to enhance interaction in multiuser, 3D virtual environments. Proxemic behaviour observed in SL had an important communicative function, analogous to the role of proxemic cues in face-to-face interaction. Furthermore, this type of NVC was successfully integrated with co-occurring textual discourse, enabling creation of an enriched CMC environment. Finally, although often consistent with social norms of the physical world, user-defined NVC shows adaptability to the symbolic system of the analysed virtual setting. Contrary to this, predefined and blended nonverbal cues often represent

stereotypical, gender and culture biased nonverbal acts. By striving to mimic social norms of the physical world, predefined and blended cues convey a set of specific cultural assumptions, through representation and modelling of users' nonverbal behaviour. Furthermore, this type of NVC is not successfully integrated with co-occurring textual discourse, unless such integration is imposed on the user (e.g. in the case of a spectator posture). Finally, by sending nonverbal messages on behalf of the user, that is, regardless of the user's communicative intent, predefined NVC obscures some of the most important elements of user interaction, making it difficult to comprehend who sends a certain nonverbal message, to whom, and what the message means. As a consequence, the design discourse becomes an inseparable element of communication within SL, which – along with textual and nonverbal discourse – shapes users' interaction and experience in a multiuser, 3D virtual environment.

As progressive online embodiment – to use Franc Biocca's (1997) term – speeds up progressively, the focus of CMC research gradually shifts from textual to multimodal forms of online interaction. Nonverbal communication in online settings thus becomes an increasingly relevant research topic, which reveals not just a transition between two types of online communication, but also – and more importantly – a transition between two types of online experience. Therefore, it is important for the CMC research community to keep developing theoretical and methodological approaches to this new form of online interaction, as well as a corresponding set of research ethics principles, adapted to this emerging form of internet communication.

Notes

1 A Second Life area is a piece of virtual land, which has a distinctive name and SL address. Most of the SL areas are user owned and created (see: http://secondlife.com/whatis/landpricing.php). Within an area that they possess, users can build and store virtual objects.

2 The University of Minnesota Internal Review Board approved the research. Also, the data were gathered and presented in accordance with the AoIR Ethics Code.

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