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Social organization in virtual settings depends on proximity to human visual aspect

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ABSTRACT

Virtual environments are inherently social spaces, in which humans interact through avatars. However, the parameters which favor inter-individual social structuring in those settings are still far to be understood. Particularly, the putative influence of anthropomorphic similarity of visual aspect on social organization of avatars is a key issue to understand the cognitive processes used to form social interactions in virtual worlds. Using the highly popular massively multiplayer online role-playing game World of Warcraft as a model of socially-active virtual setting, we analyzed the social behavior of 11,649 avatars as a function of their visual aspect. Our results show that social structuring in virtual settings depends on proximity to human visual aspect. Social groups formed by human-like avatars display more homogeneity than what the optimal use of the interface would predict, while this effect is not observed for social groups formed by non-human avatars. Thus, immersion in virtual environments depends more on visually-triggered social dynamics (role-play) than on optimal use of the interface (game-play). Furthermore, social aspect may override the immediate reward of interface optimization, thus representing a major factor of immersion in virtual environments.

1. Introduction

Virtual settings are more and more important in modern societies, and are used for numerous applications, ranging from recreational and educational to therapeutic (Bainbridge, 2007; Mayo, 2009; Murray-Rust, 2008; Rose, Brooks, & Rizzo, 2005). The development of virtual environments also provides new tools to investigate cognitive skills, such as memory, spatial cognition, or multimodal integration (Guitton, 2010; Kessler & Thomson, 2010; Newman et al., 2007). Progress in these areas is possible because virtual worlds are now reaching a level of realism sufficient to simulate efficiently some aspects of real environments (Bartle, 2003; Giard & Guitton, 2010; Lee et al., 2003).

One of the main characteristics of virtual environments is that they are inherently social spaces (Alexander, 2003; Bartle, 2003; Cole & Griffiths, 2007; Williams, Ducheneaut, Xiong, Yee, & Nickell, 2006). Indeed, through virtual self-representations called avatars, individuals can interact, bond, and create emotional relationships with other users (Bainbridge, 2007; Cole & Griffiths, 2007). The intensity of social contacts in virtual spaces often leads to the creation of transient to long-lasting social groups (Alexander, 2003; Cole & Griffiths, 2007; Guitton, 2010). The existence of these social interactions, and of the resulting social groups, is one of the key factors of immersion in virtual environments (Bartle, 2003; Chen, Sun, & Hsieh, 2008).

However, the parameters which favor social structuring in virtual settings are still far to be understood (Bainbridge, 2007; Chen et al., 2008). Some studies have suggested that proximity to human standard visual aspect (anthropomorphic similarity) could play a role in the social aggregation of people in virtual settings (Kim, 2009; Nowak & Rauh, 2008; Taylor, 2002). The similarity principle also underlies an attraction between individuals who look similar (Bailenson, Garland, Iyengar, & Yee, 2006). Moreover, laboratory-setting studies suggested that a higher group identity and conformity could be reached when the avatars presented important visual similarity (Kim, 2009; Lee, 2004; Lee & Nass, 2002). Although, it is unclear whether this putative effect of proximity to human standard visual aspect on social aggregation can be generalized to long-lasting ecological cyber-environment. More important, it is unknown whether the visual aspect is a consequence or a trigger of social structuring. Furthermore, would the visual aspect be a factor stronger than others (such as avatar behavior within the game or interface optimal use) of avatars' social aggregation?

To investigate this lingering question, we selected as a model the highly popular massively multiplayer online role-playing game World of Warcraft (Blizzard Entertainment) (Bainbridge, 2007; Chan & Vorderer, 2006; Chen et al., 2008), which presented for us two particular characteristics of interest: first, the game dynamic requires the players to create autonomous social groups

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Table 1
Description of the sample.

	Alliance	Horde	Total
Number of Guilds	40	40	80
Number of male avatars	3439	3757	7196
Number of female avatars	2788	1665	4453
Total number of avatars	6227	5422	11,649
Average size of the Guilds	155.67 ± 94.53	135.55 ± 60.32	145.61 ± 77.43
Minimum size of the Guilds	38	19	–
Maximum size of the Guilds	417	251	–

– the Guilds – to coordinate their actions (Chen et al., 2008); second, the two allegiances of the virtual world gather races with highly contrasted visual aspects: human-like aspect (the Alliance) vs. non-human, more exotic monster-like aspect (the Horde). We thus analyzed the social aggregation of 11,649 socially active human-like and non-human avatars. Our results clearly demonstrate that social structuring in virtual settings depends on proximity to human visual aspect. Thus, immersion in virtual environments depends more on visually-triggered social dynamics (role-play) than on optimal use of the interface (game-play).

2. Material and methods

2.1. Data collection

Information about socially-active Guilds and avatars was collected using the searchable database of the "World of Warcraft Armory" website (www.wowarmory.com), which provides information regarding avatars, their server and their group affiliation (Guitton, 2010). Socially-active Guilds were randomly selected from Guilds having members active in the website forum (Guitton, 2010). Groups were selected from North-American English-speaking servers, from December 2009 to February 2010. Eighty Guilds were chosen equally from the two allegiances of the virtual setting (40 human-like Alliance Guilds, and 40 non-human Horde Guilds). At the time of data collection, the Alliance gathered five human-like playable races: humans, dwarfs, gnomes, night elves, and draeneis. In contrast, the Horde gathered five non-human (either monster-like or over-fantasised versions of humans) playable races: orcs, trolls, taurens, undead, and blood elves. For each group, the leader' in-game race and sex were recorded, as well as the exact constitution in terms of in-game race and sex of avatars composing the group.

2.2. Homogeneity indexes

In each group, the relative homogeneity has been quantified as a function of the leader characteristics. Homogeneity indexes have been used as variables and computed for three parameters: the leader' in-game race, in-game sex, and the combination of these two parameters. Homogeneity indexes have been calculated as the distance in standard deviations between the repartition of a given group and the average repartition of the actual parameter in groups of the same category. Positive values reflect a greater homogeneity than average on the concerned parameter than in groups of the same category.

2.3. Statistical analysis

Overall repartitions were analyzed using Chi-Square X^2 test based on frequency counts. Statistical analyses on homogeneity indexes have been performed using non-parametric Mann–Whit-

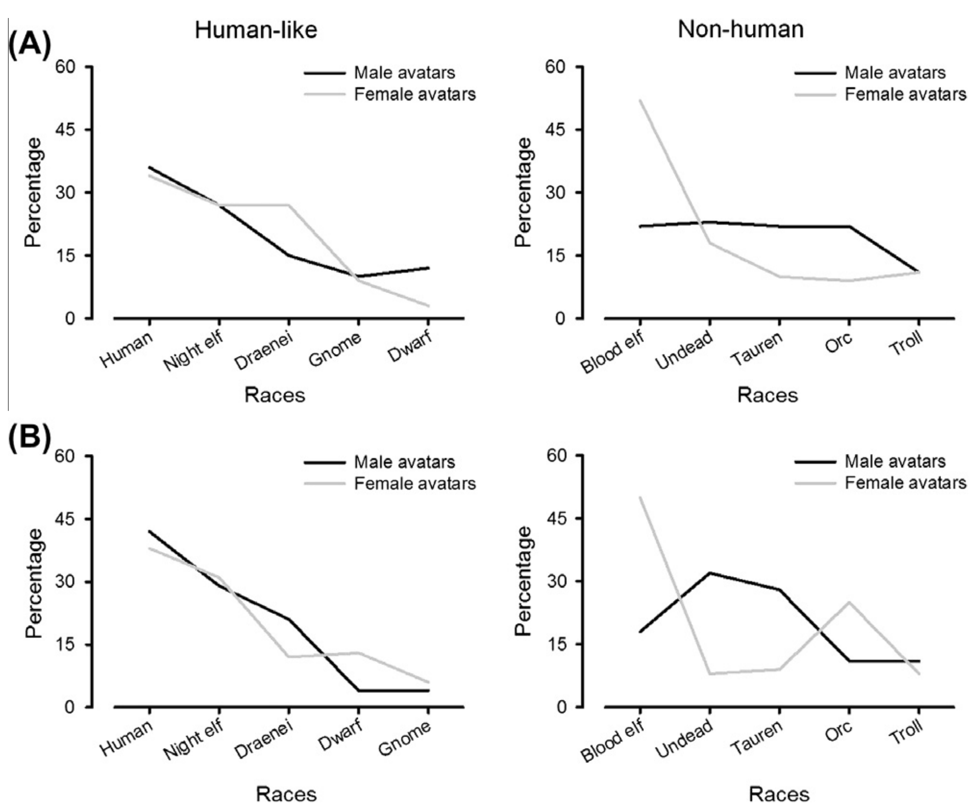

Fig. 1. Avatars repartition in the groups analyzed. (A) Average repartitions of human-like and non-human avatars, in function of in-game races. A significant difference in overall repartition was observed between non-human male and female avatars (X^2, $p < 0.001$). (B) Repartition of human-like and non-human leaders, in function of in-game races. A significant difference in overall repartition was observed between non-human male and female avatars (X^2, $p < 0.001$). Black lines represent male avatars, white lines represent female avatars.