How are virtual worlds designed to facilitate social interaction and collaboration between avatars?

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Introduction

Today millions of people worldwide are playing, living, and learning in virtual worlds known as massively multiplayer online games (MMOGs), different from other genres of video games as they represent a medium of social interaction that can be used by thousands of simultaneous remote players. The recent growth of Virtual 3D worlds is largely due to the mass availability of relatively cheap broadband enabling the game engine, and database to be located centrally so changes to the world happen synchronously on the server rather than on the game client allowing real time, multiplayer interaction. Previously, internet connections were too slow to allow more than basic chat and perhaps a 2 dimensional graphical environment.

The virtual world exists and is designed with certain objectives in mind; that players will be able to interact with each other, build social networks and collaborate together within a 3D space. In order to make them suited to group interaction Bailenson & Beall (2006) suggest that virtual worlds should be:

- **Multi User**, supporting multiple geographically dispersed users;
- **Synchronous**, enabling people to interact with each other in real time;
- **Navigable**, allowing users to freely navigate the 3D space;
- **Embodied,** representing users by digital proxies called avatars;
- **Spatial,** providing a shared 3D interaction context.

I want to examine some of the key design features common to most MMOGs to show why they are important to interaction and collaboration, how they are used, and how they might be developed.

Grouping

In virtual worlds avatars will group to perform an activity together where they have a common purpose and are in the same geographical space. Groups take on many forms from short term task groups to long term community groups, but it is from this grouping together that social networks are created. Designers are aware of the power groups have in generating and expanding social networks and consequently the virtual world itself. Researchers such as Penumarthy & Borner (2006) have attempted to categorise groups into types such as "Leader-Follower", where there is one leader and many followers obeying rules and orders or "Moderated": where members are free to function within the scope of the activity and are moderated by a leader. In reality the worlds are so disparate in design and groups vary so much, are organic and are constantly evolving that I don't believe they lend themselves to classification by structure, the designer needs to look instead at how groups function.

Guilds are an important factor contributing to the popularity of MMORPG's such as World of Warcraft and Guild wars. And in these two games in particular Guilds are where most of a player's important relationships are formed and collaboration occurs. Studies by Ducheneaut and Yee (2006) show that, overall, 66% of WoW's characters are in a guild. Moreover, this number increases to 90% for characters level 43 and above, and that, for guilds with 16 to 60 members, the average hardcore members number between 6 and 9. Guilds provide a support network in terms of materials and advice, they are a social forum and they also provide a pool of collaborators for quests or raids. Guilds are probably the most structured & deliberate example of a group design in an MMOG, in that you can only belong to one Guild, there is no other way of forming a persistent affiliation and not being in a Guild makes advancement in the world harder.

Figure 1-1. Guild meeting in Star wars Galaxies.

Most MMOGs are structured so that players are forced to interact. EverQuest (Sony 1999) is a good example of how player-to-player interactions are encouraged: the "quests" players have to accomplish are purposefully too difficult for a single character, and require the help of a group of other players. As Jakobson and Taylor have proposed, EverQuest is "one of the best examples of explicit socialization processes embedded in a game". In more recent games like Star Wars Galaxies or SWG (Sony 2003) and World of Warcraft, the interdependencies between players are even deeper and broader: a complex ecology of professions forms the basis of an economic system where players have to cooperate and exchange goods and services, as they would not be able to progress otherwise. Professions are used in many MMOGs to enable interaction by purposefully designing them to be interdependent. In SWG, marksmen need medics and entertainers to heal their wounds and battle fatigues. Medics, in turn, need wounded Marksmen to heal and scouts to procure the resources needed to make drugs. WoW encourages players to group using two classic mechanisms. First, grouping with players of a different class to increase efficiency as character classes have abilities that complement each other (e.g. Priests are the best healers, Warriors the best melee fighters, etc.).. Second, making many quests and dungeons in the game too difficult to be tackled alone so that players have to form either a party (5 players maximum) or even a raid (40 players maximum) to have a chance in these difficult locations.

Group membership in Second Life is optional and not a requirement of advancement unlike guilds. They exist for many reasons, whether you're running an in-world business, club, poetry society, role playing group or just have a common interest with others, groups help Residents come together. Each resident can be a member of 25 groups, and there is no member limit allowing for a rich palette of social connections. Creating a group is inexpensive and requires just 2 people, roles and abilities can be assigned making these suitable for running a business or project. Powerful messaging tools mean you can chat to the group or send out a group notice to keep members informed of events. Another unique design feature is that members can share and deed land and objects to the group, creating communal property and facilitating collaboration.

In Second life you can officially partner up with another avatar by applying for a partnership through the website. There is also a growing trend of marriages in Second Life and a thriving wedding industry to support this with, dress makers, chaplains, wedding day arrangers, churches to hire etc. Marriages are also seen in other MMOGs such as There (Makena Technologies 2003), Entropia Universe (MindArk 2003) and even in World of Warcraft (Blizzard 2004).

Communication

MMOGs attempt to simulate the experience of face-to-face conversation. "Social interaction in them is organized by reference to persistent spaces, inhabited by humanoid bodies (or 'avatars'), that can gesture and speak (via text chat and/or voice)." Moore, R. J. et al (2006).

Just like the real world, the virtual one depends on residents being able to communicate directly with each other and techniques have evolved that attempt to mimic how we communicate in real life within the constrains of current technology. Input is via the keyboard and has not really developed since the days of MUDS and instant messaging, so what we have is 2D communication systems trying to cope with a 3D environment. There is always a method of face to face chat which is spatially delimited to a few metres (around 20-25m seems to be normal) thus encouraging avatars to get close in order to chat. Shouting (with a much further reception radius) is also employed for example when a physical obstacle prevents close up chat or when looking for someone. Private chat or

whispering also derives from earlier chat rooms and is vital in facilitating the development of more personal relationships and even romantic ones. Interestingly WoW's chat channels are not limited by distance. Each zone has a general channel broadcasting to all players present and, guild chat transmits text across the entire world. While this may at first appear unrealistic, Ducheneaut (2006) notes that this leads to a sense of social presence. Unlike most other MMOGs, Second Life provides only one kind of broadcast chat channel, "Group IM." While group IM is very similar to guild chat in form, the ways it is used by players are surprisingly different. Non official use of group chat in Second Life is considered a crime as bad user interface design means that messages are plastered across the player's field of view in a transparent text box over which players have no control plus they receive an audio alert and further message whenever anyone starts or leaves a group session.

Figure 1-2. Chatting in There.

Most MMOGs with the notable exception of "There" employ a kind of text chat in which the entire message only becomes visible when the player hits <enter>. As a result, one can never tell when another is taking a turn or how the turn might be unfolding; players cannot predictably achieve one-speaker-at-a-time, one-topic-at-a-time, or tight coordination (minimal gap and overlap between turns), and it can make a conversation rather like communicating by telegraph. In face to face situations use can be made of clicking or typing noises to tell respondents that someone is about to speak, but in group, whisper or long range chat this is not possible. Second life has just introduced a feature that tells you

when the person you are speaking to is typing so at least you know a message is imminent. The limitations of present in-world communication systems are there largely because many of these worlds evolved out of the MUD, and chat room tradition. Also cheap broadband and internet voice chat systems were not available until recently and many players are now using plugins and 3rd party voice systems in games like World of Warcraft and EverQuest. It is interesting to note however that when Linden labs announced they are working on introducing voice chat in Second Life many people complained that it would infringe their right to anonymity!

Not everyone wishes to remain anonymous and there is increasing activity in cross-reality interaction, which is where players are interacting across the virtual and the real world. Designers have used avatar Bio's where players can include some personal information such as location, interests, photos, gender and age, to help players find likeminded people to interact with. Forums and blogs are encouraged by games companies as they expand the off-line community and strengthen social networks. Live concerts and discussions streamed into Second Life are very popular allowing residents to showcase their talents and participate in events. A new advance in Second Life is the ability to port out of the game to a player's website using embedded URLs thus opening up brand new channels of interaction.

The Avatar

In order to understand the dynamics of social interaction within virtual worlds it is necessary to take a closer look at the role of the avatar. The avatar can be described as a person's digital proxy and represents the player within the virtual environment. Avatars range from simple pre-defined 2D characters to fully customisable and expressive Avatars as in Second life. A significant challenge when developing a Virtual World is "creating expressive avatars capable of representing users' actions and intentions in real time." (Bailenson)

Simulating face to face conversation is still one of the toughest challenges facing game designers and developers and lags behind the advances made simulating physics, lighting, and animation. Human face to face interaction relies heavily on non-verbal cues such as gaze, posture and gesturing to enhance the verbal content, manage the conversation flow and communicate emotion. Control of expressions and gestures in

MMOGs is limited by current interface capability and is largely manual, either menu driven, key mapped, or emoted. Automation has been experimented with but can result in misleading behaviours such as an avatar waving to an approaching attacker! Given the limitations on expressive gesturing, the emphasis needs to be focussed on developing the other non verbal cues to compensate. Portraying directed attention is made easy when the avatars point of view is controllable within the 3D space allowing the player to focus attention by moving its body or head to face another avatar. However reproducing credible eye contact or gaze is another matter. Gaze is incredibly important in face to face chat, regulating flow, providing feedback, providing focus and expressing emotion. Experiments by Lee, Badler & Badler (2002) and later Bailenson & Beall have shown that an avatar with directed gaze significantly outperforms one with random gaze in terms of perceived interest, engagement, friendliness and liveliness.

Figure 1-3. Second Life avatar demonstrating realistic eye-gaze, and directed posture.

Designers are beginning to recognize the importance of using Non zero-sum gaze; this means that an avatars' gaze is rendered slightly differently for each target to create eye contact with each person they are addressing and gives the illusion that they are being spoken to personally. This mimics the technique used by real life speakers and leaders and is important in conveying a sense of group inclusion and connection between speaker and audience or even raid leader and group. There is growing body of opinion that good avatar animation is more effective in portraying non verbal cues and emotion in particular, than photorealistic facial expressions. Disney animators found that they could effectively

portray emotions using simple line drawings of actor's movements and facial expressions provided the movement was convincing. In a study by Schiano, Ehrlich, Krisnawan and Sheridan (2000), a robot enacted six basic emotions alongside human actors and the audience had to try and decode these. The robot's scored lower than the humans but close enough to support the argument that behaviour is more important then accurate appearance in transmitting non-verbal cues.

Projecting one's self in an of abstract form is a fundamental expression of humanity whether it is through the traditional outlets of Art, performance and writing or the new means of creating a virtual self through an avatar. Avatars are currently rendered animations rather than photorealistic representations of the player which gives players a visual anonymity, allowing them to explore new ways of interacting and expression. While many players will attempt to create an alternative self, by changing gender, appearance, race, personality etc... Most are simply being themselves and interacting as they would in their real lives, experiencing real emotions and relationships. An important aspect to remember when talking about self projection is appearance and uniqueness and the huge emphasis in nearly all MMOGs on avatar clothing to present an identity and to differentiate oneself from others. MMOGs are also reputation games so wearing powerful items, for instance, is essential to the construction of a player's identity, broadcasting the player's status to others and rewards them with a sense of achievement. This playing to an audience is set to become more important and more should be done to design spectator events in MMOGs and researchers have recently proposed a set of guidelines to "design for the spectator experience" (Reeves 2005).

Meeting places

Avatars will move around the world according to their goals and group requirements and also such factors as, the location of teleports or transport links, access to resources, Land, vendors and skills. Over time distinct patterns of avatar movement and settlement develop, which can be analysed using spatial mapping techniques with data "mined" from the games themselves. Designers can then ascertain why certain locations are preferred to others and attempt to resolve any imbalances. A good example of an imbalance is seen in World of Warcraft where the Elf Capital Darnassus is one of the least visited places in the game because of its isolated location on an Island in the top left corner of the map with

poor transport links. Minimising travelling times allowing users to freely navigate the 3D space while delivering a sense of space is a constant balancing act.

If players are to interact, they have to meet in the first place. One of the methods used to encourage social interaction in MMOGs is to steer players towards certain locations with social interaction in mind. In SWG it is the cantinas, in SL the welcome areas and clubs, in WoW the inns and auction house.

Figure 1-4. Players congregating by the mailbox and bank in Ironforge (WoW)

Some locations are tied to the provision of a particular service, a bank, mailbox, teleport or transport hub. Healing battle fatigue in SWG means visiting a cantina and waiting there for at least a few minutes while recovering. The cantina is, therefore a strange compromise between a first aid station and a sociable place where people are entertained. In another attempt at encouraging player-to-player interaction

SWG's designers have made it possible for players to train each other and the densely populated Starport with its heavy traffic is one of the best places to look for a trainer. An assortment of: markets, bazaars, auction houses and stores feature in all MMOGs and are used to promote interaction in two ways. They enable congregation of players in a pre defined space with a common purpose and they encourage communication between buyer

and seller where players can trade directly with each other, without intermediation. In worlds such as Second Life and There, shopping is a social event just as it can be in real life, by taking a friend with you or chatting to other customers in the store.

Conclusion

The success of a Virtual World relies on players interacting with each other, building social networks and collaborating together within a 3D space. Interaction is voluntary and should not be forced or expected; it should be a product of good design. The Sims Online (Maxis 2002) is an example of bad design, where to encourage socialising, skills are acquired quicker when practised around other people, however there is no reason to communicate other than the fact you are in the same place. The result is that nobody talks and avatars are left to grind away while their owners are AFK. Interaction depends on players being able and wanting to communicate directly with each other both verbally and non-verbally and good interface design and communication channels make this process much easier.

It is from grouping together that most social networks are created and virtual worlds grow. Groups are defined by their function within the world, and vary to include support, Dependency, interest, economic, social and romantic. We have seen how the avatar represents the player in the virtual world and the importance of good animation and freedom to express oneself through the avatar. Designing meeting places where players can congregate is also a method to encourage interaction and proper placement of cities, transport links and resources is also vital.

What of the future? Well incentives and rewards could be to be built into games that reward live, social interaction, and game designers could use social interactivity data from their servers to understand in-game social activity better and identify problems. For example performing spatial analyses of avatar diffusion and examining the social networks that each player is a part of. I also see an increasing adoption of alternative communication tools such as live chat and a growing emphasis on cross-reality channels of interaction blurring the line between the virtual and the real.

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