

Distribution of User Focus in Collaborative Virtual Environments

PER STORLØKKEN



**KTH Numerisk analys
och datalogi**

Examensarbete
Stockholm, Sverige 2004

TRITA-NA-E04108



Numerisk analys och datalogi
KTH
100 44 Stockholm

Department of Numerical Analysis
and Computer Science
Royal Institute of Technology
SE-100 44 Stockholm, Sweden

Distribution of User Focus in Collaborative Virtual Environments

PER STORLØKKEN

TRITA-NA-E04108

Examensarbete i medieteknik om 20 poäng
vid Programmet för medieteknik,
Kungliga Tekniska Högskolan år 2004
Handledare var Frode Volden
Examinator var Nils Enlund

Preface

This Master's Thesis in Media Technology was completed at the Department of Computer Science and Media Technology, Gjøvik University College (HiG). The MSc Media Technology programme is offered in cooperation with the Royal Institute of Technology (KTH) in Stockholm, this Thesis is therefore also a Master's Thesis in Media Technology and Graphic Production at KTH.

The purpose of this report is to examine which elements in the interface users of Collaborative Virtual Environments focus on during interaction, and thus hopefully help start the process of creating suitable interface standards for these environments.

I would particularly like to thank my supervisor at HiG, Frode Volden, especially for the help with the statistics, and Darren Thurston for proofreading and suggestions. In addition I would like to thank everybody who participated in the experiment or the survey.

Abstract

Collaborate Virtual Environments (CVEs) allow multiple users, located in different physical locations, to co-exist in the same virtual environment. While in the environment users are identified by their visual representation, known as an avatar. One of the most common examples of such environments is Massively Multiplayer Online Games (MMOGs). Users of MMOGs are likely to experience a feeling of presence when they interact with the environment; they are mentally transported to the environment. Research has shown that the avatar has a great influence on the feeling of presence, but what effect does the rest of the interface have? What happens if the user is not looking on the avatar? We suggest that MMOG interfaces are based on single-user interface models, and that these standards are not suitable for multi-users environments. In this report we will examine how users approach the interface of these environments, in particular how they distribute their focus between different interface elements when performing certain tasks. We examine both a group of experienced users and a group of novice users. The data from the experience users was gathered through a survey, while the novice users participated in an experiment. Users focus on different interface elements during each type of interaction, and surprisingly few have their primary focus on the avatar. It was discovered that there is a correlation between which element the users focus most on and their feeling of presence. We also found that novice users approach the interface in a different manner than experienced users. In addition we found a number of other issues that suggest that the current interface layouts might not be optimal for multi-user environments.

Sammendrag

Virtuelle Miljø for Samarbeid gjør det mulig for brukere som oppholder seg på forskjellige steder å eksistere sammen i det samme virtuelle miljøet. Mens de oppholder seg i miljøet kan brukerne gjenkjennes på deres visuelle representasjon, også kjent som deres avatar. Et av de mest kjente typene av sånne miljøer er Massive Flerbruker Spill. Brukere av disse spillene har en sjanse til å oppleve en følelse av nærhet når de interakterer med miljøet; de blir mentalt transportert til miljøet. Forskning har vist at avataren har en stor innvirkning på følelsen av nærhet, men hvilken effekt har resten av grensesnittet? Hva skjer om brukeren ikke ser på avataren? Vi mener at grensesnittene for disse spillene er basert på modeller for en-bruker grensesnitt, og at disse standardene ikke passer til flerbruker miljøer. I denne rapporten vil vi undersøke hvordan brukere tilnærmer seg dette grensesnittet, spesielt hvordan de distribuerer fokuset mellom forskjellige elementer i grensesnittet når de utfører forskjellige oppgaver. Vi undersøker både en gruppe erfarne brukere og en gruppe uerfarne brukere. Data fra de erfarne brukerne ble samlet ved hjelp av en spørreundersøkelse, mens de uerfarne brukerne deltok i et eksperiment. Brukere fokuserer på forskjellige elementer i grensesnittet under hver interaksjonstype, og overraskende få hadde fokus på avataren. Det ble oppdaget en sammenheng mellom hvilket element i grensesnittet brukerne fokuserte på og den følelsen av nærhet de opplevde. Vi fant også ut at uerfarne brukere tilnærmer seg grensesnittet på en annen måte enn de mer erfarne brukerne. I tillegg fant vi en del andre saker som peker mot at dagens grensesnittutforming muligens ikke er optimal for flerbruker-miljøer.

Contents

1	Introduction	1
1.1	Review	1
1.2	Claim	2
1.3	Agenda	3
2	Background	3
2.1	Presence	3
2.2	Virtual Environments	5
2.3	The Avatar	6
2.4	User Interfaces	6
2.5	Interaction	9
2.6	User Types	10
3	Contribution	11
3.1	Method	11
3.2	Interface	14
3.3	Survey	16
3.4	Experiment	17
4	Results	21
4.1	Interface Types	21
4.2	Communication	21
4.3	Cooperation	23
4.4	Movement	25
4.5	Focus in the Experiment	28
4.6	Presence	29
4.7	Experienced versus Novice users	32
4.8	Player Types	34
5	Discussion	35
5.1	Focus	35
5.2	Presence	37
5.3	Player Types	37
5.4	Not Considered	38
6	Conclusion	39
7	Further Work	40

List of Tables

1	Distribution of focus during communication in each game	22
2	Distribution of focus during cooperation in each game	24
3	Distribution of focus during movement in each game	26
4	2 of 12 noticed the chat indicator	29
5	Focus during communication compared to precondition scores . .	29
6	Focus during movement compared to sensory environment scores	31
7	Content Characteristics scores	31
8	1st. person vs. 3rd. person view	33

List of Figures

1	The nine identified interface layouts. Illustration from [15, p. 171]	8
2	Player Types. Illustration from [2, p. 131]	10
3	The major interface elements of AO. See figure 21 on page XXXIV in Appendix C for a larger version	16
4	The outdoor area explored by the participants of the experiment. The six green dots represent starting points, the three blue dots represent meeting points, and the red line show the area covered. The entire area is approximately one square km.	19
5	Focus during communication	21
6	Focus during communication in 4 selected MMOGs	23
7	Focus during cooperation	24
8	Focus during cooperation in 4 selected MMOGs	25
9	Focus during movement	26
10	Focus during movement in 4 selected MMOGs	27
11	Maps. Top left: UO. Bottom left: SW:G. Right: UOAM	28
12	Comparison of precondition scores between novice and experienced users.	32
13	Comparison of sensory environment scores between novice and experienced users.	33
14	Distribution of player type scores in the survey	34
15	Distribution of player type scores in the Bartle test	35
16	A screenshot from Anarchy Online with descriptions of the most commonly used interface elements that was distributed among the participants in the experiment	XXII
17	The MUD Grimme	XXX
18	Ultima Online, released 1997	XXXI
19	Everquest, released 1998	XXXII
20	Dark Age of Camelot, released 2001	XXXIII
21	Anarchy Online, released 2001	XXXIV
22	Star Wars: Galaxies, released 2003	XXXV
23	Lineage 2, released 2004	XXXVI

Terminology and Abbreviations

AO: Anarchy Online

Anarchy Online is a trademark of Funcom

Avatar: Avatar comes from the Sanskrit word “avatara” which means descent, but was commonly used for the incarnations of the Hindu deity Vishnu. It is now being used for an incarnation in human form, or an embodiment of a concept or philosophy — often in a person (“he is the avatar of good”). In CVEs, as in many other applications, the avatar is the graphical representation of the user.

Character: The character is the abstract representation of the user.

CVE: Collaborative Virtual Environment

DAoC: Dark Age of Camelot

Dark Age of Camelot is a trademark of Mythic Entertainment, Inc.

EQ: Everquest

Everquest is a trademark of Sony Computer Entertainment America Inc.

GUI: Graphical User Interface

Guild: A guild is an association of users with similar goals and interests.

Level: A level is an abstract measure of the amount of experience a character has.

MMOG: Massively Multiplayer Online Game, previously known as Massively Multiplayer Online Roleplaying Game (MMORPG). The roleplaying part was dropped due to a lack of actual roleplaying in these games. Also known as Persistent State Worlds (PSW) and Virtual Worlds.

MUD: Multi User Dungeon

NPC: Non-Player Character, an avatar controlled by the system, and not a user. They are also known as Mobiles (MOBs). An avatar controlled by a user is known as Player Character (PC)

Presence: Presence can be defined as the feeling of “being there” — the user is mentally transported to a virtual environment.

RPG: Roleplaying Game

SW:G: Star Wars: Galaxies

Star Wars: Galaxies is a trademark of Lucasfilm Entertainment Company Ltd.

UI: User Interface

UO: Ultima Online

Ultima Online is a trademark of Electronic Arts Inc.

UOAM: Ultima Online Auto Map

VE: Virtual Environment

1 Introduction

1.1 Review

During production of Virtual Environments (VEs) a lot of time and resources are allocated to the development of graphics, both the environment and the avatar — but in particular the avatar. The avatar is the graphical representation of the user in the VE, and research has shown that the quality of the avatar has a direct effect on the feeling of presence in the user [8, 5]. The avatar is therefore considered the most important element in the interface where presence is concerned. There are, however, other interface elements.

This report will examine how users distribute their focus between different Graphical User Interface (GUI) elements in an avatar-based Collaborative Virtual Environment (CVE). A CVE is a virtual environment where multiple users can co-exist and thus cooperate — a multi-user virtual environment. We will see how the layout of the interface affects the feeling of presence during different types of interaction. We will also study whether different user types have a different approach to the interface, and if they prefer one interface type over another.

To gather the data needed a survey was conducted with experienced users of Massively Multiplayer Online Games (MMOGs), in addition an experiment was conducted with novice users. MMOGs were selected as the subject for this research due to the number of different commercially available CVEs they represent, and the large number of users they have. In addition: If we compare the screenshots in Appendix C we see that, with a couple of exceptions, the interface elements are similar in all the MMOGs — as is the layout.

MMOGs are basically games placed in virtual environments where people from around the world can play together, usually for a monthly fee. They can handle from several hundred to a few thousand co-existing users, and they are persistent — at least to some degree. The environment is persistent in that it exists independent from the users; things can happen in a user's environment even when the user is not present. The avatar is persistent in that when users enter the environment their avatar is in the same location and condition as when they left. However, the avatar is generally not persistent in the environment — when the user leaves, so does the avatar.

Presence has been chosen to measure how the layout affects the user. An increased feeling of presence, and in particular co-presence, is considered important for these environments. In this context presence can be defined as the feeling of “being there”, while co-presence is the feeling of “being there together with others”. It can be assumed that a GUI where users have high scores in the various aspects of presence is better suited for these environments than one where users have low scores.

What little research has been done on interfaces for multi-user virtual environments where the user is represented by an avatar — has generally focused on the avatar. Research on the rest of the interface has generally been limited to single-

user environments. Multi-user environments differ from single-user in one aspect in particular. In a single-user environment there is obviously only one user that can manipulate the environment; the interface is centered on this user. With multiple users in the environment this changes, now a user can observe changes in the environment not initiated by them. GUI elements that in single-user environments are either static, or could be considered static due to their predictable nature, must be seen as dynamic in multi-user environments. This will influence how the user views the interface elements.

Different types of interaction might require, or at least encourage, use of different interface elements. The interaction, in combination with the different use of the interface, might also affect the feeling of presence. While interactions in these environments can become relatively complex, they will include at least one of these elements: Conversation, Cooperation, or Movement. Each of these elements can be broken down further, but at a more detailed level the differences between the MMOGs become unmanageable. Therefore these three elements were chosen.

Player Types were first introduced by Richard Bartle, the coauthor of MUD and creator of MUD2 — these player types has therefore also become known as Bartle Types. These are archetypes of players, where the players are divided into four categories based on how they approach a multi-user game. The categories are: Achiever, Explorer, Killer, and Socializer. We want to examine whether a user of one player types use the interface in a noticeable different manner than a user of a different player type.

1.2 Claim

Existing research concludes that the avatar is very important, and influences the feeling of presence to a great degree. It also shows that a feeling of presence is an important factor influencing how users approach virtual environments. This raises the question: What about the rest of the interface, what effect does it have?

Assuming the avatar is the main provider of presence, not looking at the avatar should reduce the feeling of presence experienced by the user. One would assume that aiming the focus of the user towards the avatar would be a goal for the entire interface.

My claim is that the user does not focus on the avatar. The user focuses on the interface element with highest concentration of quantified, or abstract, data. Further I claim this is due to the fact that the interface is built on single-user standards that are not suitable for multi-user environments.

In addition, as a result of this, the learning curve encountered when first introduced to these environments is unnecessarily high due to the unfamiliar and unintuitive way to distribute focus between the different elements of the interface.

The layout of the interface and where you focus in the interface affect the feeling of presence. Some interface elements are more likely to generate a feeling of presence than other.

My aim is to see where the user focuses; and see if the choice of focus correlates with any of the elements of presence, player type, or other dependent factors.

1.3 Agenda

The remainder of this report discusses its background, previous research and related issues. Further the reasoning behind the approach taken in this report and choice of methods will be explained. The reason why there is focus on two groups of users, and the reason for not choosing the same approach for both groups will be presented — before the execution of the survey and the experiment are explained in detail. Then we examine three common situations in MMOGs; see where the users focus, and how this relates to their feeling of presence, player type, and other variables. In the end the results of these examinations will be discussed, some conclusions will be drawn, before suggestions for further work are made.

2 Background

2.1 Presence

Presence has been defined in several different ways[10, 16]. The definition best suited for the context of this paper is the feeling of “being there” — the user is mentally transported to a virtual environment. As we will examine multi-user environments we will also discuss co-presence, which can be defined as “being there together with others”. Multiple users are transported to the same virtual environment, and feel like they are together with other real people in the environment. This consist of the mental transportation, or projection, into the environment and the acknowledgement that there are other real users in the environment.

Presence is either mediated or unmediated. To achieve unmediated presence the interface between the user and the environment should not be noticeable, while mediated presence has a tangible interface between the user and the environment. The kind of virtual environments we will explore are mediated. Speech is represented by text, movement is controlled by e.g. keyboard and mouse, the user can watch his own avatar from outside, and so on. While there is great interest in making the mediation as transparent as possible, there are issues in these environments that require mediation; several complex tasks require a certain amount of input to be executed. In addition the users need some kind of feedback on their actions; the possibilities here are currently limited by hardware. Another important aspect is cost, MMOGs are commercial applications. A transparent interface would most likely require increased costs on the user side from additional equipment, something that would reduce the number of potential users.

Enlund[7] proposes three basic factors of presence: Individual Preconditions, Sensory Environment, and Content Characteristics. Attempts to define the basic factors of presence has been made before; the reason this definition was chosen

is that it is more generic than previous attempts, and thus cover all the previous definitions.

Individual Preconditions consist of individually determined psychological factors that influence the sense of presence: Imagination, emotional state, associative context, and suspension of disbelief. Imagination is the ability to imagine things; someone with a strong imagination is more likely to accept a poor quality environment as he or she can provide the missing pieces themselves. People with particular vivid imagination might even prefer this, as it allows them to model the environment they prefer with their own imagination. Emotional state is how the environment affects emotions, to what degree ones emotions can be affected or manipulated is individually determined. Associative context consist of knowledge and previous experience. Someone who has read a lot of fantasy is more likely to accept a new fantasy setting than someone who has no relations with the genre, just as someone with previous experience with a similar environment is more likely to accept it than someone with no previous experience. The exception here is that someone experienced is also more likely to notice errors and mistakes. Suspension of disbelief is the ability to consciously accept something as real.

Sensory Environment is basically how the environment is presented to the user, its technical limitations: Vividness, interactivity and control, and company of others. Vividness is determined by the number of senses involved (breadth), and the quality, or resolution, of the sensory input (depth). Interactivity and control depends on the degree of control the user has on the environment and what kind of response they receive. The company of others refers to other entities in the environment, this is not restricted to other users — but also includes computer controlled entities.

Content Characteristics can be divided into plot and story, narration and dramaturgy, and presentation and execution. Plot and story includes all the elements of the story. Even when there is no huge story arc, there are still stories being told. This is particularly important in the kind of environments we discuss in this report, as each user is part of a unique story, with plots and progression that differ from everybody else. This increases the importance of narration and dramaturgy. As there is neither a predefined order in which different parts of the story appears, nor a predetermined pace, it is important that each part can be experienced as a short story in itself. In the end it is probably presentation and execution, more than anything else, that influence how the content is received by the users. A simple story with poor plots and lacking in narration and dramaturgy can still work well as long it is presented correctly, and is well executed.

Presence is not a goal in itself — it is a tool. The goal is involvement; this is easily seen in how presence is used differently in different environments. News reporters are “on location” even hours after the incident they are reporting took place, in an effort to engage. Books and movies include lots of descriptions, scenery, and such that are not absolutely necessary to tell the, often rather simplistic, story. Developers of MMOGs spend a lot of time and resources to create the different graphical aspects of the world in which the game takes place. MUDs have proven

years ago that a pure text interface to the same game would work — but the graphics increase the feeling of presence, and thus increase involvement from a greater range of potential users.

While the methods applied are different in various media and for different situations, the basic properties remain the same. The difference is in the effect people in different professions seek, the tool itself remains the same. People who can suspend their disbelief while reading a book or watching a movie, are more likely to be able to do the same in a virtual environment — assuming a similar associative context. It is therefore reasonable to assume that the results from research in one field can be universally applied to other fields as far as presence is concerned.

There are various ways to measure presence. Nash et al.[13] have divided these into subjective and objective measures. Subjective reports are the most common measurement report, given that presence is a mental state this comes as no surprise. Several stock questionnaires have been developed based on different concepts and models. There are still a number of issues related to these ways of measuring presence that need to be examined before it is possible to make a unified method or questionnaire. Objective measures, while preferred for quantification, are difficult to implement for presence. A number of conditions, like heart rate, pupil dilation, and blink responses have been suggested as possible indicators of presence. That is all they are though, *possible* indicators — as each of these is a possible indicator for a number of other issues as well. Other proposed methods includes allocation of attention resources between the real and the virtual environment, and possible changes of behavior before and after being in a virtual environment. None of these methods have been tested extensively, and they are thus neither very practical, nor reliable. One would think that a combination of subjective and objective measures would be best, as they have different strength and weaknesses. But there has been little research in this area.

2.2 Virtual Environments

A Virtual Environment (VE) is an artificially created environment in which one or more users can exist in some form. There are several different types of virtual environments; this report will focus on Collaborative Virtual Environments (CVEs). CVEs are basically VEs where multiple users can co-exist and affect each other directly, or indirectly, through an avatar — usually in the form of cooperation.

More specifically we will be examining Massively Multiplayer Online Games (MMOGs); a type of CVE where anywhere from a few hundred to several thousand users can co-exist in the same graphical world. Represented by an avatar the user can move around in a two or three dimensional landscape, meet other avatars and interact with them.

MMOGs can be seen as the result of developing Multi User Dungeons (MUDs) with graphics, Role-playing Games (RPGs) with multiple users, or a combination. RPGs are single-user virtual environments, but otherwise similar to MMOGs. MUDs are text-based multi-user environments where the user is represented by a

character. The avatar is the visual representation of the user, while the character is the abstract representation of the user. An avatar currently only has visual attributes, attributes like strength, agility, and intelligence, and abilities that can be activated by the user are all part of the character. Crudely put the avatar is the container of the character. Thus, what could be called the avatar in a text-based game is the text string with the name of the character. In a case where all the skills of the avatar derive from the skills of the user — there is no character.

Meridian59 (M59) was launched in 1996 and is widely recognized as the first MMOG to be released. There were graphical multi-user games released before Meridian59, but these have been labeled graphical MUDs, rather than MMOGs, due to the way the world was structured (the world, among other things, was organized in the same manner as MUDs). Currently there is a wide selection of MMOGs available, and even more in production. There are more than one million users in Europe and North America, and at least three times that worldwide. However, the rate with which new users are arriving is way lower than first expected.

2.3 The Avatar

Avatar comes from the Sanskrit word “avatara” which means descent, but was commonly used for the incarnations of the Hindu deity Vishnu. It is now being used for an incarnation in human form, or an embodiment of a concept or philosophy — often in a person (“he is the avatar of good”). In CVEs, as in many other applications, the avatar is the visual representation of the user.

There are several studies on the effect the avatar has on the feeling of presence, all of which conclude that changes to the avatar affect the feeling of presence.

Gerhard, Moore, and Hobbs[8] found that there is an overall significant difference between basic shapes, cartoon-like, and humanoid avatars. There also was a significant difference between basic shapes and cartoony avatars - but not between cartoony and humanoid avatars.

Cassanueva and Blake[5] found that there was a significant difference in the co-presence scores between avatars of different appearance. The realistic humanoid avatars produced a greater sense of co-presence than cartoon-like avatars, which in turn produces a greater sense of co-presence than unrealistic avatars. They also found that avatars with gestures and facial expressions produced a significantly higher level of presence than static avatars. They did, however, not find any correlation between presence and co-presence.

Based on this, and other research, we can conclude that the avatar is the main provider of presence in these types of interface.

2.4 User Interfaces

The avatar is only one part of the interface; it seems likely that the rest of the interface has an effect on presence as well. There have been few reported contributions to the structured design and evaluation of VEs, just as there are few guidelines

to usability in VEs[3]. “Understanding of what is meant by usability in VEs is relatively poor, and there is little agreement on which attributes among the many variables of the VE interface are significant, whether they are different in different use scenarios and user circumstances, and how these might be operationalized in design practice.”[17] For CVEs the numbers are even smaller, in particular as there is no indication that VE guidelines can be directly applied to CVEs.

Currently MMOGs have a set of relatively common interface elements. These include the avatar and its surroundings, a chat window, a map or radar, an overview of your status, overview of teammates and their status, the status of one selected target, and feedback from the game. In addition many MMOGs have a graphical overview over a number of user-defined shortcuts. Some of these shortcuts can be to abilities that can only be activated with certain intervals. The shortcut bar then doubles as a status bar as it show the status of these abilities, whether they can be activated, and sometimes the time remaining until they can be used. Each of these interface elements carry quantified information that is useful in certain situations. There are a number of other interface elements as well, but they can be seen as temporary elements, they are only needed in specific situations and are kept hidden when not used.

The only quantified information the avatar carry is its appearance, and possibly an overview over the items it has equipped. In addition its surroundings will reveal the position of objects and other avatars in the vicinity — at least those within the view angle of the avatar. Generally this is the only quantified information located around the avatar; everything else is located in other interface elements. Thus, at the time they are used, each of the other interface elements carries more, and more important, information than the avatar. The avatar can carry what we can call meta-information in many cases: One might see that someone is talking to them, but not what they’re saying, or one can see that someone is hitting them, but not if it hurt.

MMOGs are a relatively new genre, and interface improvements are evolutionary, not revolutionary. How, then, do one decide on an interface for a new genre? First, there is a limited number of interface layouts, only 9 have been identified used in games as shown in figure 1 on the next page. Note that all but one of them has the quantified information located at the edges of the screen (the last one, I believe, is used for two-player console games). RPGs use only a subset of these. As said earlier: a MMOG can be seen as a RPG with multiple users, a MUD with graphics, or a combination. The interfaces in current MMOGs suggest a combination. The interface layout often resembles a traditional single-user interface, with an additional, MUD-like, text window that handle most of the multi-user functionalities like chat in addition to some quantified data (contrary to many MUDs where very little data was actually quantified).

Most single-user interfaces share certain characteristics: A work area in the middle and menus, icons, and other interface elements arranged along the edge of the screen. The elements outside the work area are either static, or changes only as a result of direct manipulation by the user. This might not be true for a multi-user environment; here many of these elements will be dynamic — at least in the sense

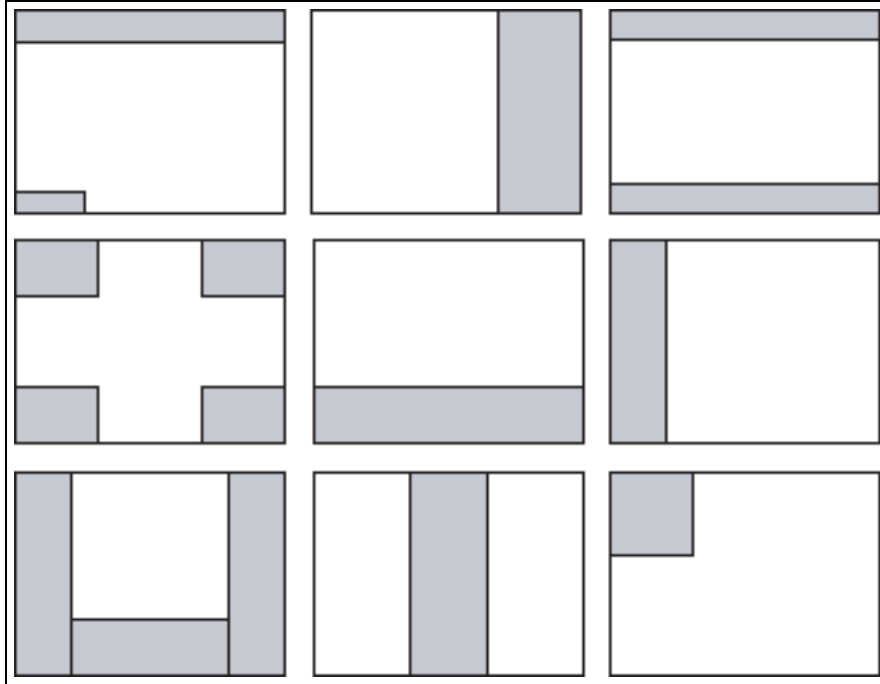


Figure 1: The nine identified interface layouts. Illustration from [15, p. 171]

that they can change as a result of the actions of other users. The users will not be in complete control of their interfaces.

This in itself increases the information density in these elements. But these elements also have a higher density of information in the way that they quantify information that is only hinted at in the avatar and its immediate surroundings. Due to these differences they require a great deal more attention than equivalent elements in a single-user environment. The amount of attention demanded by these elements combined is likely greater than what is required by the avatar. This means the users will be distributing their attention in the interface in a different manner than in single-user environments.

It is unlikely that the existing guidelines for good single-user interfaces can be applied to interfaces for multi-user applications without any modifications. The reason for this is that the user no longer is in complete control of what is happening. There are other people in the world that will do unexpected things. It is therefore important to be aware of the actions of others. The actions of others influence which interface element is most important at any given time. If the information needed to understand these actions is located away from the avatar, this will probably lead the experienced users to move their focus away from the avatar. This might lead to a reduced feeling of presence as one gains experience in the environment. This is the opposite of what one would want to accomplish. The composition of the interface should change to allow for an easy way to retain as

much information as possible without changing focus.

One possible answer here is to present everything as text in the same window. This was done efficiently in MUDs, and the legacy is still very much there in MMOGs. This is contrary to one of the other goals, presence, as this might draw even more focus away from the avatar and its surrounding. Another possible solution would be to relocate some of the information to the area around the avatar. This could have side effects, it could prove distracting, and if the information is very dominating it could still lead the user to ignore the avatar. In addition there is also a point where there is too much information located in one space, overwhelming the user.

2.5 Interaction

There are several types of interactions; Manninen[11] has classified different types of interaction: Avatar Appearance, Body Language, Gestures, Autonomous, Object-based, Language-based, Control and Coordination, Physical Contact, and World Modification.

Certain types of interaction will likely have a higher influence on presence; can these be tied to particular interface elements? If so, this might enable us to examine how the interface affects our interaction with others in a multi-user setting. To use a small example: Communication. If we use the types provided by Manninen, communication consist of Avatar Appearance, Body Language, Gestures, Language-based, and sometimes Physical Contact. In most MMOGs Avatar Appearance, Body Language, and Physical Contact is displayed in the same interface element — the avatar and its surroundings. Language-based is generally displayed in a different interface element — the text box, or chat area. Gestures was originally displayed as text in the text box, but is moving towards the avatar as the growing number of available animations for the avatar allow it to become more expressive. Thus, a simple interaction that requires one point of focus in real life requires you to focus on two different elements in MMOGs. This could affect the feeling of presence. Add a small task to do at the same time, and the user will soon have three or four interface elements with important information — and little indication of which is most important at any given moment.

Other environments have had the same kind of issues, where the user needs a constant overview over a lot of dynamic data in addition to focusing on a specific event. These environments have settled on different solutions, but the best known and most successful is probably the Heads Up Display (HUD), used by e.g. fighter pilots. The HUD display the information as a layer on top of the event the user should keep his focus on, for example as a helmet. The reason why fighter pilots want easy access to as much information as possible is to make better decisions faster. Split second decisions are not as important in CVEs; the goal here is rather to make the users feel as if they are present in the world — together with the other users. While the presence of additional interface elements in the work area might feel like a disturbance, it might be less disturbing for the feeling of presence than

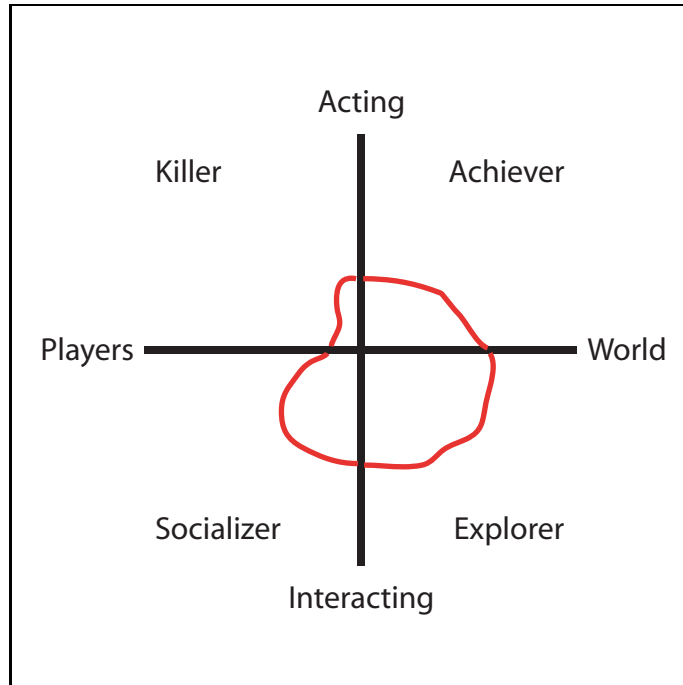


Figure 2: Player Types. Illustration from [2, p. 131]

having to look away and focus solely on that interface elements. E.g. of what use are facial animations if the user is looking at what the other person is saying, which is represented as text on a completely different part of the screen? If the text has been represented as e.g. a chat bubble, the text would be both closer to and connected to the avatar of the person speaking — resulting in a much smaller area that needed attention, enabling the user to watch both the avatar and its message without changing focus.

2.6 User Types

Bartle[2] has defined four player archetypes; Achiever, Explorer, Socializer, and Killer. As seen in figure 2 these can be described in a two-dimensional graph - where the x-axis can be labeled *Interacting/Acting*, and the y-axis *Players/World*. From this we see that the achiever act on the world, while the killer act on its players, and the explorer interact with the world, while the socializer interact with other players. While these definitions are specific to games, the different types actually represent different approaches to the environment, and can be universally applied:

Achievers see the world as a game, their ultimate reward is winning — as in “beating the game” in some way.

Explorers see the world as a pastime, such as reading or gardening. Their

ultimate reward is discovery and furthering knowledge and understanding.

Socializers see the world as entertainment, such as TV, a movie, or a concert. Discussion of the performance and behavior of themselves and others is their main draw.

Killers see the world as sport. Their ultimate reward is winning - as in beating their opponents, the other players. Bartle claim this is of the huntin', shootin', and fishin' kind, rather than the running the 100-meters or the marathon kind. While this was certainly true in the past, due to the lack of restrictions in the environment - it might in fact be changing. That is, the player type isn't changing, the perception of the environment is. Even though hunting, shooting, and fishing are regulated in many countries, they are seen as unrestricted environments. Track and field, on the other hand, has strict regulations that are constantly controlled. But as he point out, the trend is more toward team sports than individual sports. The environment can be controlled and adapted, and currently is, to the point where killers will be unable to engage in their huntin', shootin', and fishin'. The main reason for this regulation is that a large portion of the potential customers do not enjoy being hunted or used for target practice. Fishing is the most difficult to control, as people do not hesitate to act like fish if the bait is tempting enough. Killers are being regulated to the point where they either have to adapt or leave, and thus the player type will not properly reflect their effect on the environment.

In figure 2 on the previous page there is a red graph, this graph represent an imaginary user. This user score highest in explorer, second highest in socializer, followed by achiever, and finally a low score in killer.

There are some important caveats though: This score is not necessarily a characteristic of the player; it is a characteristic of the player in conjunction with one particular environment. While some will approach different environments in more or less the exact same manner, there are others who will change their behavior depending on the environment. In addition, players change over time.

3 Contribution

3.1 Method

Before describing the experiment, survey, and the results it is necessary to explain the choice of methods — as they might not be immediately obvious.

There are various ways to measure the User Interface. How fast a task can be performed, how often mistakes are made, and how intuitive, or easy, it is to learn and use. In addition to efficiency, correctness, and usability there are applications that give the user a feeling of being present at a different location than where he or she is located physically. Presence has been chosen because it is considered the most important measure of virtual environments. In addition, efficiency and correctness are heavily affected by experience while usability testing requires standards to be measured against[14]. While effort has been made to establish usability standards for VEs[3] and CVEs[17], there still are no established usability

standards for multi-user virtual environments. Presence is difficult to measure, as is everything subjective. While it might not be possible to measure exact values of presence, it should be possible to measure a value that is proportional to the value of presence, and then discuss the changes in presence on the basis of changes to this value.

MMOGs were chosen as testing environment for multiple reasons. They have existed for several years and have a large number of experienced users. Experienced MMOG players are among the most experienced users of virtual environments, they often have experience with several different environments. Many MMOGs have similar, but not identical, interfaces, this allow us to easily test for minor differences in the interface. In addition it was desirable to test in an active environment, where there are a number of distractions like sound, lighting, weather, moving objects, additional users, and potential “danger”. A bare-bones system will amplify the effect of changes, in a more complex system the same change might drown in the available data. Distractions increase the difficulty, and importance, of filtering and parsing the available data. This will have a noticeable effect on how the users act and react to changes and differences in the environment.

Data from both novice and experienced users was needed to enable us to draw the necessary conclusions. The data from the experienced users enables us to see which interface elements they consider important in certain situations, and some of the effects of this choice. The data from the novice users will primarily allow us to see any discrepancy between them and the experienced users. We could gain some insight in what is instinctive, and what is the result of experience. In addition it might reveal differences between the novice users.

For the advanced users an online survey was chosen. It would have been difficult to gather a large enough group of experienced users in one location. In addition it was desirable to gather data on several different interfaces; something that required a large and diverse group. It would have been difficult to do this in any other way; the choice was prompted by necessity.

This method has obvious weaknesses. Many MMOGs have interfaces that can be modified to some extent, an exact statement about the interface of each game is not possible — assumptions have to be made. There is no way to explain possible ambiguous questions. However, everybody who took the survey had the possibility to leave feedback, and none of the feedback indicated this to be a problem.

An experiment was conducted with the novice users. The reason for this choice was due to two issues: Primarily a controlled environment was needed. To be able to answer the relevant questions it was required for the participants to experience specific situations. In addition it was important that they experienced these situations in similar environment, and with an identical interface. Secondly there are a number of issues involved in entering these environments for the first time, information can be scarce and far from everything is obvious. It was therefore necessary that the participants started off with the same background information, with only their experience to differentiate them.

There are drawbacks to this method, the users would find themselves in an

unfamiliar environment, and they might enter the virtual world at a higher pace than they would ordinarily do; as they went through neither the character creation nor the newbie tutorial area. This was due to the fact that this MMOG will start new avatars off in a random generated area, from which they will enter the world in a semi-random location. This would make it impossible to collect everybody in the same area in less than a couple of hours, at which point the experiment could start — since the experiment required them to be in a group. Neither would they have access to much documentation, however an introduction to the interface was given, in addition to explanations of what else they needed or wanted to know. All these issues were dealt with in an effort to reduce the impact, but there would necessarily be an impact.

It would be unrealistic to expect users to immediately become familiar with a new interface, in particular a completely new type of interface. The data collected will reflect this — and could show results of expectations and reactions rather than interaction.

The main thing we want to explore is whether the focus of the user affects, or is affected by, presence or player type, meaning: Does someone focusing on one interface element experience the MMOG differently from someone focusing on a different element. Where people focus will be decided by what they are doing at the time. Three typical situations have been selected, and will be explored independently. By doing this we hope to isolate each situation enough to identify the factors that influence the focus of the user in each situation. The three selected situations were communication, cooperation, and movement.

Communication involves talking to other users, both those in your vicinity and those far away. During communication the user interact with other users, but not with the environment or computer controlled entities. This might be the activity where a sense of presence is both most important and most likely to be generated. Communication in MMOGs is text based; conversations are typically displayed in a text box in either the lower left corner, or in the lower middle of the screen. There are usually different modes of communication, a message with no prefix will reach those in your immediate area, but with different prefixes you can communicate with the people in your group or guild (an association of users with similar interests who enjoy each others company), or talk to one person without allowing others to listen. Separate channels dedicated to particular issues are also common, trade can be one example.

Cooperation can be defined as an activity that requires you to coordinate your actions with one or more users. It commonly involves manipulation of the interface while also being able to converse with the people you cooperate with in an effort to coordinate your actions. Cooperation is the most complex of the selected tasks, as it usually involves interaction with the environment and computer controlled entities, as well as other users. Cooperation is defined in a somewhat broad context, as it would be impossible to ask narrowly enough defined questions. What cooperation consist of differ between MMOGs, but the assumption can be made that the core elements are similar. Unfortunately this does not allow us to narrow

down the possibilities, as the actions needed to perform the same core task will not necessarily be similar in every MMOG. As an example, combat usually includes the coordination of: targeting, dealing damage, taking damage, healing damage, positioning, and so on. Some games rely more heavily on some aspects than others. But cooperation here is much like in any other context: Understand what the others are doing and either perform your task at the correct time, or perform the complimentary action when it is needed — and inform the others of what you are doing. This is true for both small groups of 2-3 people and large forces of 50-100. It would be reasonable to assume that people with different tasks will focus on different parts of the interface. Something that is not caught by this survey, as the element you focus on while doing a task in one MMOG might not be the element you would choose when performing the same task in a different MMOG.

Movement is the operation of relocating from A to B. By moving, actually crossing the distance is assumed, no “teleportation” or other modes of instant travel. Movement is reasonably similar for all games, the only slight difference can be the controls involved, but that difference is not large enough to influence where the user focus during the operation. Movement involves interaction with the environment and often computer controlled entities, but not much interaction with other users.

3.2 Interface

This report is based on the concept that a user interface is made up by several interface elements, and can be described as the sum of these elements. While there are various ways to define what an interface element is, we chose to define it as something that has defined contextual boundaries and is presented in a limited visual space. Information that is used in the same context, but is located in several places on the screen is not one interface element. Multiple types of information located in one spot should not be considered one interface element either, but we will ignore this once in the experiment for the sake of simplicity.

There are two main types of interface elements, those the user access all the time, and those that are only shown when they are used. The latter type are not interesting for this report as they get a lot of attention for a period of time, but other than that they get no focus at all. We want to examine how the users distribute their focus between the interface elements they use regularly.

Defining the interface elements proved a bit problematic since different MMOGs have slightly different interfaces, and therefore also slightly different interface elements. In the end we ended up with five elements: The Avatar, The Chat Area, Status Bars, Overhead Map, and Gameplay Feedback.

The Avatar is the graphical representation of the user; the interface element also includes the immediate surroundings of the avatar. There is generally little difference in how this element is displayed. This interface element usually give the user information on what equipment his and nearby avatars are wearing, where in the world the avatar is located, and its position compared to other avatars and

entities. In addition some interfaces display information regarding health, changes to health, and temporary effects on the avatars.

The Chat Area is where all communication is displayed. This is usually a box located on the lower half of the screen, but it can also be displayed as speech bubbles above the head of the avatar. Some interfaces have two chat areas, where each area display different types of communication, e.g. all modes of communication is displayed in a text box, but vicinity chat is displayed in chat bubbles as well.

Status Bars include all the status bars the users are likely to see; both their own, their target, and their team. Unfortunately this can not always be seen as one single interface element, but they are usually not divided into more than two groups. It could also be argued that the shortcut bar should be considered a status bar as it often keeps track of timed events and such. The shortcut bar is a visual presentation of selected keyboard shortcuts, some of which can only be activated once in a given timeframe - in many cases the icons in the shortcut bar gives an indication on whether or not a shortcut is available, and in some cases how much time remains until it becomes available.

Overhead Map is an element that not all MMOGs have, but it is a relatively important element for those who do, and therefore should be part of the survey. Figure 11 on page 28 show examples of maps and a more in-depth description follow there.

Gameplay Feedback is an element that is displayed in many different ways. It is often displayed in the same window as chat, but can also be displayed around the avatar.

During the experiment we only had to consider the interface of AO, and thus the interface elements could be chosen to more correctly reflect this exact interface. In addition we were dealing with novice users - and some of the finer distinctions between interface elements might have been lost on them (in particular the idea of having two interface elements occupying the same location on the screen). Therefore we ended up with the elements seen in figure 3 on the next page: 1. The Avatar, 2. The Text Area, 3. Status Bars, 4. Overhead Map, and 5. Group View as the interface elements here.

The Avatar is the same as in the survey, as is its immediate surrounding. Some information is displayed around the avatar, in particular temporary effects and changes to health.

The Text Area includes both the chat area and the gameplay feedback. Since these were novice users it was decided not to make a distinction between the two (as little of the gameplay feedback would seem essential from the user's point of view).

Status Bars are the users own and those of his or her target, as these are displayed in approximately the same location. As said before, one could argue that the shortcut bar (6) in figure 3 on the following page also acts partly as a status indicator. This was not taken into consideration/anticipated - but should have been, as a couple of participants spent an inordinate/excessive amount of time focused on this element.



Figure 3: The major interface elements of AO. See figure 21 on page XXXIV in Appendix C for a larger version

Overhead Map refers to the map AO has. This map is upgradeable, as the participants were using low level avatars; their map was not upgraded and did not display as much information as it can. This element was not available to the participants during the entire experiment.

Group Overview refers to the status bars of those in ones team. These are located in a different location than those of the user. In addition this element will give the users an indication of how close they are to their teammates. This element was not available to the participants during the entire experiment.

3.3 Survey

The survey consisted of several groups of questions: Demographics, presence, player type, focus, and a few questions that didn't fall into a particular category.

A number of the presence questions are the equivalent of those used by Gerhard et.al.[8]. Even though they have chosen different definition of presence, with Immersion, Awareness, and Immersive Tendencies as basic factors, the questions can be mapped into the definition proposed by Enlund[7].

There is a survey on the web known as the "Bartle Test"[1] that attempts to classify the person taking the survey as a combination of player types. Too many additional questions were required to use the same type of questions in this survey. A different approach was chosen, where, instead of selecting a preferred way to

handle situations in the virtual environment, one was asked to rate how important different types of interactions were to them. Thus a rough overview of player types could be established.

The focus questions are the key questions of the survey. One has to select which interface element one has most and least focus on during different types of interaction, choosing from the five most common and dominating interface elements. Some additional questions were added in an effort to examine certain variables not included in the other categories.

The survey was posted on the web and linked to from the message boards of two sites frequented by experienced MMOG players (<http://www.waterthread.org> and <http://www.player2player.net>), this also left room for comments.

3.4 Experiment

The experiment consisted of three groups with four participants each. All participants were experienced computer users. Two groups started without access to the map and group overview interface elements, see figure 3 on the previous page, available and could only communicate through the /tell prefix (a message directed at one other user), once they had managed to find each other they could use vicinity chat (no prefix). Before the third task they gained access to both interface elements, and were allowed to use /g (a message to the entire group). The last group started with access to both elements and /g, but lost access to the interface elements prior to the third task.

There were three tasks for the groups to complete; all were common situations users find themselves in during a play session: Locate other users, locate a building and a peaceful NPC, and explore a building while fighting hostile NPCs. After completing these tasks the users would have experienced communication, cooperation, and movement in the virtual environment.

Anarchy Online

In this chapter we will present some more indepth descriptions on why AO was chosen as the testing environment for the experiment and the choices made in the environment. Experience with AO might be needed to fully benefit from this chapter.

The original goal of the experiment was to see how the users reacted when information was displayed differently, in different interface elements (e.g. SW:G with and without speech bubbles). This turned out not to be practical. The main reason AO was chosen as a testing environment over other MMOGs was because it has a feature none of the other candidates had - an indicator on the avatar that it had spoken. When someone in AO talk to people in the vicinity, their head will blink. To examine if users noticed this would be interesting, as it might suggest how efficient facial expressions would work with this interface.

The choice of AO came with a couple of problems as well. After a player has created his character the character is teleported to a semi-random location in the world. The initial area is a tutorial area you can not leave before you have gained a level (an abstract measure of the experience a character has gained). While this would have been great for new players, it would both have taken a lot of time and it would not have been part of the experiment. It was therefore decided to move the characters through the character creation and the tutorial area prior to the experiment. Aside from the fact that not enough participants would have been available for an experiment with the increased duration and that the additional time spent would not benefit the experiment — there are also few of the current MMOGs that have a tutorial area, users are usually dropped directly into the world.

AO has two main interface layouts to choose between, the oldest one was chosen. The reason for this was that parts of the experiment was to be run without the use of some of the available interface elements. In the new layout the buttons activating these elements are centrally located, while in the old layout they were in the upper right corner and not as tempting to use.

Each group had six avatars to choose from: Solitus Male Soldier, Solitus Female Doctor, Solitus Female Adventurer, Opifex Male Agent, Opifex Female Fixer, and an Athrox Enforcer. Avatars were chosen so they would look different but relatively normal (so no Nano). Professions were chosen to avoid pets, and to a large degree nano-formulas, in an effort to reduce the amount of controls the participants would have to learn.

The participants started in the Entertainment District of Omni-1, which might seem unfortunate due to the symmetric nature of this area. The reason why this place was selected was Baboons, a nightclub located here. It was deemed necessary to allow the participants time in a friendly indoor environment so they could get used to it before continuing to the mission area. Baboons was chosen because of its size and complexity compared to other static indoor areas.

Due to the random nature of missions in AO a group mission was selected for each group prior to the beginning of their session, to ensure their destination was in a place they could reach easily. All three groups were given a mission of the “Locate an NPC” type of slightly above medium difficulty. Group missions in AO includes a “boss room”. The room with the target of the mission can only be reached through a teleporter and is significantly more difficult to survive than the rest of the mission.

Task 1

The first task was to locate the other participants. Meeting up with other users is something you’ll always required to do; to join a party, trade or any other action that require more than one user require all involved users to be in the same area in the virtual space (usually close enough for visual contact). This obviously involves movement, but also a great deal of communication.

As seen in figure 4 on the following page the participants started a bit apart,



Figure 4: The outdoor area explored by the participants of the experiment. The six green dots represent starting points, the three blue dots represent meeting points, and the red line show the area covered. The entire area is approximately one square km.

but with the exception of 2 avatars, they all shared at least one point of reference with the others.

The real world analogy would be that they were in a town that was foreign to all of them and wanted to meet. They had mobile phones (/tell) and could communicate with everybody they were supposed to meet. One group even had GPS (map). It seems the logical first step would be to locate each other and to find common points of reference in the area. This analogy failed.

What happened, with all three groups, was the complete opposite. The first thing everybody did was to pick a direction and move in that direction. Only after 3-5 minutes had passed did they start communicating, but by that time no one had common reference points.

This behavior is analogous to children in a supermarket. There are too many interesting things to explore, so they lose track of their parents. When they start looking for their parents, they just decide on a direction (towards whatever looks boring, as that is probably where parents would go) and move in that direction.

Once they started communicating they slowly started to move back towards where they started. When they finally met, no group was further than 50 meters away from where one of their members had started. The group that started with the map was the one that spent least time to gather, but only by a couple of minutes. With the map they had three methods of describing their location, describing features in the virtual world or on the map, or using the map coordinates. Some time

was spent using all three, causing a good deal of confusion, before they agreed on one method.

Task 2

The second task was to first locate a building, and then locate a NPC in that building. This is a very common task as NPCs often have information, items or something else players need. This task is mostly dependant on movement, and the ability to orientate in a virtual environment. In addition this task was meant to prepare the participants for the third task.

The building they were to locate was very close to where one of the participants had first started (on purpose, in an attempt to make the search easier), but locating it did prove difficult. Both because navigating a city of this size is difficult when one is unfamiliar with it, keeping the team together also proved a bit of a challenge. Focusing on both the communication with the other participants and where they were heading proved difficult, those who spent too much time focusing on the communication often got separated from the group. Locating the npc within proved just as difficult, at least for those who did not yet have access to the map — as the layout proved a bit disorienting. All rooms were searched repeatedly.

Task 3

Prior to the third task the participants had to locate a house; during this part all groups had access to the map, locating this house without a map would have been a small challenge even for experienced users. The task itself was to locate a NPC within the house; however, this NPC was hostile and defended by other hostile NPCs.

The participants were very careful in the beginning while figuring out how combat worked. As they met few real challenges they got more and more confident until they were to enter the final room. To enter this room they had to use a teleporter. When they teleported they got confused, in particular those using the 3rd person camera, as the camera angle was changed. To re-orientate they chose to move their avatar instead of moving the camera. Moving the avatar probably seems like a more natural thing to do, in addition this was the first time moving the camera had a distinct advantage. By moving the avatar they alerted the NPCs in the room of their presence and came under attack. Earlier they had only fought one NPC at a time, now they had to fight three. This lead to a great deal of confusion and nobody survived their first trip here.

However, in spite of all their problems, most of the participants claimed they actually enjoyed the experience — further proving the power of this media. In particular the social animations, buying and finding items, and equipping the avatar with items that changed its appearance was enjoyable.

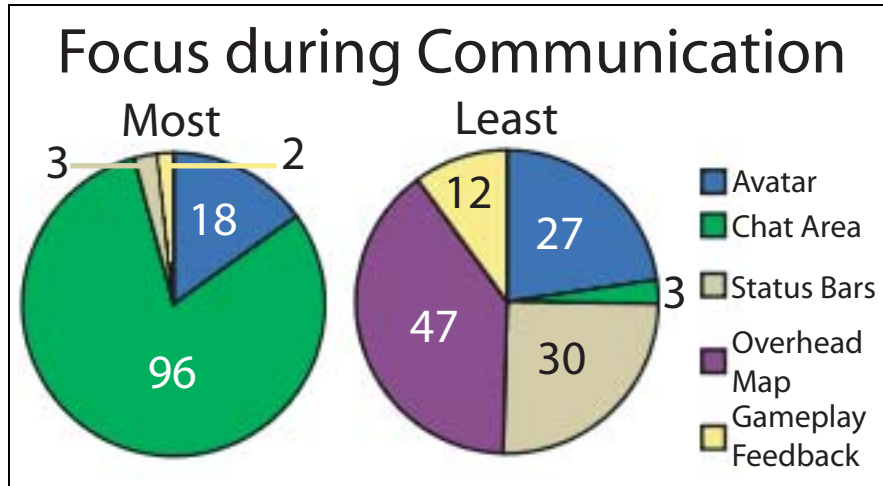


Figure 5: Focus during communication

4 Results

4.1 Interface Types

Some of the results presented in this chapter might be difficult to understand for those who do not know MMOGs intimately. To better illustrate the effect of the interface we will, in addition to presenting the results, also compare the distribution of focus in the four most selected MMOGs in the survey: Dark Age of Camelot (DAoC), Everquest (EQ), Star Wars:Galaxies (SW:G), and Ultima Online (UO). While the layout of the interface differs between all the four games, they can be divided into two groups. DAoC and EQ share the same philosophy, and so does SW:G and UO. DAoC and EQ have the more traditional single-user interface, where all quantified information is located in windows arranged along the edges of the screen. SW:G and UO can be seen as more “avatar-centric” as they display, in particular chat, but also gameplay feedback in the area around the avatar (in addition to the more traditional view, it should also be mentioned that UO built its interface directly from a single user interface). In addition, UO and SW:G have an overhead map as part of the client, while EQ and DAoC can only access a map through third party applications (whose use is a bannable offense). Thus, if we take a closer look at these MMOGs we should get a better picture of the effect of the interface.

4.2 Communication

In figure 5 we see that 80% of the people who completed the survey have their main focus on the chat area, while 15% have their main focus on the avatar. However, in table 1 on the following page we see that all but two of the people with main

Game	Most Focus during Communication					Total
	The Avatar	The Chat Area	Status Bars	Overhead Map	Gameplay Feedback	
Anarchy Online	0	5	0	0	0	5
Asheron's Call	0	9	0	0	0	9
Asheron's Call 2	0	2	0	0	0	2
Dark Age of Camelot	0	24	1	0	0	25
Everquest	1	15	1	0	1	18
Everquest Online Adventures	0	0	0	0	0	0
Final Fantasy XI	1	4	0	0	0	5
Horizons	0	2	0	0	0	2
Neocron	0	2	0	0	0	2
Shadowbane	0	8	0	0	0	8
Star Wars: Galaxies	3	7	0	0	0	10
Ultima Online	13	12	1	0	0	26
Other	0	6	0	0	1	7
Total	18	96	3	0	2	119

Table 1: Distribution of focus during communication in each game

focus on the avatar are basing their answer on SW:G or UO. In UO regular communication is displayed above the head of the avatar, while communication within a team is displayed only in the text area (assumedly due to this being added later). SW:G has a similar system; while the game has a text area similar to other games, all vicinity chat is also displayed above the head of the avatar. This means there is no great shift of focus required to cover both the avatar and the chat. So, while they might focus on the avatar, they also have the conversation in plain sight. If we disregard these two games we see that of remaining - only 5% have their main focus on the avatar and not the chat.

It is also interesting to notice where users have least focus. The avatar, while not considered as unimportant as the overhead map, is considered only slightly more important than status bars. With the reliance on body language and facial expressions in regular conversations this is quite surprising. This suggests that these interfaces are not particularly well suited for communication, which might be attributed to them being built on a single-user interface template. This also suggests that adding facial expressions might not be very effective in these interfaces.

Case

In figure 6 on the next page we see that in the traditional UI (DAoC and EQ) all but a few focus on the chat area, while in the avatar-centric (SW:G and UO) a substantial amount focus on the avatar. In addition, since the chat is displayed near

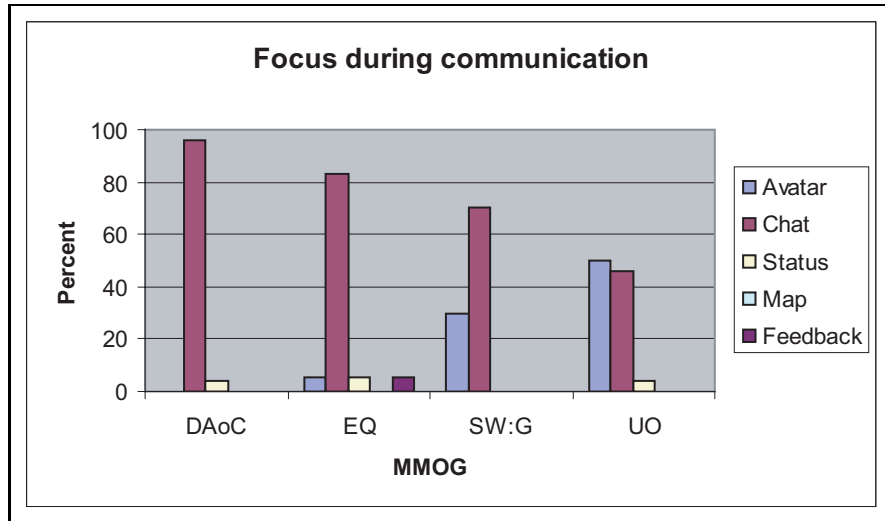


Figure 6: Focus during communication in 4 selected MMOGs

the avatar, it can be assumed that many who focus on the chat in the avatar-centric UI have the avatar in focus as well — something that is impossible in the traditional UI. It must be noted that SW:G has a regular chat window as well, and UO has a journal (both can be observed on respective screenshots in appendix c), the UO journal is rarely used as a chat window (or at all).

4.3 Cooperation

As seen in figure 7 on the following page the distribution of focus here is reasonably even between the avatar, chat area, status bars, and gameplay feedback. Notice that the avatar has the second lowest score. The results are also evenly distributed between the different games as seen in table 2 on the next page. This could mean there are individual criteria that eventually decide where you choose to place your focus, like your task during the cooperation.

A more telling way might be to see what the users are not looking at. Again the avatar score very poorly, as close to 30% say it is the part of the interface they focus least on - again only outdone by the overhead map. This suggests that with the exception of those who have primary focus on the avatar, the avatar and its immediate surroundings do not carry important information.

Case

As shown in figure 8 on page 25 there are differences between the MMOGs, but not significant ones. This can be attributed to the requirements of different tasks during cooperation. As cooperation becomes more complex it has become common to divide the large task into small and simple tasks - thus each participant will only

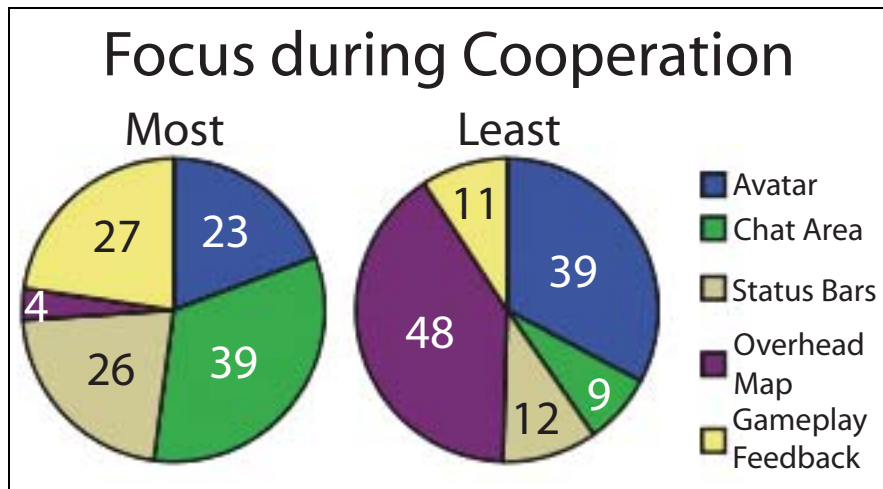


Figure 7: Focus during cooperation

Game	Most Focus during Cooperation					Total
	The Avatar	The Chat Area	Status Bars	Overhead Map	Gameplay Feedback	
Anarchy Online	0	1	1	0	3	5
Asheron's Call	1	2	2	0	4	9
Asheron's Call 2	0	1	0	1	0	2
Dark Age of Camelot	6	9	8	0	2	25
Everquest	2	5	3	1	7	18
Everquest Online Adventures	0	0	0	0	0	0
Final Fantasy XI	0	4	0	0	1	5
Horizons	0	2	0	0	0	2
Neocron	1	1	0	0	0	2
Shadowbane	3	3	0	1	1	8
Star Wars: Galaxies	4	2	2	0	2	10
Ultima Online	6	7	9	1	3	26
Other	0	2	1	0	4	7
Total	23	39	26	4	27	119

Table 2: Distribution of focus during cooperation in each game

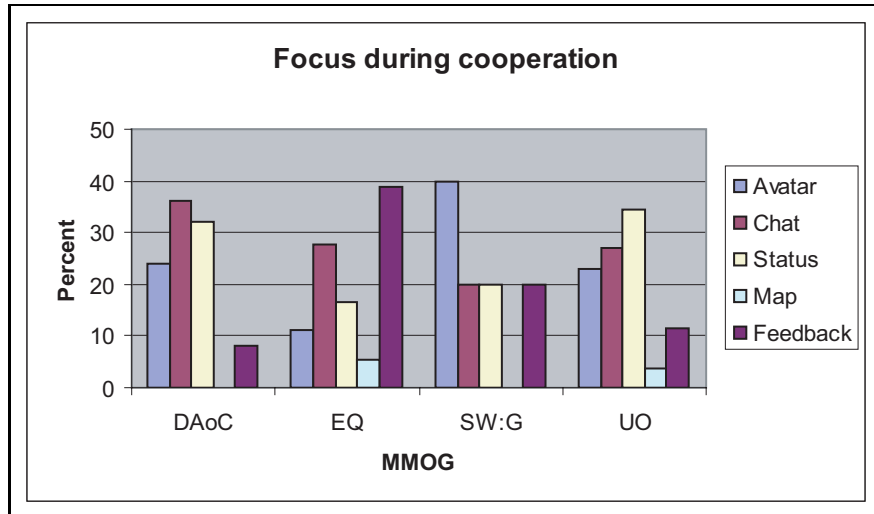


Figure 8: Focus during cooperation in 4 selected MMOGs

focus on the interface elements needed to perform their particular task. It is interesting to note that a different interface element score highest for each game. This could be a result of both information placement and what information is considered important overall.

4.4 Movement

As can be seen in figure 9 on the next page the distribution is heavily in favor of the overhead map and the avatar. Again, if we look at the distribution between the games in table 3 on the following page we will see that DAoC, EQ, and UO are the games where most people focus on the avatar. This can be explained; DAoC and EQ do not have an overhead map, leaving the avatar and its immediate surroundings as the only interface element with much relevant information regarding ones movement. However, the observant reader would notice that both these games have a portion of answers saying they actually focus on the map. This could be because there is third-party programs that will create a map from the information sent to the client. This is, however, considered cheating. For UO it might be because there are many things that do not show on the map that it isn't very valuable for navigation, only for telling where you are. But then again, the majority in UO actually focuses on the overhead map. This could be because there is a legal third party program that enables a much more detailed map than the one in the client. This can only be speculation, as the survey did not provide information that can shed light on these questions.

If we examine what they focus least on, we'll see that the avatar doesn't do as badly here as in the two first situations; the overhead map is the only element with a better score. From this we can assume that the avatar and its immediate

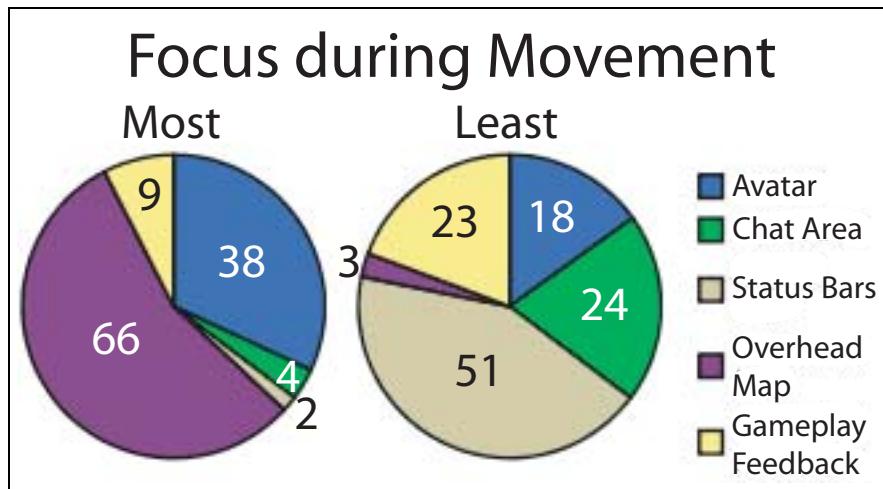


Figure 9: Focus during movement

Game	Most Focus during Movement					Total
	The Avatar	The Chat Area	Status Bars	Overhead Map	Gameplay Feedback	
Anarchy Online	2	0	0	3	0	5
Asheron's Call	3	0	0	6	0	9
Asheron's Call 2	1	0	0	1	0	2
Dark Age of Camelot	14	1	1	6	3	25
Everquest	6	0	1	9	2	18
Everquest Online Adventures	0	0	0	0	0	0
Final Fantasy XI	2	1	0	1	1	5
Horizons	2	0	0	0	0	2
Neocron	0	0	0	2	0	2
Shadowbane	3	0	0	5	0	8
Star Wars: Galaxies	0	0	0	9	1	10
Ultima Online	5	1	0	19	1	26
Other	0	1	0	5	1	7
Total	38	4	2	66	9	119

Table 3: Distribution of focus during movement in each game

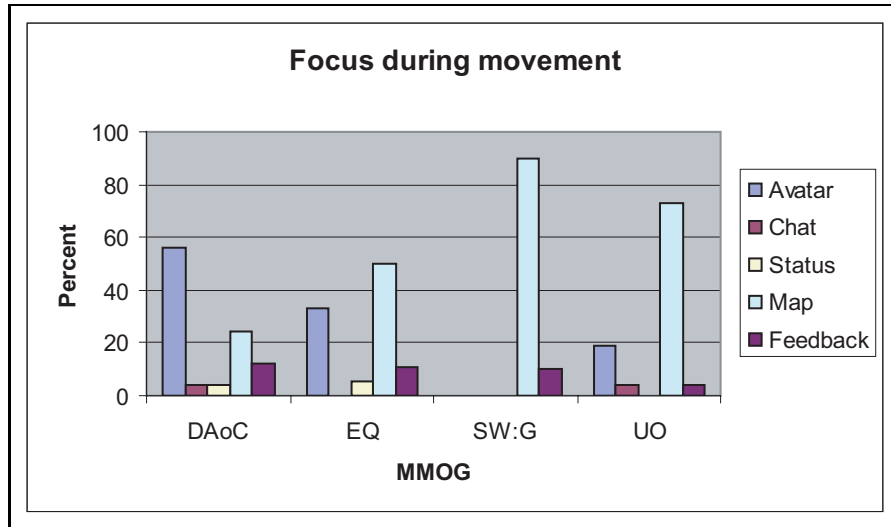


Figure 10: Focus during movement in 4 selected MMOGs

surroundings hold at least some information that is more important than the other elements in this situation.

Case

In figure 10 we see that users of MMOGs with a native map rely almost completely on the map during movement. If we look at the maps in figure 11 on the following page (note that the maps have been scaled) we can compare the maps.

The map from SW:G holds a lot of information on dynamic objects; in addition there is a map that can be displayed as a transparent layer that also show static objects (see the screenshot in appendix c). The purple dots represent allied players, the blue dots represent neutral and enemy players, the white dots represent special NPCs like trainers, and the white squares represent objects that can be used. In addition, peaceful creatures are represented by yellow dots and aggressive creatures by red dots. Entities that have just left the radius covered by the map are represented by small arrows at the edge of the map, and active waypoints are shown with large arrows. Below the map are the coordinates of the spot you're standing in. The large blue triangle points north.

The map from UO only show static elements and features in the landscape, it does not give any information about dynamic objects and entities. UO Auto Map (UOAM) in addition shows names and icons for points of interest, world coordinates, but it does not show any dynamic objects or entities either. In addition UOAM has a lot more functionality than the native UO map, it can be scaled, users can add their own notes to the map, and so on.

The value of the map is easily shown by the number of people who claim to use



Figure 11: Maps. Top left: UO. Bottom left: SW:G. Right: UOAM

a map in DAoC and EQ. People rather risk getting banned than playing without a map. Admittedly, the illegal maps that exist for these games aren't merely maps — they include a lot of additional info that gives you a noticeable advantage.

4.5 Focus in the Experiment

Up to this point we have only examined the results from the survey; the results from the experiment were different. The participants can be divided into two groups; half focused primarily on the avatar and secondarily on the char area, while the other half divided their focus between all interface elements — irregardless of their value in the situation. Why would this be the natural reaction in meeting with this interface?

Those who focused mainly on the avatar basically treated the interface as a regular single-user interface. They kept their main focus on the work area, and focused on the other interface elements when they thought they needed to, and not as a reaction to changes in those elements. This makes sense, the layout resembles a single-user interface and it would therefore be easy to draw the conclusion that the interaction with the interface would be equivalent also.

Those who divided their focus between all the interface elements were probably searching for information; they wanted feedback on their actions the avatar

	Chat Indicator	
	Frequency	Percent
Yes	2	16.7
No	10	83.3
Total	12	100.00

Table 4: 2 of 12 noticed the chat indicator

Precondition	Most Focus during Communication					Total
	The Avatar	The Chat Area	Status Bars	Overhead Map	Gameplay Feedback	
1	7	24	0	0	0	31
2	7	23	2	0	0	32
3	3	31	0	0	1	35
4	1	13	0	0	1	15
5	0	3	1	0	0	4
6	0	2	0	0	0	2
Total	18	96	3	0	2	119

Table 5: Focus during communication compared to precondition scores

did not give them, and their unfamiliarity with the interface left them perpetually searching. Thus, unlike the first group, they did change their focus as a result of changes to the interface elements, but they did not possess the knowledge needed to recognize important information.

AO has a chat indicator; the head of an avatar that speak blink strongly (see AO screenshot in appendix c for an example). In table 4 we see that only 2 of the 12 participants in the experiment noticed this chat indicator. Considering that half the group had a strong focus on the avatar, one would think this number would be larger. In addition, neither of those who noticed the chat indicator had their main focus on the avatar. They were both in the group that distributed their focus more evenly between the different interface elements. This strongly suggests that people might not actually focus on the part of the interface they believe they focus on. Further, one has to wonder what effect facial expressions and animations will have when users don't even notice this bright flash.

4.6 Presence

Individual Preconditions

As seen in figure 5 on page 21; most users focused on either the avatar or the chat area, we tested whether there was a possible correlation between this focus and any of the factors of presence. We found a possible correlation between individual

preconditions and whether people focused on the avatar or the chat area. A two-tailed t-test shows that the difference between the means is statistically significant ($t = -2.100$, $df = 112$, $p < 0.05$). Meaning there is a correlation between preconditions and where people focus most during communication; those with a high focus on the avatar during communication also score higher on preconditions.

The precondition score is calculated from the answers to selected questions in the survey. The scale is from 1 to 6, where 1 indicates a high score in preconditions and 6 a low score. When looking at the preconditions scores in table 5 on the previous page it is important to remember that these are long time users. They should score quite high in this area, as those with a low score would likely not want to become users in the first place. Since these are long time users it might be more correct to use the word condition. There is no easy way to tell if the prolonged exposure to virtual environments will increase the acceptance of situations that might seem strange when you're first introduced to them. Meaning; there is a possibility that the Individual Preconditions are affected by experience. In addition the distribution of focus in the different MMOGs is slanted, which might suggest that the correlation is between specific MMOGs and precondition scores. However, nothing has been found that support this.

Sensory Environment

As shown in figure 9 on page 26 users are focusing on either the avatar or the overhead map during movement. Again we tested for correlations between this focus and the factors of presence. A possible correlation between the focus and sensory environment was found. The two-tailed t-test shows that the difference between the means is statistically significant ($t = -2.237$, $df = 102$, $p < 0.05$). Meaning there is a correlation between sensory environment and where people focus most during movement; those with a high focus on the avatar during movement have higher sensory environment scores.

The sensory environment score is calculated from the answers to selected questions in the survey. The scale is from 1 to 6, where 1 indicates a high score in sensory environment and 6 a low score. In table 6 on the next page we see that sensory environment scores are generally lower than preconditions. It would have been interesting to see how much of this is due to the GUI, and how much is due to the controls. Unfortunately this survey does not allow us to explore this. In addition it raises a question about how much interference from the interface the users are willing to accept. We see in table 3 on page 26 that the distribution of focus is more evenly distributed in each MMOG during movement than during communication. No correlation between specific MMOGs and sensory environment scores was found.

Sensory Environment	Most Focus during Movement					Total
	The Avatar	The Chat Area	Status Bars	Overhead Map	Gameplay Feedback	
1	6	1	0	7	1	15
2	18	2	1	15	3	39
3	6	1	0	18	2	27
4	3	0	1	15	1	20
5	4	0	0	6	2	12
6	1	0	0	5	0	6
Total	38	4	2	66	9	119

Table 6: Focus during movement compared to sensory environment scores

Content Characteristics		
	Frequency	Percent
1	5	4.2
2	27	22.7
3	68	57.1
4	17	14.3
5	2	1.7
Total	119	100.0

Table 7: Content Characteristics scores

Content Characteristics

Content Characteristics varies from MMOG to MMOG. No correlation between Content Characteristics and where users focus was found in any of the three cases. If one considers that these are permanent properties, and not something that change depending on how one interact with the environment - they might however affect what kind of MMOGs different users choose.

One example of this is that users who have a high score in the explorer player type also score higher on content characteristics than those with high scores in other player types. This is not surprising as the explorer is the user type that relies on the widest range of content types.

The content characteristics score is calculated from the answers to selected questions in the survey. The scale is from 1 to 5, where 1 indicates a high score in content characteristics and 5 a low score. In table 7 we see that the overall distribution makes it unlikely to be a significant difference in the mean of two samples.

There is one important caveat: There is no way to reliably test for correlation for each individual MMOG, as the sample size for each MMOG is too small - it is therefore a possibility that a correlation exist that has not been caught by this

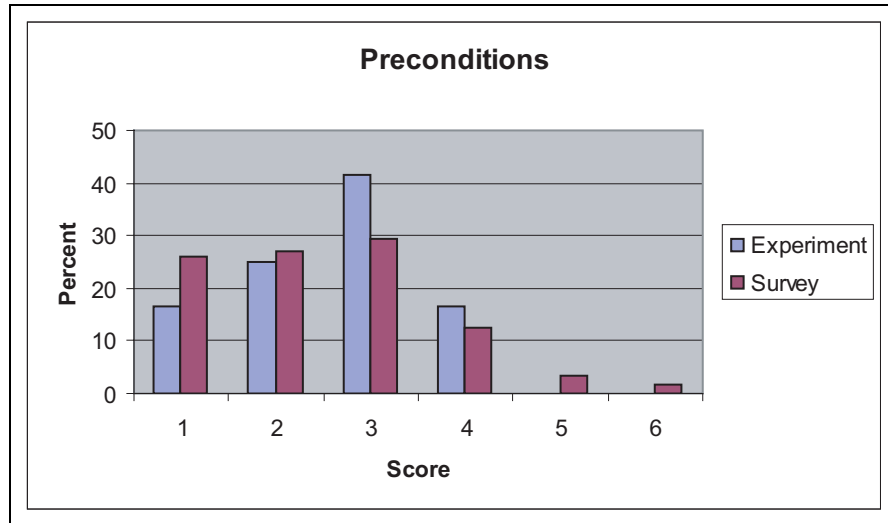


Figure 12: Comparison of precondition scores between novice and experienced users.

survey.

4.7 Experienced versus Novice users

In this chapter we will examine some of the differences between novice and experienced users. We did not have enough participants in the experiment to do much statistical analysis, but there are a few issues that are interesting.

Comparing precondition scores between the novice and the experienced users, as have been done in figure 12, we see that they almost follow the same curve. It is important to note that score for the experienced users is in connection to CVEs, while the score for the novice users is more general. The similarities are still interesting, as one would initially assume that the experienced users would score higher than the novice users since users with high precondition scores would likely not enjoy a MMOG.

In figure 13 on the next page we see what might be the answer. The sensory environment scores of the novice users are almost inverted compared to those of the experienced users. This clearly shows the challenge one is facing when introducing new users to these environments. A partial explanation for the churn rate of novice users might also be found here.

In table 8 on the following page we see that while the majority of the novice users preferred the first person view, most of the experienced users prefer a third person view. The participants of the experiment that commented on their choice of view said easier movement and better navigation were the main reasons for choosing a first person view. We have no data on why experienced users prefer third person view, but one possible reason could be that it gives a better overview

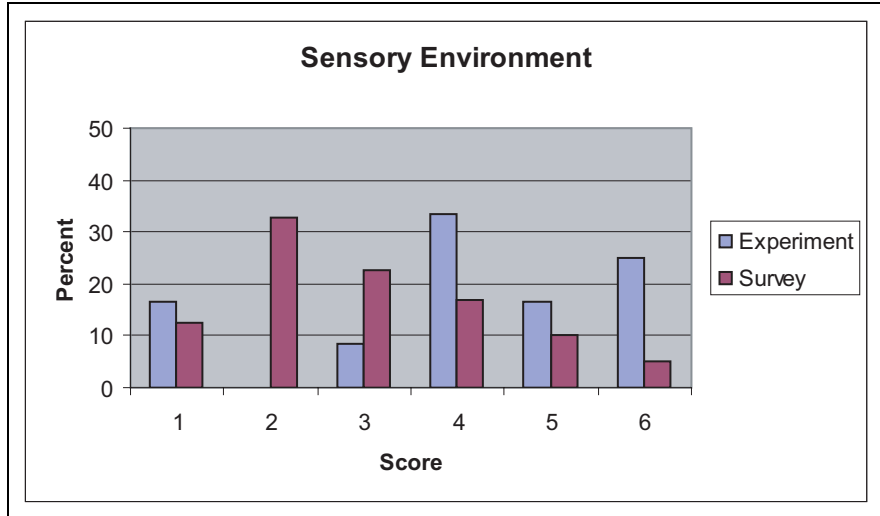


Figure 13: Comparison of sensory environment scores between novice and experienced users.

	Experiment		Survey	
	Frequency	Percent	Frequency	Percent
First Person	9	75.0	37	31.1
Third Person	3	25.0	82	68.9
Total	12	100.00	119	100.0

Table 8: 1st. person vs. 3rd. person view

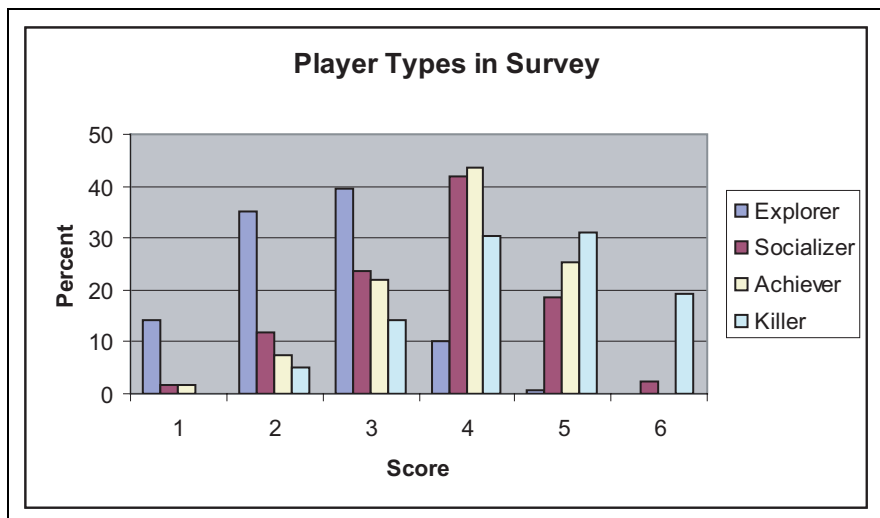


Figure 14: Distribution of player type scores in the survey

of ones surroundings. It should be mentioned that some of the experienced users commented that their preference depended on what situation they were in.

4.8 Player Types

There are no standard ways to measure what player type a user is. There is, however, one test[1], known as the Bartle test, on the web that has become the de-facto way to measure player types. It is a binary-choice questionnaire, where one chooses between two reactions to a scenario. As one has to choose an answer, one will occasionally have to select an unsuitable answer, since ones player type is not represented by the two options. It is also relatively transparent which answers will lead to a specific player type, and thus people can choose answers to become the player type they want to be, rather than to base their answers on what they would actually do in the situation. In addition the test suffer the same problems all online surveys and questionnaires do (including the one used for this report), as people select to take it - and thus might not be representative for the general population.

The method used in the Bartle test required too many questions to be added to the survey; therefore a different approach was selected. A scale was chosen instead of binary-choice, and instead of asking about reactions to situations direct questions about gameplay preferences were asked. This reduces the potential audience to experienced users, but it also reduced the number of questions to a manageable size. It also retains some of the weaknesses as the Bartle test, like the transparent reason for the questions. While it gives a different type of answer, the averages from the survey should be equivalent of the Bartle scores.

The player type scores are calculated from the answers to selected questions in the survey. The scale is from 1 to 6, where 1 indicates a high score and 6 a low

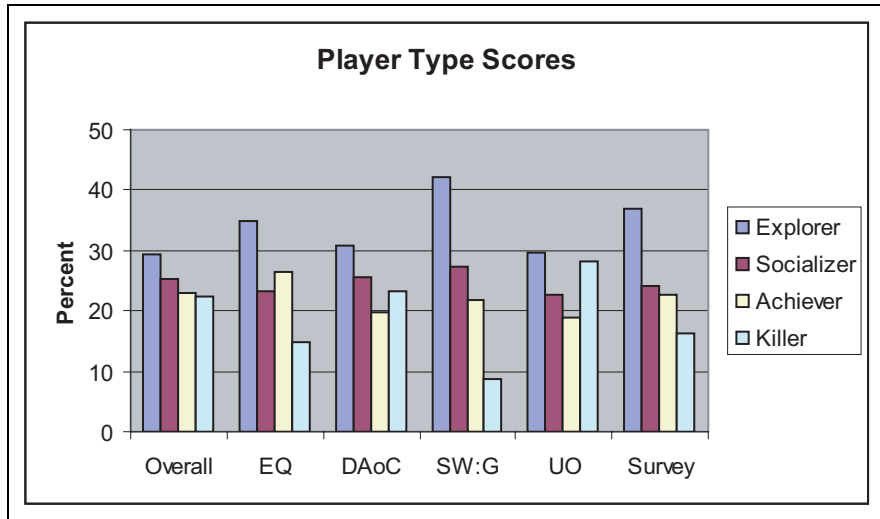


Figure 15: Distribution of player type scores in the Bartle test

score. In figure 14 on the previous page we see that explorer scores were high, killer scores were low, with socializer and achiever scores in between. Since these scores can't be tested against any previous research, we will compare the average scores for each type to the Bartle test score in an effort to test the results. Figure 15 show that the scores from the survey are within reasonable distance from the both the overall score for everybody who has taken the Bartle test, as well as the Bartle test scores for the four most selected MMOGs in the survey.

No correlation was found between where people focus and their player type. This is interesting, as one would think that users with different goals would have a different approach to the interface. It could suggest that the user have to conform to the interface, rather than adapt the interface to their needs. However, a correlation was found between those with a high score in explorer and content characteristics. The primary goal of the explorer is to further knowledge and understanding; they should therefore be among those who consume the widest range of content.

5 Discussion

5.1 Focus

The human eye does not see consistently throughout its field of vision [9, p. 98]. As the human brain ages it becomes less and less able to discern events that occur in the peripheral vision region. The human eye has the best resolution in only a small area; its peripheral resolution is relatively poor, as is its color recognition. It does however react to movement and changes; we will instinctively focus on a spot where we have noticed change. Only movement is registered if an object moves

at the side of your visual field where only the edge of your retina is stimulated. It is impossible to identify the object, there is no color, and when the movement stops, the object becomes invisible. The extreme edge of the retina is even more primitive, when it is stimulated by movement we experience nothing; but a reflex is initiated, rotating the eye to bring the moving object into central vision.

While we do not engage the edge of the retina in this manner when looking at the screen, we do get the same effect, albeit to a lesser extent. One possible reason why people focus on the other interface elements is that while the movement and changes in the avatar and its surrounding area often are predictable, while the changes in the other elements are more unpredictable and therefore demanding more attention. They are also smaller, and thus require a more direct gaze to get the resolution needed to recognize the change. It has even been suggested that the instinct to focus on a change in the peripheral vision range can be exploited to focus the attention of the player on indicators in the interface [15, p. 170]. Again, while this will work in a somewhat predictable environment, it might not give the same effect in a more chaotic and unpredictable environment where multiple indicators trigger at the same time, or the same indicator trigger continuously.

It appears as if people focus on the element with most quantified information. This seems like a rather obvious conclusion, but it has effects on how the user experiences the environment. While it seems obvious that the user will focus on the elements with the highest density of relevant information, the placement of these elements in the interface does not seem to reflect this. One reason could be that the developers feel that this type of interface works “well enough”. Another reason could be that the users feel the interface gets cluttered if too much info is located too close to the action. However, for the experience of the game it seems as if a cluttered interface is better than one where you have to focus on interface elements located away from the action. Additionally some users have complained that locating information in the work area breaks suspension of disbelief. All this has to be weighted against the effect of users focusing on secondary interface elements, and not the work area. At any rate, it could be made optional.

As Alan Cooper[6, p. 22] put it: “Similarly, all software is designed by the arcane demands of programming languages and databases. Tradition is the strongest influence in the design of all these media.” and “What really happens in most programming shops is that there is no one on staff who has a clue about designing for end users. However, these same clueless people are far from clueless about program design, and they have strong opinions about what they like, personally. So they do what they do, designing the interaction for themselves, subject to what is easiest and most enjoyable to code, and imagine that they are actually designing for users.” While this might be a slight exaggeration, things suggest that it is tempting to use the interface to improve the impression of the application by enhancing the things the application is good at while hiding what it is bad at, with no real regard to whether the functionality is an important or common part of the daily use of the application.

5.2 Presence

There is one particular thing that needs consideration. Do people that focus on the avatar have higher scores in presence, or do people with higher scores in presence choose environments where they can focus on the avatar?

We found two correlations: The first was that focus on the avatar during conversation correlated with high scores in individual preconditions. The second was that focus on the avatar during movement correlated with high scores in sensory environment.

One possibility would be that those with a high score in preconditions choose avatar centered environments. Seeing this in the light of previous research, it does not make sense. If the avatar is the monumental provider of presence as suggested, then logic would suggest that avatar-centered environments should score lower than environments that are not centered on the avatar, since people with low precondition scores should be more likely to accept these environments. Since the survey was presented to experienced users, all questions were asked in regards to virtual environments. It therefore seems safe to assume that avatar-centered environments actually do generate a higher level of presence than others.

Those who focus on the avatar have, on average, higher scores in presence. This conforms to existing research. The avatar thus seems to be the main provider of presence and should preferably have focus in the interface. To provide this quantified information should be accessible in the area near the avatar. The one issue contradicting this is tradition. MMOGs are commercial applications; they are made to generate revenue for the developer. Players are a fickle lot; they would rather leave than spend time learning a new unfamiliar interface. It might therefore be wiser to have the changes in addition to, rather than as a replacement of, the traditional interface.

5.3 Player Types

The only correlation found was between Explorers and Content Characteristics, as mentioned this seems logical. What is more interesting is that there is no significant difference between how different player types approach the interface. One would think that e.g. socializers and killers would focus on different interface elements, since they have different primary goals for being in the environment. We do not have the data foundation to consider why this is, but one could speculate that the layout of the interface forces the user to conform, rather than lend itself to customization.

The distribution of the different player types is similar for all games. This is significant, as most games are targeted at one or two groups. It suggests that there are additional reasons why players choose the games they choose, like community, and friends. It could also suggest that there needs to be a balance between the different player types to maintain a healthy environment, as discussed by Bartle[2]. In addition, the scores from the original Bartle Test suggest that Player Type does

not dictate what game people choose.

5.4 Not Considered

A number of issues have not been considered in this report. The most prominent of which is sound. There are in particular three interesting ways in which sound can be applied; as speech, effects, or ambient.

Speech can in theory replace the chat view. However, speech has a number of issues and restrictions that have to be considered. The most important is how many people one can pay attention to at the same time. In these environments one will often have a number of people competing for ones attention, one need some way to make sure you get the important ones. Speech can neither be serialized nor is it persistent. While text can be organized so that text from multiple users who speak at the same time is easily identified, speech will happen in real time. The same people will now speak at the same time, making it more difficult to focus on the important communication. Initially one might not even know what is important, thus increasing the effort needed to identify interesting information.

The solution for this would be filtering, but filtering is far from easy in this scenario. It has to be real time, delays will not be acceptable. Users currently don't have the bandwidth to receive all the different audio and filter it client side. It is also unlikely that a server currently has the capacity to receive it, filter it, and distribute the correct audio to each user without adding a noticeable delay.

Another problem is harassment; not only would it be easier to harass someone, but unlike text where what a user say is prefixed with the name of his avatar — there is currently no easy way to identify the source of audio.

In spite of all this, speech has become part of these environments through third party applications. These applications require users to know the location of a server and how to connect to it; this can be seen as preemptive filtering. This way the aural communication is limited to a relatively small group, while communication with everybody else is through text. It is unlikely that speech will be integrated with an MMOG as anything else than a replacement service for these third party applications in the near future.

Sound effects can be used to convey relatively accurate information in the same way that graphical effects are used. While information can't be as efficiently displayed with sound as it can with graphics, there is a limit to the amount of visual information we can absorb in one unit of time. By using sound one can increase the information output without overloading the visual senses. Another problem would be to make the different sounds distinct enough, while still suitable to represent the particular type of information.

Good ambient and background sounds are also important, as they help increase both breadth and depth of vividness, in addition to improving the quality of the presentation. This effect has not been accounted for in this report.

Earlier we said that MMOGs (and by extension, their interfaces) can be seen as the result of developing MUDs with graphics, RPGs with multiple users, or

a combination. There is at least one more way to approach these interfaces: as information-rich displays. We have already touched on the subject, as HUD is one type of information-rich display. There is reason to believe that applying methodology from information-rich displays and cognitive theory would benefit the interface types discussed in this paper. However, it seems that research in this field has focused on displaying static information on static objects. Results in this paper could suggest that displaying dynamic information on dynamic objects might have slightly different requirements. But this has not been the focus of this report.

6 Conclusion

Development is very focused on the avatar and the world, maybe as much as 90% of the effort in making a MMOG is here. Yet close to 1/3 of those asked responded that this is the area they focus least on during communication, cooperation, and movement — and only around 1/4 focus most in this area.

Before committing a lot of resources on one particular part of the interface it would make sense to make sure people are actually focusing on that part. The data gathered for this report suggest that the number of people focusing on the avatar and its immediate surroundings is quite low seen in light of the amount of resources committed to this part of the interface. Great animations and facial expressions are only efficient if people are actually watching.

If one consider that the cheapest of the financially successful/viable MMOGs cost around \$2.5 million, the average is well over \$7 million[12], and that there are at least two MMOGs currently in production that are looking to run well over \$25 million in pure production costs - it is strange how little focus there is among developers on the actual user interface. The amount of resources needed to improve the rest of the interface is probably significantly lower than what is currently used on improving of the avatar.

Admittedly, the avatar and its surroundings is the most important part of the interface, and it is where the elements of presence can be applied with best effect. As has been shown, users who focus on the avatar have higher presence scores than those who focus more on other interface elements.

The rest of the interface is just an abstraction of what happens with and around the avatar. Maybe with the exception of chat, but even chat can be seen as an abstraction of communication between avatars, rather than a conversation between users. The problem is that the abstracted and quantified data is considered more important than the avatar by the majority of the experienced users. The novice users focus on the avatar to a larger degree, but they will not remain novice forever.

However, the novice users were not comfortable with the interface either. They either treated it as they would a single-user interface, or they got confused trying to keep track of all the information.

There are at least two possible solutions for this problem; locate the quantified information closer to the avatar, or remove some of it altogether. Either solution

will increase the density of information of the avatar and its immediate surroundings relatively to the rest of the interface. One could also try to increase the accuracy of the meta-information, although this has proven difficult in the past. Another possibility could be to present the quantified info in a more discreet manner, so that it doesn't demand attention the way it currently does.

If used as a training simulator it is very important to remember that one have to present data in a way that is at least imitating reality, as it seems quantified data will take focus away from the scene. Therefore quantified data presented differently from what one will see in reality could result in a different focus than what one would have during the same task in real life, which could lead to a different, even flawed, reaction pattern.

7 Further Work

There are a number of interesting issues that need to be explored further.

In this report we compare where in the interface the users report they have their focus to e.g. their presence scores. Presence is a state of mind, and therefore should, and does, correlate with where in the interface users think the focus. However, there is reason to believe that where users think they focus is not where they actually focus. It would be interesting to use e.g. eye tracking to collect data on where users focus and compare with where the users thought they focused in the same session.

In addition it would be interesting to see if the users change their focus if additional ways of visualizing information were added. E.g. If one added speech bubbles to an interface with a chat area, would users still focus on the chat area, or would they move their focus to the speech bubbles.

Novice users had noticeable problems getting accustomed to the interface. An experiment focused on evaluating the factors responsible for the barrier experienced by even computer literate users could possibly reveal some of the reasons for these problems.

Certain types of information can be more efficiently conveyed by audio than interface elements. It would be interesting to examine how audio, in particular speech, influence the users - both feeling of presence and where they focus.

Whether one is using speech or text for communication, there is reason to believe that the patterns for communication in large groups are different for small groups. To examine how different ways to facilitate communication affect the users, and if there is a difference between small and large groups could be interesting.

References

- [1] E.S. Andreasen, B.A. Downey. “*Measuring Bartle-quotient*” Available at <http://www.andreasen.org/bartle/stats.cgi> (June 23 2004)
- [2] R.A. Bartle. “*Designing Virtual Worlds*”. New Riders, 2003.
- [3] D.A. Bowman, J.L. Gabbard, D. Hix. “A Survey of Usability Evaluation in Virtual Environments: Classification and Comparison of Methods”. In *Presence* 11(4) 2002, pp 404-424
Available at <http://ejournals.ebsco.com/Issue.asp?IssueID=231579> (June 2004)
- [4] D.A. Bowman, C. North, J. Chen, N.F. Polys, P.S. Pyla, U. Yilmaz. “Information-Rich Virtual Environments: Theory, Tools, and Research Agenda”. In *Proceedings of ACM Virtual Reality Software and Technology*, 2003, pp. 81-90. Available at http://people.cs.vt.edu/%7Ebowman/papers/vrst_irves_FINAL.pdf (June 2004)
- [5] J. Casanueva, E. Blake. “The Effects of Avatars on Co-presence in a Collaborative Virtual Environment”. In *Technical Report CS01-02-00, Department of Computer Science, University of Cape Town, South Africa*, 2001
Available at <http://citeseer.nj.nec.com/casanueva01effects.html> (June 2004)
- [6] A. Cooper. “*The Inmates Are Running the Asylum*”. SAMS, 1999.
- [7] N. Enlund. “The Production of Presence - Distance techniques in Education, Publishing and Art”. In *ACS'2000 Proceedings, Szczecin*, 2000, pp. 44-49.
Available at <http://www2.hig.no/at/nmm/enlund.acs.pdf> (June 2004)
- [8] M. Gerhard, D.J. Moore, D.J. Hobbs. “Continuous Presence in Collaborative Virtual Environments: Towards a Hybrid Avatar-Agent Model for User Representation”. In *Proceedings of the Intelligent Virtual Agents: 3rd International Workshop, IVA 2001*, Madrid, Spain, September 10-11, 2001. LNAI(LNCS) 2190, pp.137-155.
Available at <http://www.springerlink.com/> (June 2004)
- [9] R.L. Gregory. “*Eye and Brain. The Psychology of Seeing*”. 5th ed. Princeton Science Library, 1997.
- [10] M. Lombard, T. Ditton. “At the Heart of It All: The Concept of Presence”. In *JCMC*, 3(2)
Available at <http://www.ascusc.org/jcmc/vol3/issue2/lombard.html> (June 2004)

- [11] T. Manninen. "Rich Interaction in the Context of Networked Virtual Environments - Experiences Gained from the Multi-player Games Domain". In *Joint Proceedings of HCI 2001 and IHM 2001 Conference*, Blanford A., Vanderdonckt J., and Gray P. (eds). Springer Verlag pp. 383-398.
Available at http://www.tol.oulu.fi/~tmannine/list_of_publications.html (June 2004)
- [12] J. Mulligan, B. Patrovsky. "*Developing Online Games*". New Riders, 2003.
- [13] E.B. Nash, G.W. Edwards, J.A. Thompson, W. Barfield. "A Review of Presence and Performance in Virtual Environments". In *International Journal of Human-Computer Interaction*, 12(1), 2000, pp. 1-41
Available at <http://ejournals.ebsco.com/Issue.asp?IssueID=5742> (June 2004)
- [14] A. Parush, R. Nadir, A. Shtub. "Evaluating the Layout of Graphical User Interface Screens: Validation of a Numerical Computerized Model". In *International Journal of Human-Computer Interaction* 10(4), 1998, pp. 343-360
Available at <http://ejournals.ebsco.com/Issue.asp?IssueID=5320> (June 2004)
- [15] A. Rollings, E. Adams. "*Andrew Rollings and Ernest Adams on Game Design*". New Riders, 2003.
- [16] J. Steuer. "Defining Virtual Reality: Dimensions Determining Telepresence". In *Journal of Communication*, 42, 1992, pp. 73-93
Available at <http://www.presence-research.org/papers/steuer92defining.pdf> (June 2004)
- [17] J.G. Tromp, A. Steed, J.R. Wilson. "Systematic Usability Evaluation and Design Issues for Collaborative Virtual Environments". In *Presence*, 12(3) 2003, pp. 241-267
Available at <http://ejournals.ebsco.com/Issue.asp?IssueID=280062> (June 2004)

Appendix A - The Survey

This is the survey that was published on the web.

Page 1

Welcome.

This is a survey about Massively Multiplayer Online Games (MMOGs).

The survey consist of 43 questions, and is completely anonymous.

Having played a MMOG is required to be able to answer many of the questions.

The data gathered from this survey will be used as background material for my Master's Thesis.

Page 2

1. How old are you?

1. Age		
	Frequency	Percent
10-15	0	0.0
16-20	11	9.2
21-25	29	24.4
26-30	30	25.2
31-35	27	22.7
36-40	18	15.1
41+	4	3.4
Total	119	100.00

2. What is your gender?

2. Gender		
	Frequency	Percent
Female	10	8.4
Male	109	91.6
Total	119	100.00

3. How many years have you played MMOGs?

3. Experience		
	Frequency	Percent
Less than 1	1	0.8
1-2	8	6.7
3-4	31	26.1
5+	79	66.4
Total	119	100.00

4. On average, how many hours pr. week do you play MMOGs?

4. Hours pr. week		
	Frequency	Percent
0-5	15	12.6
6-10	22	18.5
11-20	40	33.6
21-30	30	25.2
31-40	8	6.7
41+	4	3.4
Total	119	100.00

5. Have you ever become so involved with a virtual world that you lost track of time?

5. Lost track of time		
	Frequency	Percent
Yes	103	86.6
No	16	13.4
Total	119	100.00

6. Have you ever become so involved with a virtual world that you were unaware of things happening around you?

6. Unaware of surroundings		
	Frequency	Percent
Yes	54	45.4
No	65	54.6
Total	119	100.00

7. Have you ever become so involved with a virtual world that people had problems getting your attention?

7. Problem getting attention		
	Frequency	Percent
Yes	66	55.5
No	53	44.5
Total	119	100.00

8. Have you ever been excited, saddened, scared or felt any other emotion by something that has happened in a virtual world?

8. Strong emotions		
	Frequency	Percent
Yes	111	93.3
No	8	6.7
Total	119	100.00

9. How experienced with the use of virtual worlds do you rate yourself?

9. Rated Experience		
	Frequency	Percent
Expert	62	52.1
Experienced	49	41.2
Adept	7	5.9
Novice	1	0.8
Inexperienced	0	0.0
Total	119	100.00

Page 3

When you play MMOGs, how important is it to be able to:

10. Play with your friends.

10. Friends		
	Frequency	Percent
Critical	38	31.9
Important	38	31.9
Needed	25	21.0
I don't care	18	15.1
I hate this	0	0.0
Total	119	100.00

11. Beat the game.

11. Beat the game		
	Frequency	Percent
Critical	2	1.7
Important	17	14.3
Needed	20	16.8
I don't care	67	56.3
I hate this	13	10.9
Total	119	100.00

12. See as much of the world as possible.

12. Explore the world		
	Frequency	Percent
Critical	24	20.2
Important	57	47.9
Needed	28	23.5
I don't care	10	8.4
I hate this	0	0.0
Total	119	100.00

13. Compete against other players.

13. Competition		
	Frequency	Percent
Critical	17	14.3
Important	35	29.4
Needed	26	21.8
I don't care	35	29.4
I hate this	6	5.0
Total	119	100.00

14. Develop your character.

14. Develop character		
	Frequency	Percent
Critical	41	34.5
Important	49	41.2
Needed	27	22.7
I don't care	2	1.7
I hate this	0	0.0
Total	119	100.00

15. Meet and get to know new people.

15. Meet new people		
	Frequency	Percent
Critical	13	10.9
Important	28	23.5
Needed	52	43.7
I don't care	26	21.8
I hate this	0	0.0
Total	119	100.00

16. Kill everything in sight.

16. Kill everything		
	Frequency	Percent
Critical	5	4.2
Important	10	8.4
Needed	32	26.9
I don't care	58	48.7
I hate this	14	11.8
Total	119	100.00

17. Learn as much as possible about the game.

17. Explore the game		
	Frequency	Percent
Critical	27	22.7
Important	46	38.7
Needed	40	33.6
I don't care	6	5.0
I hate this	0	0.0
Total	119	100.00

18. Acquire more loot and money than anyone else.

18. Acquire loot		
	Frequency	Percent
Critical	4	3.4
Important	12	10.1
Needed	23	19.3
I don't care	66	55.5
I hate this	14	11.8
Total	119	100.00

19. Organize and run a large guild.

19. Organize guild		
	Frequency	Percent
Critical	1	0.8
Important	6	5.0
Needed	18	15.1
I don't care	67	56.3
I hate this	27	22.7
Total	119	100.00

Page 4

20. Choose one of the following MMOGs on which to base your answers in the next section.

20. Choose game		
	Frequency	Percent
Anarchy Online	5	4.2
Asheron's Call	9	7.6
Asheron's Call 2	2	1.7
Dark Age of Camelot	25	21.0
Everquest	18	15.1
Everquest Online Adventures	0	0.0
Final Fantasy XI	5	4.2
Horizons	2	1.7
Neocron	2	1.7
Shadowbane	8	6.7
Star Wars: Galaxies	10	8.4
Ultima Online	26	21.8
Other	7	5.9
Total	119	100.00

20a. You chose other game; please enter the name of the game:

20a. Other game		
	Frequency	Percent
GemStone IV	1	0.8
Meridian 59	1	0.8
Planetside	1	0.8
The Realm	1	0.8
World War II Online	2	1.7
Yohoho! Puzzle Pirates	1	0.8
Total	7	5.9

Page 5

What part of the interface do you focus on:

21. Most, when communicating with other players?

21. Most focus during Communication		
	Frequency	Percent
The Avatar	18	15.1
The Chat Area	96	80.7
Status Bars	3	2.5
Overhead Map	0	0.0
Gameplay Feedback	2	1.7
Total	119	100.00

22. Least, when communicating with other players?

22. Least focus during Communication		
	Frequency	Percent
The Avatar	27	22.7
The Chat Area	3	2.5
Status Bars	30	25.2
Overhead Map	47	39.5
Gameplay Feedback	12	10.1
Total	119	100.00

23. Most, when cooperating with other players to perform a task?

23. Most focus during Cooperation		
	Frequency	Percent
The Avatar	23	19.3
The Chat Area	39	32.8
Status Bars	26	21.8
Overhead Map	4	3.4
Gameplay Feedback	27	22.7
Total	119	100.00

24. Least, when cooperating with other players to perform a task?

24. Least focus during Cooperation		
	Frequency	Percent
The Avatar	39	32.8
The Chat Area	9	7.6
Status Bars	12	10.1
Overhead Map	48	40.3
Gameplay Feedback	11	9.2
Total	119	100.00

25. Most, when moving from one location in the game to another?

25. Most focus during Movement		
	Frequency	Percent
The Avatar	38	31.9
The Chat Area	4	3.4
Status Bars	2	1.7
Overhead Map	66	55.5
Gameplay Feedback	9	7.6
Total	119	100.00

26. Least, when moving from one location in the game to another?

26. Least focus during Movement		
	Frequency	Percent
The Avatar	18	15.1
The Chat Area	24	20.2
Status Bars	51	42.9
Overhead Map	3	2.5
Gameplay Feedback	23	19.3
Total	119	100.00

Page 6

27. When you play the game, do you get a sense of being present in the virtual world?

27. Present in world		
	Frequency	Percent
Yes	83	69.7
No	36	30.3
Total	119	100.00

28. When you play the game, do you feel there are real people in the world with you?

28. Real people		
	Frequency	Percent
Yes	107	89.9
No	12	10.1
Total	119	100.00

29. Are the mechanisms that control your avatar intuitive?

29. Intuitive controls		
	Frequency	Percent
Yes	91	76.5
No	28	23.5
Total	119	100.00

30. Do you identify with your own avatar?

30. Identify with avatar		
	Frequency	Percent
Yes	75	63.0
No	44	37.0
Total	119	100.00

31. When you play the game, do you see yourself as the avatar, or do you see yourself as controlling the avatar?

31. Be or control the avatar		
	Frequency	Percent
I am the avatar	33	27.7
I control the avatar	86	72.3
Total	119	100.00

32. My senses are completely engaged during my stay in the virtual world.

32. Engaged senses		
	Frequency	Percent
Yes	35	29.4
No	84	70.6
Total	119	100.00

33. I am immediately aware of the existence and actions of the other players.

33. Aware of others		
	Frequency	Percent
Yes	92	77.3
No	27	22.7
Total	119	100.00

34. How well can you concentrate on the task rather than the mechanisms used to perform it?

34. Task or mechanism		
	Frequency	Percent
I can focus completely on the task	18	15.1
I focus mostly on the task	52	43.7
My focus is divided equally between the two	37	31.1
I focus mostly on the mechanisms	12	10.1
I focus completely on the mechanisms	0	0.0
Total	119	100.00

35. How natural does communication in the virtual world feel?

35. Natural communication		
	Frequency	Percent
Like Real Life	2	1.7
Natural	30	25.2
Acceptable	73	61.3
Unnatural	13	10.9
Alien	1	0.8
Total	119	100.00

36. Are you easily distracted by outside events when involved in an activity in a virtual world?

36. Easily distracted		
	Frequency	Percent
Yes	31	26.1
No	88	73.9
Total	119	100.00

37. When you communicate with other players, do you consider the use of non-verbal communication, such as gestures, facial expressions, and emotions, useful?

37. Non-verbal communication		
	Frequency	Percent
Yes	69	58.0
No	50	42.0
Total	119	100.00

38. Do you prefer first person or third person view?

38. View		
	Frequency	Percent
First Person View	37	31.1
Third Person View	82	68.9
Total	119	100.00

Page 7

When you play MMOGs, how important do you consider:

39. Quests?

39. Quests		
Critical	37	31.1
Important	47	39.5
Needed	24	20.2
I don't care	6	5.0
I hate this	5	4.2
Total	119	100.00

40. The background story?

40. Story		
Critical	15	12.6
Important	40	33.6
Needed	41	34.5
I don't care	20	16.8
I hate this	3	2.5
Total	119	100.00

41. The type of setting?

41. Setting		
Critical	22	18.5
Important	52	43.7
Needed	31	26.1
I don't care	14	11.8
I hate this	0	0.0
Total	119	100.00

42. The design of the world?

42. World design		
Critical	65	54.6
Important	45	37.8
Needed	9	7.6
I don't care	0	0.0
I hate this	0	0.0
Total	119	100.00

43. The graphics?

43. Graphics		
Critical	12	10.1
Important	40	33.6
Needed	54	45.4
I don't care	12	10.1
I hate this	1	0.8
Total	119	100.00

Setting: e.g. high fantasy, low fantasy, science fiction.

Page 8

Thank you for taking the time to complete this survey!

Appendix B - The Experiment

Here you will find the two questionnaires presented to the participants of the experiment. One was given to them prior to the experiment, and one after the experiment was finished. First a translated version with the frequencies will be given, the original Norwegian text will be presented afterwards.

Pre-experiment questionnaire

1. Age?

1. Age		
	Frequency	Percent
10-15	0	0.0
16-20	1	8.3
21-25	5	41.7
26-30	3	25.0
31-35	1	8.3
36-40	1	8.3
41+	1	8.3
Total	12	100.00

2. Gender?

2. Gender		
	Frequency	Percent
Female	4	33.3
Male	8	66.7
Total	12	100.00

3. How often do you use computers?

3. Experience		
	Frequency	Percent
Constantly	6	50.0
Often	6	50.0
Now and then	0	0.0
Rarely	0	0.0
Never	0	0.0
Total	12	100.00

4. Do you use chat programs like IRC, ICQ, MSN messenger, or equivalent?

4. Chat		
	Frequency	Percent
Constantly	3	25.0
Often	7	58.3
Now and then	0	0.0
Rarely	0	0.0
Never	2	16.7
Total	12	100.00

5. Do you play computer games?

5. Computer Games		
	Frequency	Percent
Constantly	0	0.0
Often	5	41.7
Now and then	3	25.0
Rarely	3	25.0
Never	1	8.3
Total	12	100.00

6. Have you ever played a game together with more than 100 other users?

6. Multiplayer Games		
	Frequency	Percent
Yes	1	8.3
No	11	91.7
Total	12	100.00

7. Have you ever become so involved or engaged in a book, movie, or TV-program that you lost track of time?

7. Lost track of time		
	Frequency	Percent
Yes	11	91.7
No	1	8.3
Total	12	100.00

8. Have you ever become so involved or engaged in a book, movie, or TV-program that you were unaware of things happening around you?

8. Unaware of surroundings		
	Frequency	Percent
Yes	9	75.0
No	3	25.0
Total	12	100.00

9. Have you ever become so involved or engaged in a book, movie, or TV-program that people had problems getting your attention?

9. Problem getting attention		
	Frequency	Percent
Yes	8	66.7
No	4	33.3
Total	12	100.00

10. Have you ever been excited, saddened, scared or felt any other emotion by something in a book, movie, or TV-program?

10. Strong emotions		
	Frequency	Percent
Yes	11	91.7
No	1	8.3
Total	12	100.00

11. Do you easily identify with the characters in books, TV-programs, or movies?

11. Identify with character		
	Frequency	Percent
Yes	6	50.0
No	6	50.0
Total	12	100.00

12. Are you easily distracted when reading a book, watching TV or a movie?

12. Easily distracted		
	Frequency	Percent
Yes	4	33.3
No	8	66.7
Total	12	100.00

Post-experiment questionnaire

13. When you played, did you get a sense of being present in the virtual world?

13. Present in world		
	Frequency	Percent
Yes	7	58.3
No	5	41.7
Total	12	100.00

14. When you played, did it feel like there were real people in the world with you?

14. Real people		
	Frequency	Percent
Yes	6	50.0
No	6	50.0
Total	12	100.00

15. Were the mechanisms that controlled the avatar intuitive?

15. Intuitive controls		
	Frequency	Percent
Yes	6	50.0
No	6	50.0
Total	12	100.00

16. Did you identify with your own avatar?

16. Identify with avatar		
	Frequency	Percent
Yes	2	16.7
No	10	83.3
Total	12	100.00

17. When you played the game, did you feel like you were the avatar, or did you feel like you were controlling the avatar?

17. Be or control the avatar		
	Frequency	Percent
I was the avatar	2	16.7
I controlled the avatar	10	83.3
Total	12	100.00

18. My senses were completely engaged during my stay in the virtual world.

18. Engaged senses		
	Frequency	Percent
Yes	7	58.3
No	5	41.7
Total	12	100.00

19. I was immediately aware of the existence and actions of the other players.

19. Aware of others		
	Frequency	Percent
Yes	7	58.3
No	5	41.7
Total	12	100.00

20. How well could you concentrate on the task rather than the mechanisms used to perform it?

20. Task or mechanism		
	Frequency	Percent
I could focus completely on the task	0	0.0
I focused mostly on the task	7	58.3
My focus was divided equally between the two	1	8.3
I focused mostly on the mechanisms	3	25.0
I focused completely on the mechanisms	1	8.3
Total	12	100.00

21. How natural did communication in the virtual world feel?

21. Natural communication		
	Frequency	Percent
Like Real Life	0	0.0
Natural	2	16.7
Acceptable	7	58.3
Unnatural	3	25.0
Alien	0	0.0
Total	12	100.00

22. When someone speak in this game their head will blink, did you notice this?

22. Chat indicator		
	Frequency	Percent
Yes	2	16.7
No	10	91.3
Total	12	100.00

23. Did you prefer first person or third person view?

23. View		
	Frequency	Percent
First Person View	9	75.0
Third Person View	3	25.0
Total	12	100.00

24. Was it easy to keep an overview of what the others were doing?

24. Overview of others		
	Frequency	Percent
Yes	3	25.0
No	9	75.0
Total	12	100.00

25. Was it easy to navigate without a map?

25. Navigate without map		
	Frequency	Percent
Yes	2	16.7
No	10	83.3
Total	12	100.00

26. What was most difficult in finding the others?

TEXT

27. Was it easy to see the difference/differntiate between the avatars?

27. Avatar recognition		
	Frequency	Percent
Yes	12	100.0
No	0	0.0
Total	12	100.00

28. I enjoyed the experience in the virtual world.

28. Enjoyed the experience		
	Frequency	Percent
Yes	9	75.0
No	3	25.0
Total	12	100.00

29. On a range from 1 to 5; how much did you focus on these interface elements while moving from one place in the world to another, where 1 is the one you had most focus on and 5 is the one you had least focus on:

29. Focus during movement						
	1	2	3	4	5	Total
The Avatar	7	4	0	0	1	12
The Text Area	1	5	3	3	0	12
Status Bars	0	1	3	3	5	12
Overhead Map	3	2	3	4	0	12
Group Overview	1	0	3	2	6	12
Total	12	12	12	12	12	

30. On a range from 1 to 5; how much did you focus on these interface elements while communicating with the other players, where 1 is the one you had most focus on and 5 is the one you had least focus on:

30. Focus during communication						
	1	2	3	4	5	Total
The Avatar	1	7	1	1	2	12
The Text Area	10	1	1	0	0	12
Status Bars	1	0	3	2	6	12
Overhead Map	0	2	3	6	1	12
Group Overview	0	2	4	3	3	12
Total	12	12	12	12	12	

31. On a range from 1 to 5; how much did you focus on these interface elements while cooperating with the other players to complete a task, where 1 is the one you had most focus on and 5 is the one you had least focus on:

31. Focus during cooperation						
	1	2	3	4	5	Total
The Avatar	8	3	0	1	0	12
The Text Area	2	5	2	2	1	12
Status Bars	1	1	3	4	3	12
Overhead Map	1	1	3	2	5	12
Group Overview	0	2	4	3	3	12
Total	12	12	12	12	12	

32. How did the map and group overview influence the experience of being in a virtual world?

32. UI element influence		
	Frequency	Percent
Positive	7	58.3
No difference	4	33.3
Negative	1	8.3
Total	12	100.00

33. Did the map and group overview make it easier to keep an overview of what was happening?

33. UI element overview		
	Frequency	Percent
A lot easier	5	41.7
Easier	7	58.3
No difference	0	0.0
More difficult	0	0.0
A lot more difficult	0	0.0
Total	12	100.00

34. On a range from 1 to 3; how much did you focus on these interface elements in the period you did not have access to the map and group overview, where 1 is the one you had most focus on and 3 is the one you had least focus on:

34. Focus without elements				
	1	2	3	Total
The Avatar	8	3	1	12
The Text Area	3	7	2	12
Status Bars	1	2	9	12
Total	12	12	12	

35. On a range from 1 to 5; how much did you focus on these interface elements in the period you had access to the map and group overview, where 1 is the one you had most focus on and 5 is the one you had least focus on:

35. Focus with elements						
	1	2	3	4	5	Total
The Avatar	9	0	2	0	1	12
The Text Area	0	7	2	3	0	12
Status Bars	1	0	0	1	10	12
Overhead Map	2	3	5	2	0	12
Group Overview	0	2	3	6	1	12
Total	12	12	12	12	12	

36. Was there anything in the interface that was particularly difficult to relate to?

TEXT

37. Was there anything in the interface that was particularly easy to relate to?

TEXT

38. Other comments:

TEXT

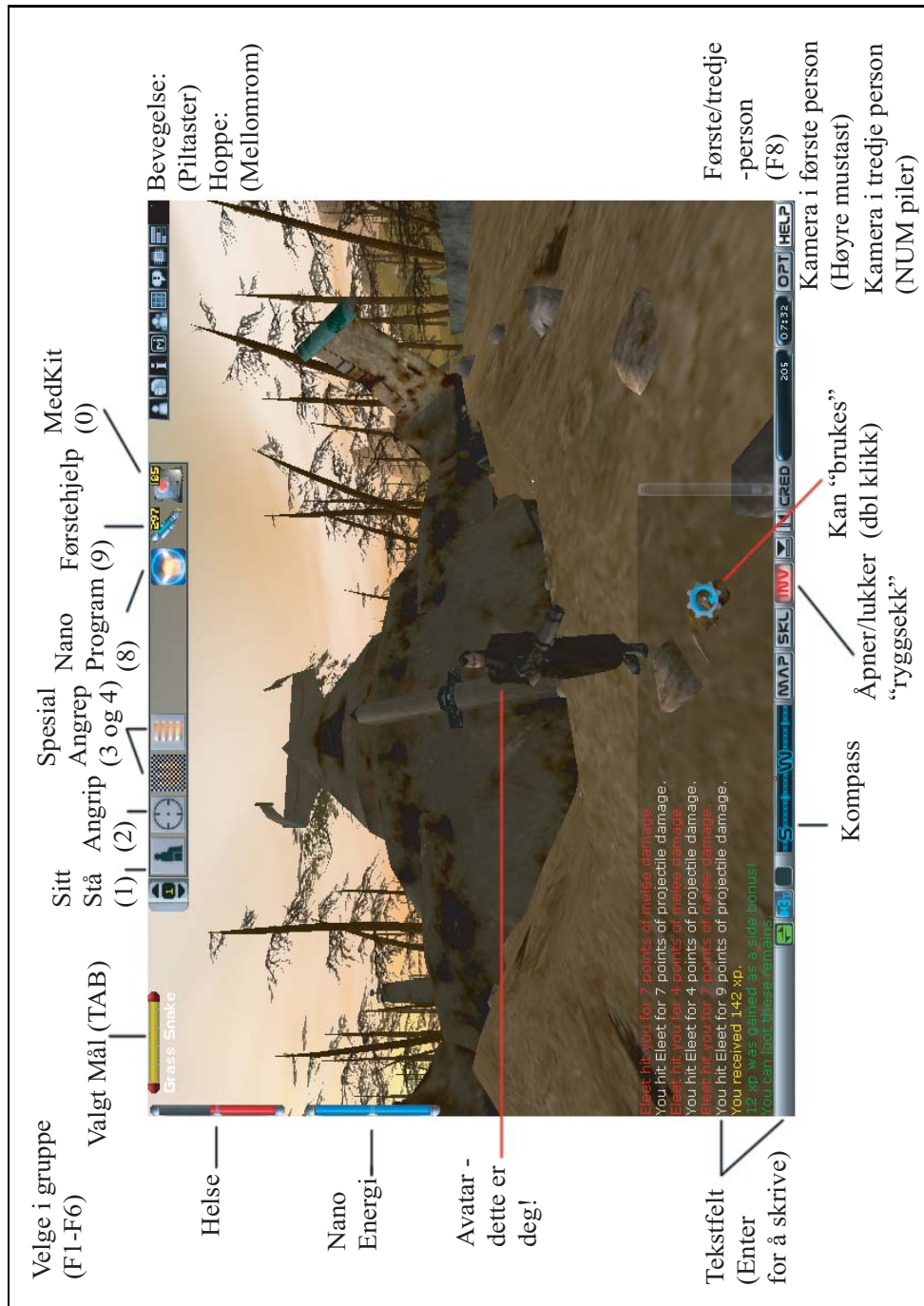


Figure 16: A screenshot from Anarchy Online with descriptions of the most commonly used interface elements that was distributed among the participants in the experiment

Pre-experiment questionnaire

1. Alder?

10-15

16-20

21-25

26-30

31-35

36-40

41+

2. Kjønn?

Kvinne

Mann

3. Hvor ofte bruker du datamaskiner?

Konstant

Ofte

Av og til

Sjelden

Aldri

4. Bruker du chatteprogrammer som IRC, ICQ, MSN messenger eller lignende?

Konstant

Ofte

Av og til

Sjelden

Aldri

5. Spiller du dataspill?

Konstant

Ofte

Av og til

Sjelden

Aldri

6. Har du noen gang spilt et spill sammen med over 100 andre brukere?

Ja

Nei

- 7.** Har du noen gang blitt så involvert eller engasjert i en bok, film eller tv program at tiden har løpt fra deg?
Ja
Nei
- 8.** Har du noen gang blitt så involvert eller engasjert i en bok, film eller tv program at du ikke har vært klar over ting som har skjedd rundt deg?
Ja
Nei
- 9.** Har du noen gang blitt så involvert eller engasjert i en bok, film eller tv program at folk rundt deg har hatt vanskelig for å oppnå kontakt med deg?
Ja
Nei
- 10.** Har du noen gang blitt glad, opprømt, lei deg, redd eller kjent andre sterke følelser på grunn av noe i en bok, film eller tv program.
Ja
Nei
- 11.** Har du lett for å identifisere deg med personene i bøker, tv-program eller film?
Ja
Nei
- 12.** Blir du lett distraherert når du leser en bok, ser på tv eller film?
Ja
Nei

Post-experiment questionnaire

- 13.** Når du spilte, fikk du en følelse av å være tilstede i den virtuelle verdenen?
Ja
Nei
- 14.** Når du spilte, følelse det som om det er ekte mennesker i verdenen sammen med deg?
Ja
Nei
- 15.** Var mekanismene som kontrollerte avataren intuitive?
Ja
Nei
- 16.** Identifiserte du deg med avataren din?
Ja
Nei
- 17.** Når du spilte, følte du at du var avataren, eller følte du at du kontrollerte avataren?
Jeg var avataren
Jeg kontrollerte avataren
- 18.** Sansene mine var helt engasjert mens jeg oppholder meg I den virtuelle verden.
Ja
Nei
- 19.** Jeg ble straks oppmerksom på eksistensen og handlingene til de andre spillerne.
Ja
Nei
- 20.** Hvor godt klarte du å konsentrere deg om oppgaven du skulle utføre, heller enn mekanismene du måtte bruke for å utføre de?
Jeg kunne fokusere helt på oppgaven.
Jeg fokuserte for det meste på oppgaven.
Jeg fokuserte like mye på begge deler.
Jeg fokuserte for det meste på mekanismene.
Jeg fokuserte helt på mekanismene.

- 21.** Hvor naturlig følte kommunikasjonen i den virtuelle verdenen?
Ekte
Naturlig
Akseptabel
Unaturlig
Uforståelig
- 22.** Når noen snakker i dette spillet vil hodet deres blinke, la du merke til dette?
Ja
Nei
- 23.** Foretrakk du å spille i første person eller tredje person?
Første Person
Tredje Person
- 24.** Følte du det var lett å holde oversikt over hva de andre holdt på med?
Ja
Nei
- 25.** Var det lett å navigere uten kart?
Ja
Nei
- 26.** Hva var det vanskeligste med å finne de andre?
Forklar:
- 27.** Var det lett å se forskjell på avatarene?
Ja
Nei
- 28.** Jeg likte opplevelsen i den virtuelle verden.
Ja
Nei
- 29.** Ranger hvor mye du fokuserte på disse delene av grensesnittet når du beveget deg fra et sted i verdenen til en annen, der 1 er den du fokuserte mest på og 5 er den du fokuserte minst på:
Avatar
Tekstfelt
Status Bar

Kart

Gruppeoversikt

- 30.** Ranger hvor mye du fokuserte på disse delene av grensesnittet når du kommuniserte med de andre spillerne, der 1 er mest fokus og 5 er minst fokus:

Avatar

Tekstfelt

Status Bar

Kart

Gruppeoversikt

- 31.** Ranger hvor mye du fokuserte på disse delene av grensesnittet når du samarbeidet med de andre spillerne for å gjennomføre en oppgave, der 1 er mest fokus og 5 er minst fokus:

Avatar

Tekstfelt

Status Bar

Kart

Gruppeoversikt

- 32.** Hvordan følte du at kartet og gruppeoversikten påvirket opplevelsen av å være i en virtuell verden?

Positivt

Ingen forskjell

Negativt

- 33.** Følte du at kartet og gruppeoversikten gjorde det enklere å ha oversikt over hva som foregikk?

Vesentlig enklere

Litt enklere

Ingen forskjell

Litt vanskeligere

Vesentlig vanskeligere

- 34.** I den perioden du ikke hadde kartet og gruppeoversikten oppe, ranger hvor mye du følte du fokuserte på disse delene av grensesnittet, der 1 er mest fokus og 3 er minst fokus:

Avatar

Tekstfelt

Status Bar

35. I den perioden du hadde kartet og gruppeoversikten oppe, ranger hvor mye du følte du fokuserte på disse delene av grensesnittet, der 1 er mest fokus og 5 er minst fokus:

Avatar

Tekstfelt

Status Bar

Kart

Gruppeoversikt

36. Var det noe i grensesnittet som var spesielt vanskelig å forholde seg til?

37. Var det noe i grensesnittet som var spesielt enkelt å forholde seg til?

38. Andre kommentarer:

Appendix C - Screenshots

Please note that the screenshots in this appendix have been captured in different resolution, on different equipment, and with different settings. In addition they have been scaled to fit on a page. They can therefore not be used to fairly compare neither graphics nor anything else — with the exception of the interface layout.


```

Norge - 12:45You are using:
<used as light>      Nothing.
<worn on finger>    Nothing.
<worn on finger>    Nothing.
<worn around neck> Nothing.
<worn around neck> Nothing.
<worn on body>      Nothing.
<worn on head>      Nothing.
<worn on legs>      Nothing.
<worn on feet>      Nothing.
<worn on hands>     Nothing.
<worn on arms>      Nothing.
<worn as shield>    Nothing.
<worn about body>   Nothing.
<worn about waist>  Nothing.
<worn around wrist> Nothing.
<worn around wrist> Nothing.
<wielded>           Nothing.
<held>              Nothing.
Norge - 12:45You witzell 'omg I am naked'
Norge - 12:45These groups are currently roaming around Grimne:

Alone in the jar:
[ M 50 ] Erin          <Head of group>
[ C 50 ] Quark         <Head of group>
[ M 50 ] Baud          <Head of group>
[ C 50 ] Murky         <Head of group>
[ C 50 ] Kler          <Head of group>
[ M 50 ] Kalak         <Head of group>
[ C 50 ] Iny           <Head of group>
Norge - 12:46The Temple Square [ n e s w ]
A large fountain stands in the middle of the square.
Norge - 12:46The Temple Square [ n e s w ]
A large fountain stands in the middle of the square.
Norge - 12:46
Joker [wiz]: get some clothes, not that expensive
Norge - 12:46
[wiz]: Joker pokes you in the ribs.
Norge - 12:46Market Square [ n e s w ]
Norge - 12:47Brief off.
Norge - 12:47Market Square
You are standing on the market square, the famous Square of Midgaard.
A large, peculiar looking statue is standing in the middle of the square.
Roads lead in every direction, north to the temple square, south to the common
square, east and westbound is the main street.
Obvious exits: North East South West
Norge - 12:47The Common Square
The common square, people pass you, talking to each other. To the west is
the poor alley and to the east is the dark alley. To the north, this square
is connected to the market square. From the south you notice a nasty smell.
Obvious exits: North East South West Up
Beastly Fido is here.
Norge - 12:47The Dark Alley
The dark alley, to the west is the common square and to the south is the
Guild of Thieves. The alley continues east.
Obvious exits: North East South West
Norge - 12:47Alley at Levee
You are standing in the alley which continues east and west. South of here
you see the levee. To the north is small house of retired warrior, Agaron.
Obvious exits: North East South West
Norge - 12:47Eastern end of Alley
You are standing at the eastern end of the alley, the city wall is just east,
blocking any further movement. A small warehouse is directly south of here.
North is a small room, almost a shrine.
Obvious exits: North South West
A Mercenary waiting for a job.
Norge - 12:47You cannot go that way.
Norge - 12:47You cannot go that way.
Norge - 12:47They are not here.
Norge - 12:47You hit the Mercenary very hard.
Norge - 12:47
You parry the Mercenary's attack.
You hit the Mercenary very hard.
You hit the Mercenary very hard.
You miss the Mercenary with your hit.

```

Figure 17: The MUD Grimne

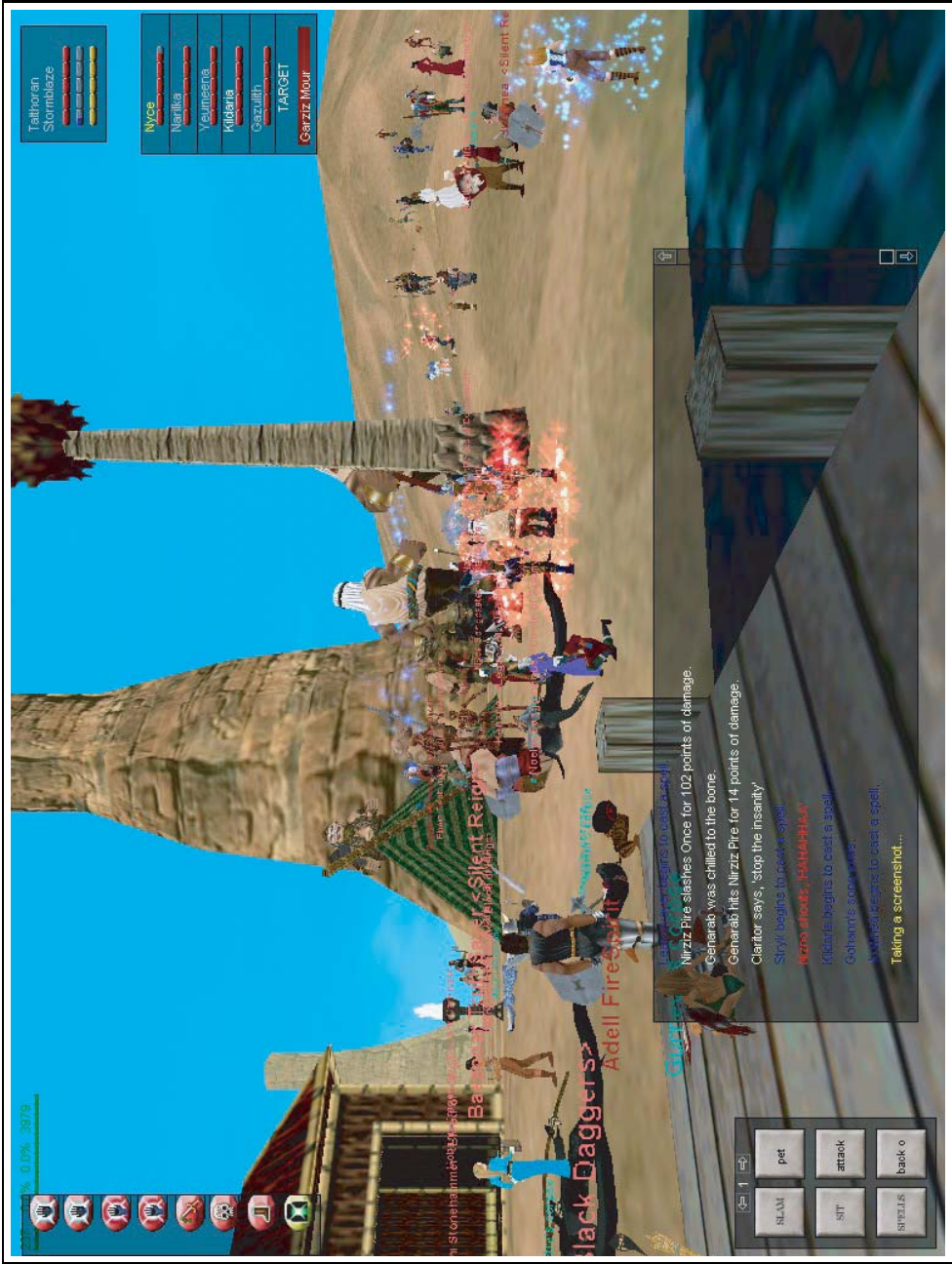


Figure 19: Everquest, released 1998



Figure 20: Dark Age of Camelot, released 2001



Figure 21: Anarchy Online, released 2001



Figure 22: Star Wars: Galaxies, released 2003

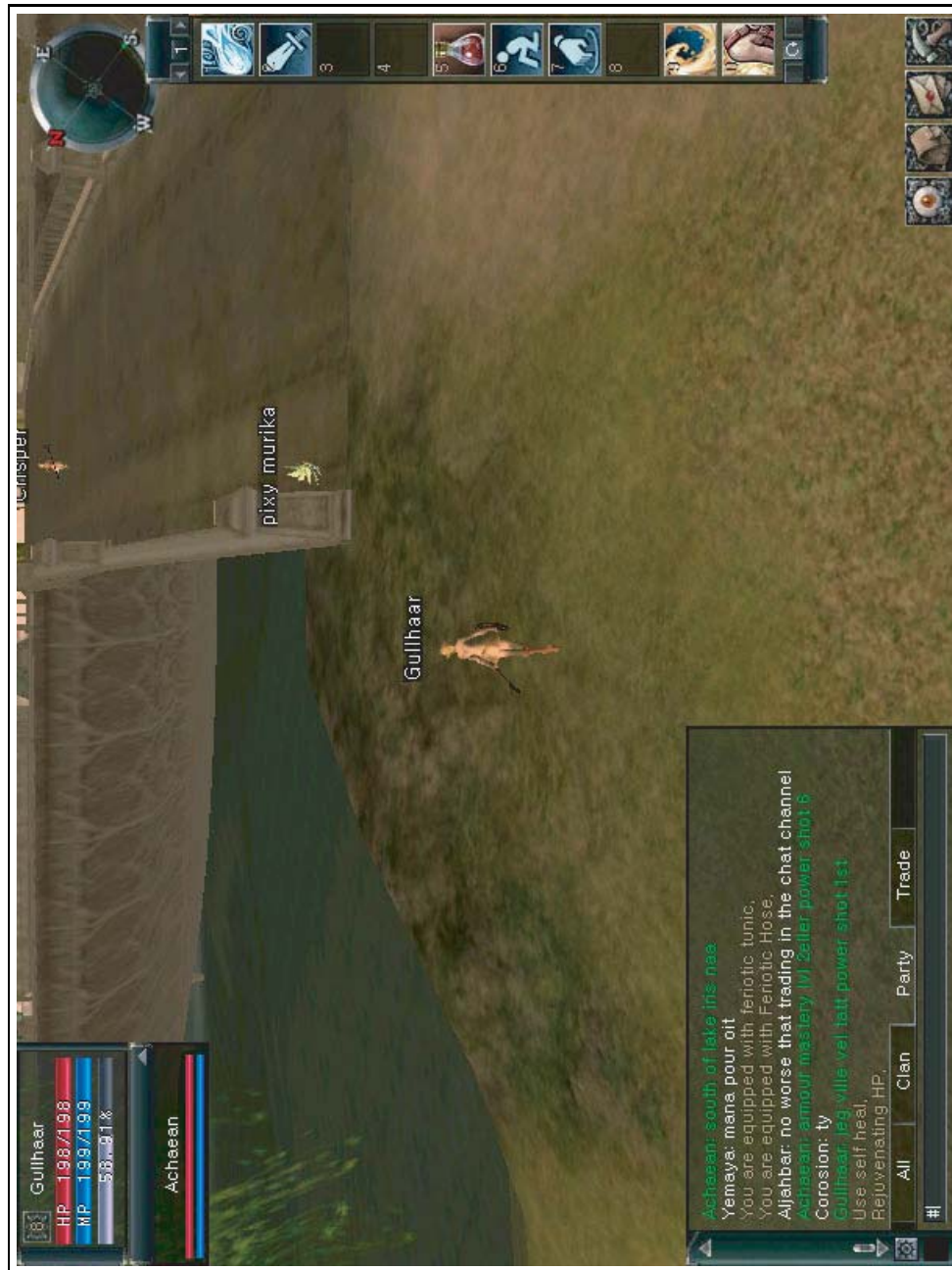


Figure 23: Lineage 2, released 2004