Tromp, Jolanda G., 1993, Results of two surveys about Spatial Perception and Navigation of a Text-Based Spatial Interface

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Abstract

The possible merits of a spatial interface are researched with a pilot study of two electronic questionnaires in a text-based object oriented Multi User Dimension (MUD), which makes use of a city metaphor to represent files.

Spatial interfaces are explained shortly, MUDs are explained and illustrated with criteria for the perception of motion and space. The results show that participants of MUDs are capable of navigating between over 100 different locations. Their navigation techniques and spatial perception of the MUD space are explained and illustrated.

Table of Contents

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1. Introduction

This paper is the report of two surveys held on a text-based, object oriented Multi User Dimension (MUD) computer game.The objective of these surveys was to find out about navigational behaviourand spatial perception of MUD space from the participants of MUDs. Thepaper is laid out as follows. First the problem of navigation in computer generated space is defined andembedded in the tradition of human-computer interface design andpsychological research of cognitive mapping. Following this, MUDs aredefined by matching the properties of MUDs with the criteria for the perception of motion and space. The rooms metaphor,teleportation and Euclidean relations of MUD spaces, are concepts that areespecially important for this research. These concepts are thereforediscussed and illustrated in greater detail.

Next the operationalisation of the measurement techniques is explained. Bymaking use of the evidence of psychological research about cognitive maps aframework is set up for identifying the issues that are to be addressed inthe surveys. To conduct the surveys two electronic questionnaires are put in the MUD, where theparticipants of the MUD can answer them. Little empirical evidence existsabout the return rate of electronic questionnaires, because the concept isrelatively new, but in these surveys the return rate is sufficient. The results show that participants of MUDshave very specific techniques to navigate MUD space, and these techniquesare described in detail. Participants have no problem visualising MUDspace, and their opinions about this are described in detail. From the results many recommendations are made forthe design of the contents of virtual environments in general and ComputerSupported Co-operative Work environments.

1.1 Navigation of Computer Generated Space

It seems intuitive to expect transference of our everyday navigation skillsto the complex computer generated information landscape, provided that thecomputer generated landscape allows us similar behaviour as the real worldlandscape. The purpose of this study is to establish how effective the transference of these navigation skills really is. Themain factors of interest are how similar computer generated spaces orvirtual spaces are to real world spaces, and how much they have to be aliketo allow us to use our everyday knowledge effectively.

Software users often have problems navigating large data structures. Thecosts of electronic storage are going down, and an increasing amount ofinformation is stored in large and complex data spaces. Generalavailability of these databases is growing and so is the number of non-experts who want to searchthrough the information. As data structures increase in size andcomplexity, the chance of getting lost, failing to find the desiredinformation, or simply getting overwhelmed by the amount of information, will multiply.

1.2 Structured Spaces

In the design of user interface, it is observed that the desktop metaphoris being replaced by the rooms metaphor (Card, Robertson, Mackinley, 1991),which in turn is replaced by the city metaphor (Dieberger, Tromp, 1993). The city metaphor can incorporate the desktopmetaphor, the rooms metaphor and many others, such as a library metaphor,the office metaphor, the farming metaphor (Marshall, 1991; Bernstein,1993), and the landscape metaphor (Florin, 1990). These metaphors are all spatial metaphors. Spatial metaphors suggestanalogies to actual behaviour in physical space and real world situations.They are expected to help users understand high-functionality systems.

Spatial metaphors do not need to be presented graphically. The text-based adventure game Multi User Dungeon(MUD) is a typical example of a spatial user interface. It uses themetaphor of rooms to generate a very detailed and highly structuredenvironment for the user to explore. By taking an exit out of such a room the user moves to a different location in theMUD space. MUDs create an elaborate spatial metaphor in the mind of theirusers offering only textual descriptions of environments. MUDs are verypopular games, with a relatively cheap and simple technology, and as such create an excellent testingenvironment for navigation abilities in computer generated space. Graphicalvirtual reality worlds are often still small and clumsy due to lack ofmachine power, while MUDs usually consist of thousands of rooms, combined with an almost real-time response.

The popularity of MUDs suggests that participants of MUDs can successfullycreate spatial memory representations from the textual descriptions of MUDspaces. Psychological research demonstrates that people are able to construct spatial maps from textual andverbal descriptions of an environment equally well (cf. Bryant, 1993;Ehrlich & Johnson-Laird, 1982; Foos, 1980; Franklin & Tversky, 1990; Mani &Johnson-Laird, 1982). People generally represent texts in mental models rather than by retaining the linguisticstructure of the text (Glenberg, Meyer & Lindem, 1987; Johnson-Laird, 1983;Morrow, Greenspan & Bower, 1987). These mental models preserve physicalproperties of space such as relative position (Bryant, Tversky & Franklin, 1992; Franklin & Tversky, 1990;Mani & Johnson-Laird, 1982), and relative distance (Glenberg, Meyer &Lindem, 1987; Morrow, Greenspan & Bower, 1987).

2. MUDs Defined

MUDs are text-based, interactive multi participant adventure games modelledlike virtual worlds, freely accessible through a world-wide computernetwork, called the Internet. MUDs frequently accommodate 50 to 100 activeparticipants at the same time. The first MUD dates from 1979; in January 1994 there

were 447 MUDs on the Internet (Goehring, 1994). MUDs are modelled like rooms,linked by exits, and made into houses, cities, forests, etc., containingobjects people can manipulate, and agents one can interact with, and manycommunication modes, like one-to-one conversation, group conversation, self-contained e-mail, self-containedbulletin boards, Gopher connections, etc. Participants have a full bodyrepresentation inside the MUD which they can customise to some extent. Theparticipants of MUDs form communities with a number of unusual properties. In most cases the participantshave never met each other in real life, they have never communicated in anyother way than mediated by the computer, and they have developed a distinctset of ethics unique to MUDs. Among the issues that have been investigated are the influence of MUDs onperceived identity (Bruckman, 1992), the occurrence of gender swapping(Bruckman, 1993a), the development of a culture (Rosenberg, 1992),communicative modalities, their impact and structure (Carlstrom, 1992; Serpentelli, 1992).

MUDs have evolved from role-playing games, similar to Dungeons & Dragons(tm), to social meeting places and Computer Supported Cooperative Work(CSCW) environments (Bartle, 1990; Curtis, 1992). MUDs are collaborativeadventuring and programming environments, and as such many problems of CSCW and Computer Supported CooperativeLearning (CSCL) have been addressed and in many cases elegant solutions andbenefits have been found. MUDs have been evaluated for their functionality for collaboration between programmers (Bruckman, 1994),researchers of media (Bruckman, 1993), the members of a sprawling systemsgroup (Evard, 1993), and the members of a large corporation (Mansteadt,1993). Because MUDs seem so effective as CSCW environments the demand for more information sharing and browsingtools has been met by changes in the MUDs. One MUD has been adapted so thatparticipants can browse and share the information of Gopher servers allover the Internet (Masinter & Ostrum, 1993). Another MUD is under development with audio, and video channels(Curtis & Nichols, 1993), and yet another MUD is created as a hyper textualcollaborative information organiser (Dieberger & Tromp, 1993), for whichthis research has been conducted.

2.1 Perception of Motion and Space in a MUD

To be able to build and refine a cognitive map (see below) ofinterconnected spaces, users need to perceive or imagine themselves asbeing in a space of some kind and moving from one space to the next.Appleyard, Lynch, and Myer, (1964) have defined criteria for the perception of motionand space. These criteria are extremely impoverished in MUDs, yetcounterparts of each are present.

A. Apparent self-motion: speed, direction, and their changes (stop-go,accelerate-decelerate, up-down, right-left).

Participants of MUDs can move themselves through MUD space by typing thecommands that are associated with the exits. The standard possible exitsthat can be defined to move the participant from one room to another are up, down, north, south, east, west. The speed with which the participantsmove is determined by themselves, and the speed of their connection. Theycan move fast, if they do not want to read all descriptions of each room,or slow if they want to read everything carefully. A command has been defined to toggle the amount of text inthe description from elaborate to the bare minimum.

B. Apparent motion of the visual field: passing alongside, overhead, orunderneath; rotation; translation; spreading or shrinking of outline ortexture; general stability or instability; apparent velocity or lack ofit.

The illusion of motion of the visual field is created by text, by simplydescribing it. By walking from one room to the next there is real motion.Numerous transportation objects have been created which the participant canmount or enter, in which they are transported through MUD space. The participants get information about thespace they are moving through, the speed, stability, and the velocity, andthe other participants get information about that participant passingalong.

C. Spatial characteristics:

1. Presence and position of enclosing objects or surfaces, theirsolidity and degree of enclosure.
   Once a participant enters a room, or some other kind of object, like acloset, an elevator, etc. they can only leave it by the exit(s) or byteleportation. They can not go out through the wall or any other way,unless of course, a (secret) exit has been defined. Sometimes rooms like closets and elevators have been defined with a door that has to be opened before a participant can enter theroom, or a lock which has to be opened first. Cabinets can have drawersthat need to be opened before the contents can be examined, etc.
2. General proportions of the space enclosed; scale with respect tothe observer; position of the observer.
   The proportions of the room are dependent on the way the room has beendescribed. Some rooms are described as large spaces, some rooms as smallspaces, and some rooms have no indication of size at all. In some cases the size of the room can be inferred from the kindof environment that it is supposed to be.
3. Quality of the light which makes the space apparent; intensity anddirection.
   Light is defined for all rooms of the MUD. A room can be either dark orlight. If a room is dark, the participant will not be able to view thedescription of the room, until she finds the means to create a lightsource. Intensities of light can, and are, sometimes created by the description of the room; a room can be described asbeing dark or badly lit without actually requiring an additional lightsource before the description can be read.
4. Relationship of spaces in sequence: jointing and overlapping.
   Rooms usually have a Euclidean relationship, but sometimes they can bemissing, or overlap, and become uniform spaces; that is, one can find roomsthat are logically not at the same point in space, yet have zero distancebetween them.
5. Direction of principal views, which draw the eye toward differentaspects of the spatial enclosure.
   The view is entirely created by the description of the room, and theadditional descriptions associated with items mentioned in the description.For instance: in the description of a room a window can be mentioned, and if this windowhas a corresponding item description the participant can examine thewindow. The description associated with the window might state the viewfrom the window.

2.2 Rooms

Rooms are described textually and such descriptions can be very coarse orvery elaborate depending on the goals, or programming skills of the author of thecorresponding room. Rooms are objects which participants can enter. Thetext with which the room is described creates the impression of being in aplace. This place can be anything from a room inside a house, or a street in a city, to a spot in a forest,

etc.Participants have the opportunity to own their own room and eventually tocreate their own house or area. Personal rooms are very popular, a lot oftime is spent in them and the participants spend much time creating rooms that suit their needs and wishes.

Going from room to room is made possible by means of exits. Usually a roomhas one or more of six possible exits: north, south, east, west, up or down. This creates the impression that theMUD is laid out on a three dimensional rectangular grid. Which in turn stimulates the illusion that the rooms are in Euclidean relationship toeach other. However, exceptions to this rule are not uncommon. In theory aroom can have an unlimited number of exits, no exits at all or exits that do not take one along theaxis of one of the three dimensions.

2.3 Euclidean Relationships

Problems in making cognitive maps of MUD space could be caused by anomaliesin Euclidean relationships like missing rooms, overlapping rooms,unconnected rooms, and magic mazes. Missing rooms are the rooms one wouldlogically expect when drawing a map of interconnected rooms in a 2D or 3D grid, but which do not exist. See figure1.

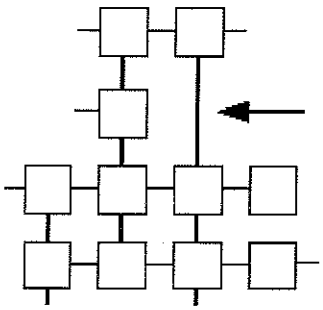

Fig. 1: Example of a missing room. The arrow shows the spot where one would expect a room.

Overlapping rooms are rooms that occupy the same space on the grid butnonetheless represent two exclusive spaces, see figure 2.

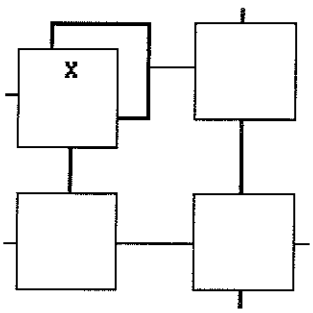

Fig. 2: Example of overlapping rooms. The X marks the spot where two roomsoccupy the same space. To clarify this, the two rooms have been drawnslightly shifted away from their real spot .

Unconnected rooms are rooms one can only reach through a magic exit, and ifno magic exit has been

defined than it is only possible to reach it byteleportation. Rooms like these occupy a separate location on the grid on which most rooms of the MUD can be laidout. On MUDs the creators and sometimes maintainers of the MUD use roomslike this to have some privacy. These rooms have no entry, and it is onlypossible to go there by teleportation. Sometimes a number of these rooms are interconnected with regular exits,but the only way to reach their location is by teleportation and to leavethem a magic exit has to be defined there. If such an exit has not beendefined the only way to leave is by teleportation. See figure 3 for an example of a single unconnected room,and a group of unconnected rooms.

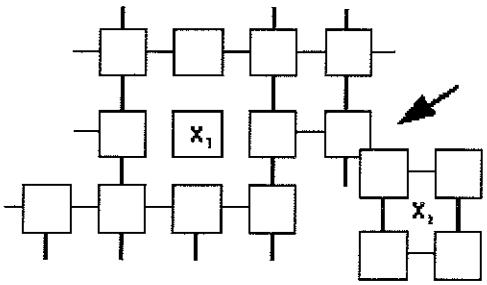

Fig. 3: Example of a single unconnected room, (X1) and a group of four mutuallyconnected rooms which are unconnected to the other rooms (X2). The arrowpoints to the symbolic representation of the fact that the four rooms areactually free-floating in the sense that their location has no Euclidean relation to the location of theother rooms.

Magic mazes are spaces where we could go through an exit, south (forinstance), and retrace our steps (north), to our departure point, only tofind ourselves in a completely different room. See figure 4. Disruptions inEuclidean relationships like these are of a dream-like quality, and they are quite commonly used in MUDs to adda little spice. These kinds of connections cause disorientation problemsvery similar to navigation difficulties in hypertexts or other largeinformation spaces.

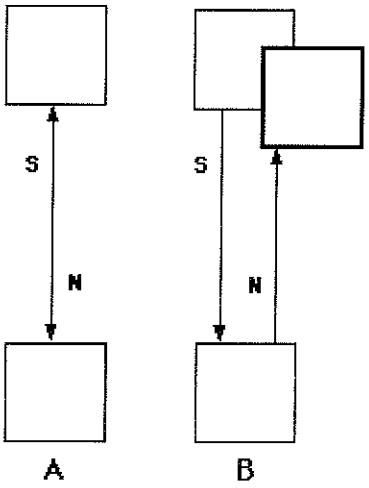

Figure 4: Example of a magic maze. A shows a normal connection between tworooms, where we can reverse our path. B shows a magic maze, where oneinstance of an irreversible path is shown. Magic mazes usually consist ofmultiple connections of this kind.

2.4 Teleportation

The usual way participants move from one room to another is by walking. Bytyping north, (or n) in a room where the exit to the north is defined, theparticipants body representation is moved to the next room. However it is also possible to make use of two kinds ofmagical means of transportation, known as teleportation and magic exits.Perhaps teleportation is most often associated with the transportation beamused in Star Trek, or with stepping through to an other dimension that folds itself around our dimension.Teleportation brings the participant instantaneously from A to Z, where Aand Z are not fixed points. Magic exits bring a participant from A to Zequal to teleportation but A and Z are usually fixed points, and the transportation is not per definitionreversible.

Teleportation is a very quick and therefore useful way of transportation inVirtual Reality (VR), but it might disrupt the participants sense ofdirection and location. Magic exits can be used by all participants of theMUD, but teleportation is not always available for all participants. In many MUDs teleportation is an abilitythat is only acquired after reaching a certain rank in the MUD. Usually ittakes at least 48 hours of play-time before this rank is reached, and sometimes more, depending onthe difficulty of the game, the determination of the participant to reachthis rank, and the kind of MUD. Usually the participant that reaches thisrank acquires the commands that allow her to program for the MUD, and at that rank their status in the gamechanges from adventurer to programmer. Programmers do not adventure and arenot allowed to help adventurers. Programmers can learn how to create roomsand objects which are than added to the virtual world of the game. These programmers can view the code ofthe MUD while they are in the MUD. They can write the code for a new room,load it into memory and enter it straight away. These abilities cause aconsiderable difference in control over the environment, in navigating the environment and often in thinkingabout the environment.

3. Measuring Navigation and Spatial Perception

The simplest way to measure the participants perception of room sizes is toask them directly. There is no "true" size of a MUD space. Volume, size and weight are not defined everywhere;there is, in theory, no limit to the number of objects and participantswhich a room can contain. Because MUD spaces are not designed metricallysize will have to be measured subjectively. This can be done by asking participants to compare the size of twoMUD spaces with each other.

One way to measure the accuracy of the participant's perception of theirplace relative to the overall lay-out of MUD space is to ask them to drawthe cognitive map they have formed of this space. This however, is not a veryattainable method because of the characteristics of the subject population.The physical location of participants can be almost anywhere on the globe,and asking them to draw a map and return it by regular mail would greatly increase the effort of responding.The least effort costly way of measuring the participant's knowledge is toask them to estimate the confidence with which they feel they will be ableto draw such a map. Another way to ask them about their knowledge of relative location is to name awell-known place and ask them if they know how to go from there to anotherwell-known place.

The attributional information of a spatial phenomenon is most difficult tomeasure, because this kind of information does not concern itself withobjective values. The most common measure for this kind of information isthe adjective checklist. This technique would consist of giving the participants a list of bi-polar adjectiveson which they select the degree in which the adjectives apply to a certain room. Thiswould have to be done for a number of different rooms of the MUD. Theresults from the different rooms can than be compared with each other tosee if participants perceive a difference between rooms.

To get a reliable measure from the checklists it would haveto be answered by a large number of participants. The effort to fill out anumber of checklists is obviously large, and combined with the unknownpossibility of getting a large number of participants, this technique is not quite feasible. It is alsopossible to ask which rooms participants favour over other rooms and whythey prefer those rooms. If they clearly favour certain rooms it means thatthey do perceive a difference between rooms.

Conclusions about Measurement Techniques
The kind of information that is desired from the respondents are attitudesabout exploring MUD space, beliefs about the structure of MUD space,navigational behaviour and attributes of MUD space. Most of the questions have an open-ended structure to gain as much knowledge aspossible, because this is a pilot study, without prior research results todraw knowledge for answer categories from.

4. Respondents, Design, and Procedure

The first survey consisted of 5 questions, the second survey of 13questions; offered to participants of the MUD as an electronicquestionnaire, inside the MUD. By electronic questionnaire is meant thatthe questions are offered to the respondents via the computer, answered via the computer and returned via the computer. There is no data available on returnrates for electronic questionnaires. For this reason the size of the firstquestionnaire has been kept so short that the questions and the transitiontext between the introduction and the actual questions had the fit of one screen full of text. After gettinga good return rate of the first questionnaire it was decided to try asecond, longer questionnaire. There was never any direct contact betweenthe author of the questionnaires and the respondents. Participants were free to decide if they wanted to answerthe questions. The MUD selected for the survey is an LP-MUD, and was at thetime of the experiment running a modified version of LP driver 3.1.2. TheMUD is called Igor, Internet address 129.16.60.9 1701, running on a machine of the Chalmers TekniskaHogskola in Gothenburg, Sweden. The MUD consists of approximately 10,000rooms.

Care has been taken to construct an interesting and appealing introductionto the questionnaire. The first question was easy to answer and interesting to everyone. The effortdemanded to answer the questions has been kept as low as possible. It waspossible to skip questions, to restate answers, and to reread answers.Questions have been stated in such a way that all categories of participants were addressed, and technical terms havebeen avoided as much as possible. See appendix A for a complete overview ofthe introductions, questions, and transitions texts.

No time-referents were asked about years of experience with MUDs, because it would be very hard to give an accurate estimateof time spend on MUDs. While at the same time most MUD participants use afantasy name in the MUD, so that relative anonymity is a fact. Anonymitywas not explicitly guaranteed, No gender questions could be asked, because the relative anonymity makes itdifficult to check this, and it is not uncommon for MUD participants to usethe opposite gender in the MUD (Bruckman, 1993a).

First Questionnaire
1) Do you know how to get from the church to the shop without looking atyour screen?
2) How do you learn your way around in a new area?
3) What strategies do you use to recognise where you are and where to go?
4) What do you do when you are totally lost?
5) Do you avoid getting lost or do you get lost on purpose, and if yes,why?

Second Questionnaire

1) MUDs are derived from role-play games. Do people role-play on the mud alot or a little or only sometimes? Why do you think this is so?
2) Name five places on the mud where you have spent a lot of time andexplain why you chose each of them.
3) Name five activities on the mud on which you have spent a lot of timeand explain why you chose each of them.
4) Can you give an example of a very large room and a very small room onthis mud and explain what makes them large/small?
5) If you design your own room on the mud what would it look like, whatobjects would you want to be there, and what special properties would youwant it to have?
6) If you had a house or a personal room on the mud, where should it be andwhy do you want it to be there?
7) Most personal rooms of wizards are not connected to the mud, you can'twalk there, only teleport. Do you imagine these rooms in a specific placeand why?
8) If you were put at a random spot in the mud in an area that you know,would you be able to draw a accurate map of that area?
9) Does going to places consist of a series of connected movements or is ita complete image in your mind?
10) Do magic exits or rooms that are missing if you would draw a mapdisturb your sense of direction?
11) Do magic mazes (places where you for instance go n,s and end up in adifferent place than where you were before) make it harder to image whatthe area looks like?
12) If you teleport to a place through a magic exit do you feel that theplace you teleported to is far or near the place you teleported from?
13) If you could chose to start the game at a specific place each time youlogin, which one of the following would you prefer?
(1) A random spot;
(2) A certain place that you picked yourself;
(3) The church.

Running the Survey

The electronic questionnaire was offered inside the MUD, by which is meantthat participants of the MUD could simply find the questionnaire as anobject called "a form", inside a room called "the research centre" in theMUD. In this room the introduction to the questionnaire was shown as "a sign", and instructions on how toanswer it were available on the form. The form could be taken out of theroom, carried around, and answered at leisure. To return the form it had to be brought back to the research centre and put in abox there. It was not difficult to find the research centre, but none theless, many respondents were drafted by other respondents. It was notdifficult, nor time-consuming to answer the questionnaire according to the pre-testers, and many respondentsanswered the questions with great precision. They often volunteered moreinformation than asked for, which must have taken quite a lot of theirtime. It is our belief that this effort was made in most cases because the respondents were happy to "talk" abouttheir experiences with the phenomenon MUD.

Approximately 600 people entered the MUD while the questionnaire wasavailable. Both times, after four days 70 questionnaires had been received,at which point the surveys were concluded. Of the first survey 66questionnaires were returned complete, and of the second survey 68 questionnaires.

5. The Results

I (1)	Yes	84%	A bit	9%	No	6%
I (2)*	Memorise	62%	Make maps	24%	Ask help	14%
I (3)*	Recognition	66%	Maps	20%	Ask help	14%
I (4)*	Wander	31%	Ask help	33%	Quit	17%
	Teleport	16%	Never get lost	5%		
I (5)*	Avoid	56%	On purpose	6%	Sometimes	24%
	It happens	9%	Never get lost	5%		
II (1)	A lot	31%	Half/half	32%	Other	4%
	Not at all	12%	Missining	21%		
II (4)	Description	49%	Other	50%	No difference	1%
II (7)	Depends on descr.	10%	Image	68%	No image	22%
II (8)	Yes	76%	Roughly	4%	No	19%
II (9)	Connected	47%	Image	39%	Both	14%
II (10)	Yes	30%	Sometimes	22%	No	48%
II (11)	Yes	67%	Sometimes	17%	No	17%
II (12)	Far	45%	Near	13%	Depends on descr.	5%
	None	15%	Depends on real dist.	23%		

Table 1: I = 1st questionnaire, II = 2nd questionnaire. * = Thesepercentages represent for each answer category the frequency count; wherethe contents of each response have been scored over multiple categories.Abbreviations explained: descr = description, dist. = distance.

5.1 Spatial Information

Participants certainly seem to create an image in their mind about the sizeof a room. In response to question 4 of the second questionnaire only 1% ofthe participants said that they perceived no difference in size betweenrooms. The overwhelming majority of participants agreed that rooms can seem small or large, but theydiffered quite a lot in their ideas of what created or influenced theimpression of the size of a room.

The most obvious answer would be that the description of the room creates the mental image of the room, because it is the most immediateinformation to base the mental image on. And indeed, 49% of the respondentsasserted this. Interestingly however, 50% of the respondents ascribe theimpression of size to something else. Among the things that are mentioned which create the impression ofsize are, in descending order of frequency: Being outside in the open air, or being inside a building. The number ofpeople in a room; apparently it follows that if there are many people inthe room it must be large. And similarly: the number of items described in a room, and the number of exits. If thetext with which the room is described is long, the room also seems bigger.This last finding could perhaps be called an artefact of text-based VR; if a small space would be described by a long text, would itbe experienced as large or small?

5.2 Locational Information

In response to question 8 from the second questionnaire all participants ofthe MUD who walk around the MUD regularly (level 1 to 20) 63% said that they are able to make at least a rough map of thesurrounding area if they were put in a random room in that area, providedthat it is a familiar area. However, all participants that have been usingteleportation as their main means of transportation for some time (level 21 and up) are equally divided inbeing able and not being able to draw a map.

In response to question 1 from the first questionnaire, 85% of theparticipants say they are confident that they can remember and visualise the route between two well known and often visited places, 11% saythey are sure they can do this a bit, and 5% say they know they can not.

In response to question 2 from the first questionnaire 62% of theparticipants say they locate a landmark and explore the new area around it.They do this by paying close attention to the descriptions of the rooms andby methodically checking every exit. They say this creates a cognitive map of the area for them. If the area isvery large, or they need to remember things in minute detail they revert to creating maps on paper. Asmaller but distinctive group of participants, 24%, say they always makemaps on paper if they walk around in a new area, and 14% say they usuallyask for help from other participants.

In response to question 3 from the first questionnaire 66% of theparticipants say they rely on distinctive words in the description of therooms, or objects in the room to locate themselves on their mental map, andcount the number of times they have to go in a certain direction from there. 20% Says they use the paper map theymade while exploring the area and 14% say they rely on their friends memoryto get their bearings. These participants describe their surroundings toother participants who may be in a totally different area, this participant then might direct them to wherethey want to go.

In reponse to question 4 from the first questionnaire participants mentionmany strategies they employ when they get lost. 31% Say they will first tryto walk in one and the same direction until they come upon something familiar. 33% Saythat if that doesn't work they will ask fellow participants, and 16% saysthat if that does not work they will either teleport back to some standardplace and 17% will quit the game and re-enter it, which also brings them back to a standard place.Interestingly 5% says they never get completely lost.

In response to question 5 of the first questionnaire 56% of theparticipants say they don't like to get lost, and try to avoid it. 6% Of the participants say they get lost on purpose, and 24% say theysometimes don't mind if they get lost. These participants say they have tobe in the mood for surprises and have time and little to lose at thatmoment to enjoy getting lost. 14% of the participants think that getting lost is an essential element of adventuring,but of these 5% also state they never really get completely lost (the sameparticipants as in question 4).

The location of a personal room is also considered important by the respondents. In response to question 6 of the second questionnaire 11% say theycan't think of a special place they would like to live near, while 89% saythey want their room to be in a specific area and near specific otherrooms. Among the things that are mentioned as important to live near are, in descending order: near the main facilities of the mud, near a place that is of personalimportance, and it has to be in an aesthetically pleasing area. On the onehand people want a room that is connected to the central facilities of the MUD and easy to get to for others, but on the otherhand it has to be a room where they can enjoy complete privacy when needed.

The responses to question 7 from the second questionnaire show that 68% ofthe participants has a specific image in mind of where unconnected roomsare located, 22% said they didn't imagine them to be anywhere at all. Themost obvious answer would be that it does not matter if a room is unconnected, because the location dependson the description of the room, but only 10% of the participants gave thelogical answer.

Of the 68% of the respondents who said they imagined unconnected rooms tobe somewhere specific, 55% said they imagined these rooms to be in anotherdimension, unconnected to the MUD. And 45% of the participants said theythink of these rooms as somewhere up in the sky, either in heaven or on top of a high mountain, or floatingaround in the clouds. The fact that a lot of participants think of theserooms as in heaven or on a high mountain might be an artefact of the names the creators and maintainers of MUDs usuallyhave, since they are usually called gods and arch wizards.

In response to question 10 from the second questionnaire 48% of theparticipants say that missing rooms, overlapping rooms, or magic exits donot disturb their sense of direction. 22% Say they are confused in thebeginning but that it just takes getting used to. Once they have reoriented themselves or familiarised themselves withthe concept they are no longer disturbed. 30% Say that the descriptionwhich sometimes accompanies the transportation through a magic exit canmake it very confusing.

Instead of adding spice, most participants intensely dislike situationslike magic mazes, and they tend to avoid them. In response to question 11from the second questionnaire 67% of the participants say they always, and17% say they sometimes get confused and also irritated if there is a disturbance in the local Euclidean spaceof the magic maze variety, and that it creates not more than a blurry picture in mind of what the area looks like. 17% Of theparticipants say they are only disturbed by it until they have establishedhow to get through such an area, and that they think of it as a group ofrooms with teleportation links only, so that linear relationships do not matter.

In response to question 12 from the second questionnaire the followinginformation was given. Teleportation takes one from A to Z. 15% Say thatthere is simply no distance implied by teleportation. If it is not possible to walk from A to Z 45% of the participants resort to thegenerally held opinion that teleportation is meant for travelling longdistances and they automatically expect to have been transported far whenthey are teleported. On the other hand participants say that transportation through a magic exit is meant for shortdistances and they automatically expect to have been transported a shortdistance. 23% Of the participants say that if it is possible to walk from Ato Z, the number of rooms between A and Z is taken as the distance between the two locations. 13% of theparticipants say that because the time needed to go from A to Z byteleportation is actually short this creates the impression that A isactually near Z. The obvious answer to the question of the distance traversed with teleportation is that there is no realdistance involved because only the description that accompanies theteleportation creates any impression of distance, but again only 5% of theparticipants gave the logical answer.

In response to question 13 of the second questionnaire 71% of theparticipants said they would like to pick the place where they enter thevirtual world themselves, 23% said that they would like to start whereeverybody else starts because it is a good way to meet people, and 6% said they would like to start at a random place.

Question 9 of the second questionnaire - if moving through MUD space isbased on a series of connected movements or on an image in mind - was adifficult question according to most respondents, because it was not stated clearly enough. However from theanswers of the respondents who did seem to understand the question as itwas intended, can be derived that while they are exploring new spaces andwhile they are thinking about or remembering a certain area, they have a mental image of the spaces, but whenthey are simply going from one known space to another, it is more a seriesof connected movements. Like for instance one respondent said: "When I know a place really well I do memorise the movements but at the same time I visualise where I am going, it aidsin remembering where to go (e.g. Santa Carla from shop)."

and another onesaid "No, an area is a complete image, but I associate movements withmoving around. Like, if I want to go to the guild I would go s,e,e,e,s ... but I still see it as a whole imagein my mind."

5.3 Attributional Information

In response to question 2 from the second questionnaire, there were anumber of places, apart from the obvious area's participants have to visit to play the game, that were mentioned repeatedly. Table 2 shows theseplaces, and the relative frequency with which they were mentioned.

	Quiet	Meeting	Info	Gaming	Esthetics	Total
Private Room	19	13	0	7	3	42
General Guild	0	16	4	3	1	24
Personal Guild	0	4	8	5	1	18
Shop	0	6	2	9	0	17
Post Office	0	0	1	0	0	1
Starting Point	0	6	0	0	0	6
Off-beat Rooms	2	1	0	0	0	3
Pub	0	4	0	3	1	8
Total	21	50	15	27	6	

Table 2: II (2). Name five places on the mud where you have spent a lot oftime and explain why you chose each of them.

The reasons for spending time in these places has everything to do with thespecial qualities of these places. Apart from the obvious qualities certainplaces should have for gaming purposes, the suitability of a place as ameeting place was thought of as highly important. Certain places where thought of as suitable for one-to-one meetings, others asplaces good for meeting new people, because many people spontaneouslygather there. Another quite obvious reason for preferring certain placeswas the fact that they contain information relevant to the participant, like mail, bulletin boards, and experiencedother participants. One last quality that was thought of as an importantreason to prefer one place over another, was its beauty, either in designor in the image created in mind.

In repons to question 3 of the second questionnaire most participantsagreed that adventuring through mud space -to actualiy play the game- wastheir most important activity. This was closely followed by chatting andemoting (the expression of affections, ranging from courting to its most explicit form - "mud sex"). The mostoften agreed on reason to be performing these activities is to socialize,closely followed by relaxation and release of energy (summarized as "fun"in the table). Also, participants felt they could obtain useful information from other players and they feltthey got respect for the rank they had reached in the game, both statedreasons for being in the mud. See table 3.

	Socialize	Respect	Info	Fun	Total
Chat	25	0	2	3	30
Program	0	5	2	1	8
Read mail/bulletin boards	5	0	6	2	13
Adventure	0	7	5	25	37
Listen in	5	0	2	1	8
Emote	17	0	1	7	25
Helping	5	3	0	1	9
Total	57	15	18	40	

Table 3: II (3). Name five activeties on the mud on which you have spent alot of time and explain why you chose each of them.

Question 1 from the second questionnaire - if participants tend torole-play on the MUD - was not equally well understood. MUDs are derivedfrom role-play games and 21% of the respondents thought this questionreferred to role-play activities outside the MUD. Also, there are different styleMUDs where role-playing is the goal of the game, whereas on LPMUDs, likethe MUD where this survey was conducted the main goal is to achieve thehighest level. However, 12% maintained that nobody role-played, and 63% of the respondents maintained thateverybody role-plays quite often. Of these 67%, 32% agreed thatparticipants tend to role-play most the first few times they meet anunknown participant. They explained that after participants know each other for some time, they role-play once in while, toentertain each other, but when they engage in personal conversations theytend to drop the role. 31% Say that the relative anonymity makes it easy topretend to be different from ones real life self, and the fantasy environment helps to sustain a differentimage of oneself for others. 4% Of the participants agreed that someparticipants "just" play to gain levels, and that only those participantsdon't bother to role-play.

In response to question 5 from the second questionnaire 89% of the participants saidthey would create very ornamented rooms for themselves, they like to haveanimated objects for amusement. They want a place to sit with theirfriends, containers to keep their personal belongings in, and often food, drinks and music to be able to entertaintheir guests. See figure 5 for an example of such a room. Most of the timeeverything is very rich in detail with the intention to sustain theillusion of reality inside the MUD. They say they would spend a lot of time and effort creating their personalspace.

```
                        Bod's room
Its a fairly medium sized cave, warm and cosy. Its basaltblack walls shows no
reflextions from the few torches hung in the corners.
All over the floor lies skillfully prepared skins from beasts slain by the
inhabitants of this cave, they are as soft and cosy as they ever can be.
A bottle of red wine stands in the corner, together with lots of creamcheese.
Along one of the walls have a fireplace been cut out. Blazing with pure
red energy it seems to give the cave life by its movements.
A pizzaphone stands on a black pillar.

Items      :
 #1: 'torches' - Burning slowly with a faint blue light.
 #2: 'floor' - Its covered with skins, lots of soft cosy skins.
 #3: 'skins' - Bears... lions... orcs... mortals... lots of types. Very soft and  nice.
 #4: 'wine' - A botle of 'Trentino Merlot'. Bod's favorite wine. (At the moment.)
 #5: 'creamcheese' - Ready to be stuffed into navels. 8)~
 #6: 'fireplace' - Burning brightly... cosy.
 #7: 'cave' - You are inside it my friend.
 #8: 'phone' - Standing on a pillar.
 #9: 'pizzaphone' - Standing on a pillar.
 #10: 'pillar' - A pizzaphone rests on top of it.
```

Fig. 5: Example of a personal room. Note: The item list is not visiblewhen in the room, except when a user examines an item, than s/he will beshown the text defined for the item.

6. Conclusions

6.1 Spatial Information

Perhaps the most direct answer to the question if rooms vary in size comesfrom the answer of one of the respondents, to another question: "No, I don't see rooms as squares on a paper, places vary in size."However the fact remains that many respondents mentioned other reasons thanthe description of the room for the impression of size, like: "being inside/outside", "number of people", number of items", "number ofexits". These reasons can all be explained by the assumption thatparticipants can make use of the information of mental models they have ofreal life places, which they substitute for the missing information aboutsize and shape for similar places on the MUD. This can be illustrated bythe answer of another participant:

"Large room: The pagoda e,3n,ne from south of shop. Pagodas I imagine to be tall buildings with lots of light, lots of space, highceilings."

The actual room looks as follows:

```
This is the top of a small pagoda. There are stairs leading down.
   There is one obvious exit: down
```

If we look at this room with the knowledge of the previous rooms, we getmore information of size, contributing to an impression of a largebuilding, but the word large is still not used. On the contrary, the pagodais said to be small, and yet, the respondent experiences this room as a large space.

```
This is the courtyard of the castle. North leads into the castle, while
east and west leads to the gardens. Far in the west you can see some smoke
drifting up in the sky. Far to the east you see the tip of a small pagoda.
   There are four obvious exits: out, north, west and east
> east
This is the garden. Surprisingly there are no flowers or trees. All you
see is bamboo and grass. There is the faint sound of running water.
Seems like a good place to be alone. Far to the east is a small pagoda.
   There are two obvious exits: east and west
> east
This is the garden. Surprisingly there are no flowers or trees. All you
see is bamboo and grass. There is the faint sound of running water.
Seems like a good place to be alone. East is a small pagoda.
   There are two obvious exits: east and west
> east
This is the base of a small pagoda. There are stairs leading up.
The way out is west.
   There are two obvious exits: up and west
> up
This is the top of a small pagoda. There are stairs leading down.
   There is one obvious exit: down
```

6.2 Locational Information

Overall the results indicate that participants perceive the houses androoms as being in distinctly different places between which they have totravel. It seems they can make cognitive maps of the spaces they travelthrough without many problems, as long as the different rooms have local Euclidean relationships, and the roomscontain obvious and distinctive landmarks. It has to be clear whether a connection between

to rooms is a normal exit to the nextroom, or a magic exit to a room in another area, to avoid confusion, andthe environment has to be relatively stable, so that the cognitive map canbe strengthened by regular visits to the same locations.

There are different strategies in navigating information, sometimes userswant to find something specific, sometimes they are simply looking around.In both cases it seems like a waste of time to get lost and it seems like ahigh price to pay for exploring. If users could explore and find their way back atall times it might be more tempting to explore. An automatic map shouldhelp considerably in this respect. Giving users the opportunity to look ata map of the surrounding area is beneficial because it anticipates a natural impulse to create maps. The mapshould be provided in different levels of detail. It should be possible tochange the level of detail on request, and the map should be available atall times.

Walking the same route regularly seems to be the best way to create cognitive maps, butteleportation is at some point in time an agreeable alternative because itprovides a quick way to travel. The results indicate that usingteleportation as the only means of transportation causes a decay of the cognitive map. This can be avoided up to a point byproviding indications of the distance and direction traversed.Teleportation could for instance be accompanied by a message about thedirection, and by a sound. If the distance is moderately far the sound could be that of a subway, and if it is far itcould be that of a plane. Another solution is to make teleportation withthe option of a view of the area traversed. On the one hand this wouldcreate a good opportunity to consolidate the existing cognitive map, on the other hand it could be used to create acognitive map of a new area. Furthermore the results indicate that mostparticipants that are new to the concept of teleportation find it slightlyconfusing. It seems therefore important to make it very clear what is actually happening when the user isteleported from one location to another.

The results indicate that participants think teleportation without fixedstarting and arrival points has the innate property of moving one acrosslarge distances, while teleportation with fixed destinations has the innateproperty of moving one across relatively short distances. These fixed teleportations or magic exits arenon-Euclidean links and the results seem to indicate that participants allow for these kinds of transportations as a means to travel betweendisconnected rooms. In this way magic exits do not disrupt the cognitivemap, instead they have a distinct function. Magic exits are seen as doorsto other dimensions and it seems advisable to use them as such. They could be used for instance to signify a linkto a close but not directly related chunk of information. For newparticipants these links can be slightly confusing so it is important toaccompany this transportation with a clear message of what is happening.

The results seem to indicate that disconnected rooms are not disrupting thecognitive map. The fact that many participants agree that these rooms areeither up in the sky or a similar place, or in another dimension signifiesthat the rooms are present on the cognitive map, but in a place that is specially reserved for these kindsof rooms. This means unconnected rooms can be used in the virtual city andit might even be considered to make use of the special place these rooms seem to get on the cognitive map. For instance, unconnected rooms could beused for special kinds of information that is of general application; orinformation that is very indirectly related. It also seems to create noproblems if there are missing rooms, or overlapping rooms, but it is perhaps best to isolate these problemsand research their effects on cognitive map making more extensively.

One very important indication of the findings about disruptions ofEuclidean space comes from the magic mazes. It seems that using such uncommon connections between places is best avoided,not only because it is difficult to make a cognitive map of these places,but also because people simply do not like it and will

not return there ifthey can help it.

While most information retrieval systems are single-user systems in thesense that people browsing it at the same time cannot communicate insidethe system, the results seem to indicate that communication betweenparticipants is an essential element of navigation, and one that is preferred over starting at the beginning whenlost.

6.3 Attributional Information

Rooms are remembered and favoured for their perceived qualities. Thesequalities are apparently dimensions on a bi-polar scale: busy - quiet, cosy - scary, empty - full, small - large, fun - boring,dangerous - save, and useful - useless. Rooms are also remembered by the objects or items inside it, by their description, and bythe exits, provided that these things give the room something which makesit distinctive from the surrounding rooms.

6.4 Summing up

Participants of MUDs can remember and visualise a large number of rooms andthe spatial relationship between those rooms. They are able to navigateover large distances; between many rooms, while maintaining a general feelof their location. Distinctive landmarks, and consistent, clear messages about their surroundings, areneeded for this orientation. Although maps are not essential fornavigation, they are in many cases deemed important enough to create themby hand. In general it can be stated that the results indicate that navigation ina textual spatial interface is quite manageable.

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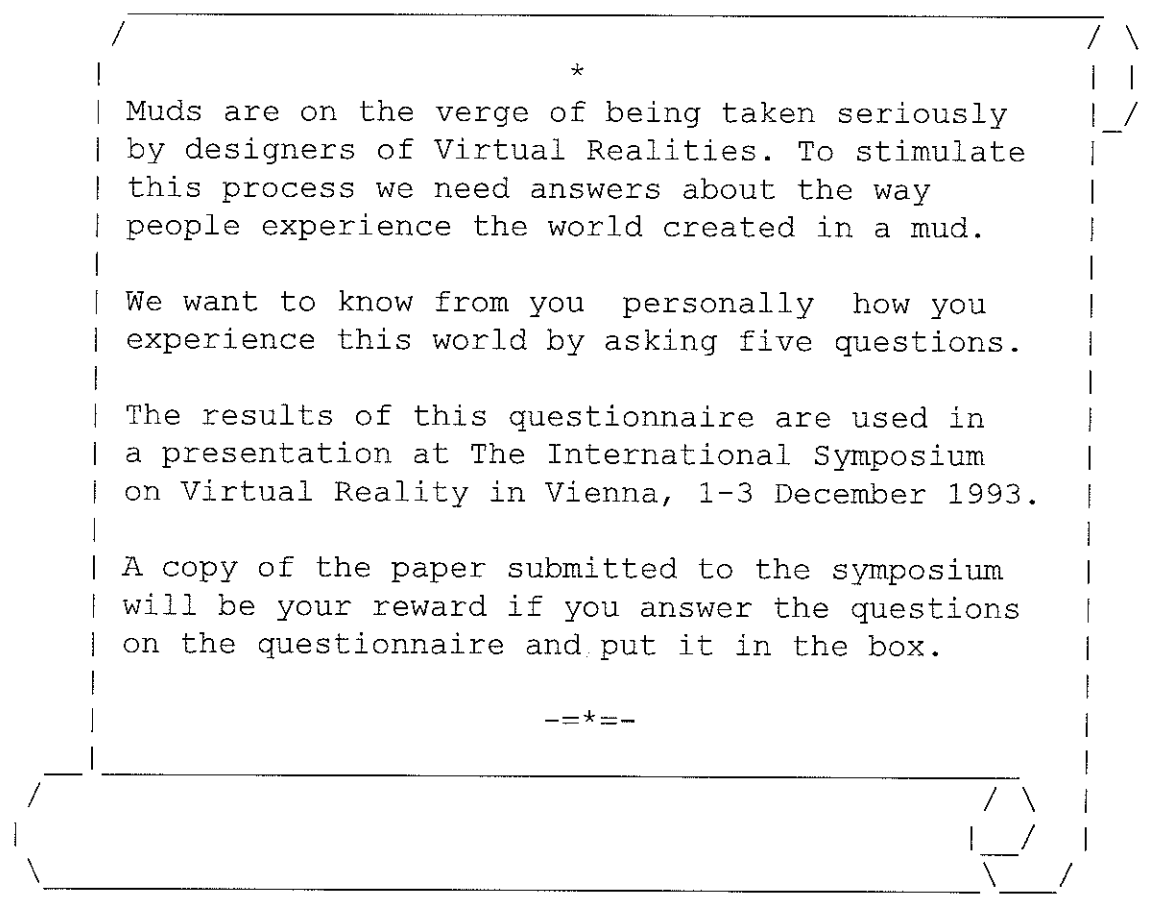
Appendix A: The questionnaires, Introduction and Transition Text

First Questionnaire: The Introduction

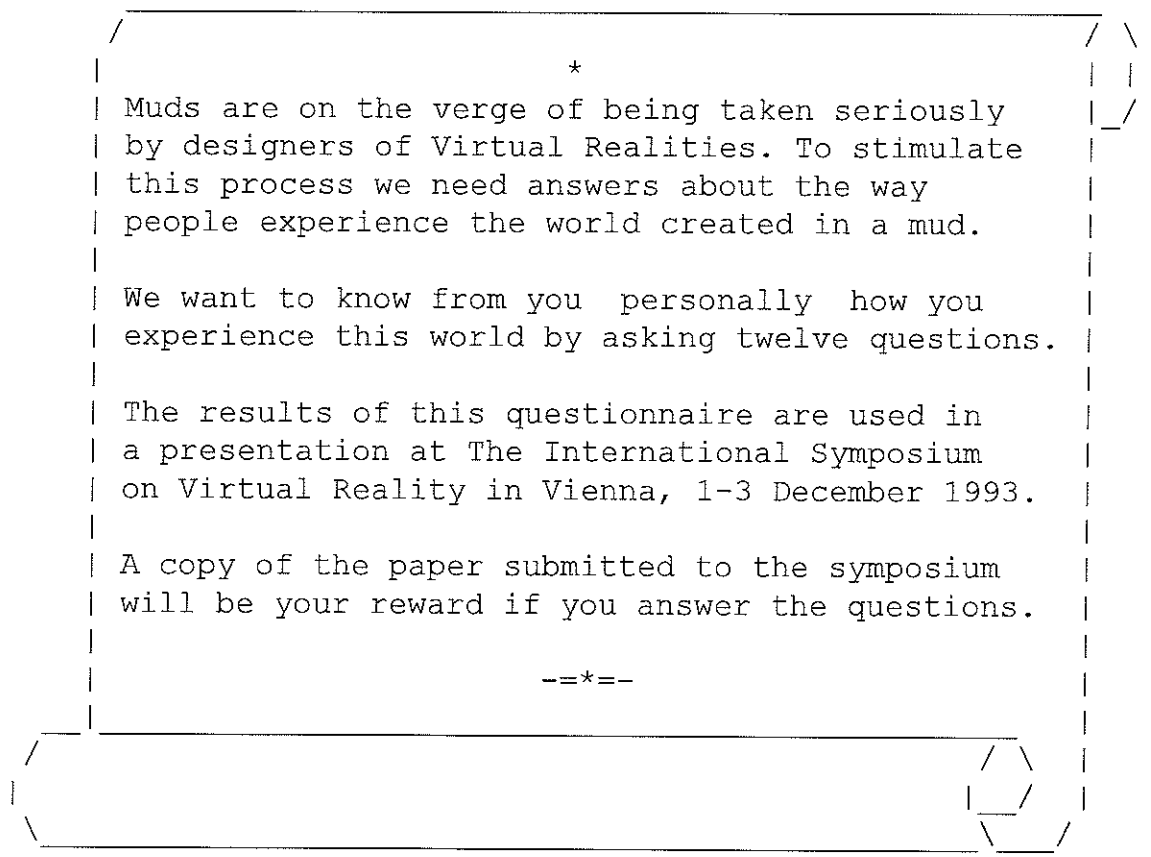


You have been given a questionnaire, to look at it type examine form, to answer it type answer, and return it by typing:
put form in box. Thank you for joining this research!
And remember: there are no right or wrong answers, it's your personal experiences we are interested in.

The Transition Text between The Introduction and The Questions
Muds can be very large places. The problem is how to find your way around. Adventuring is essentially to proceed despite risk. Risk to get lost, risk to die, risk to lose your gear. The following 5 questions will ask you about your adventuring strategies. These strategies will be very useful in the development of new user interfaces. Feel free to elaborate!

The Questions
Do you know how to get from the church to the shop without looking at your screen?
How do you learn your way around in a new area?
What strategies do you use to recognise where you are and where to go?
What do you do when you are totally lost?
Do you avoid getting lost or do you get lost on purpose, and if yes, why?

Second Questionnaire: The Introduction



The Transition Text between The Introduction and The Questions
Muds are large places in virtual reality. The following 12 questions will ask you about your experiences in this virtual world. Your answers can be very useful in the design of new virtual reality interfaces.

Technically we can make completely new landscapes in virtual reality, and we want to know what the image is that a mud creates in your mind. Feel free to elaborate! The more detailed your answers are, the better.

You can answer all questions by typing "answer", or answer a particular question by typing "answer n", where n is the number of the question. Once you typed "answer", you will be given all question in one go. You can skip questions, and come back to them after you went through all questions by typing "answer n".

You can use your usual commands while you are answering questions by putting an exclamation mark in front of the command on a new line. Like this:
!tell guest Hey!

After answering all questions, please put your form in the answer vault by typing "put form in vault".
Thank you!

The Questions
Muds are derived from role-play games. Do people role-play on the mud a lot or a little or only sometimes? Why do you think this is so?

Can you name five places on the mud where you have spent a lot of time and explain why you chose each of them?

Can you name five activities on the mud on which you have spent a lot of time and explain why you chose each of them?

Can you give an example of a very large room and a very small room on this mud and explain what makes them large/small?

If you design your own room on the mud what would it look like, what objects would you want to be there, and what special properties would you want it to have?

If you had a house or a personal room on the mud, where should it be and why do you want it to be there?

Most personal rooms of wizards are not connected to the mud, you can't walk there, only teleport. Do you imagine these rooms in a specific place and why?

If you were put at a random spot in the mud in an area that you know, would you be able to draw a accurate map of that area?

Does going to places consist of a series of connected movements or is it a complete image in your mind?

Do magic exits or rooms that are missing if you would draw a map disturb your sense of direction?

Do magic mazes (places where you for instance go n,s and end up in a different place than where you were before) make it harder to image what the area looks like?

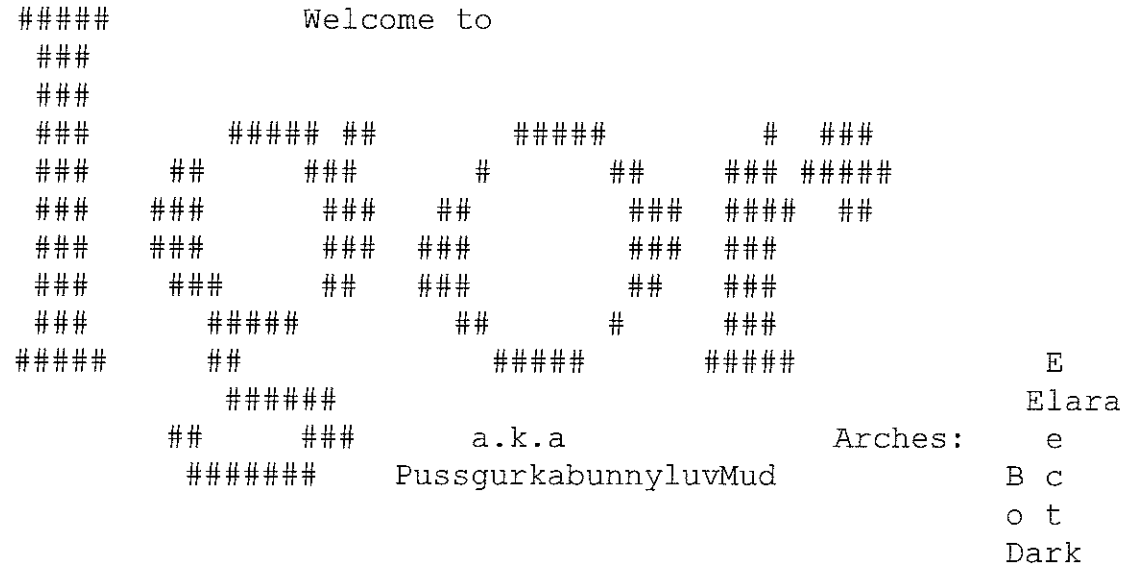
If you teleport to a place through a magic exit do you feel that the placeyo teleported to is far or near the place you teleported from?

If you could chose to start the game at a specific place each time youlogin, which one of the following would you prefer?
(1) A random spot;
(2) A certain place that you picked yourself;
(3) The church.

Appendix B: Log of a Mud Session

Taking a Look at the Questionnaire Booth

```
uvapsy<1>% telnet 129.16.60.9 1701
Trying 129.16.60.9 ...
Connected to 129.16.60.9.
Escape character is '^]'.
```



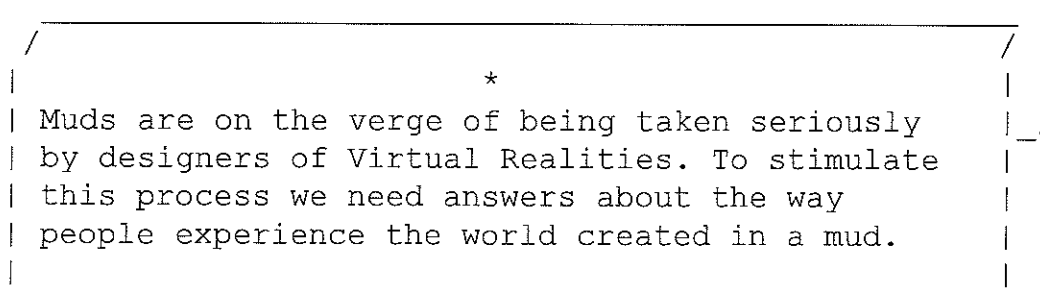
a

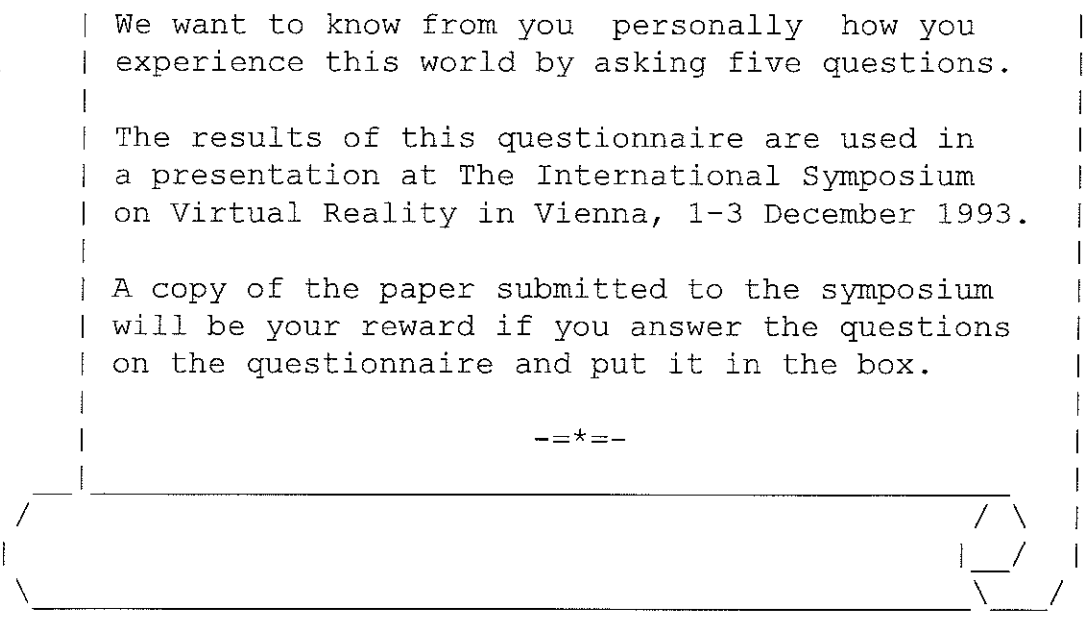
```
                        We have rules around here,
                        you know. Type "help laws".
What is your name: pixy
Password: !hsiwouY
Before you start shouting "WIZ!!!", think. Then think again.
Ever tried the "bug" command? Think again.
And, if the problem is with another player, take it to the Council of Five.
Or, go to the Sheriff's office in Larstown and file a report.

Horses are no longer for sale.  If your horse gives you problems, ask awizar
to zap it, and you'll automatically get your money back.

Last logon : Thu Aug.  5 18:29:51 1993.

You are in the local village church.
There is a huge pit in the center and a door in the west
wall. Beside the door is a button. Ghosts can be revived
here. Dead people and people who have lost their
heart beats come to the church and pray.
There is an exit south to the village green.
There is a clock on the wall.
A newbie area is north of here.
      Obvious exits: west, north and south.
Druz, Francis and Cleopatra are here.
A black booth is here.
Cornell comforts Druz.
Cornell waves to Francis, Cleopatra, Druz and you.
> smile
You smile.
> say Hi!
Druz says: hi
Francis says: hi
Francis leaves north.
> examine booth
This is Professor Pixy's research center. Enter if you dare!
> enter booth
You boldly enter the booth.
```





You have been given a questionnaire, to look at it type examine form,
to answer it type answer, and return it by typing:
put form in box. Thank you for joining this research!
And remember: there are no right or wrong answers, it's
your personal experiences we are interested in.

> look
You are in a strange little room with a low ceiling, black walls, and a
blood red curtain in front of the exit. There is a desk here and a sign.
    There is one obvious exit: out
An answer box.
A pile of questionnaires.
> inventory
Pixy's quicktyper.
A questionnaire.
A green belt with silver buckles (worn).
A bouquet of red roses.
A small green frog.
General purpose object tracer.
> examine questionnaire
MUDs can be very large places. The problem is how to find your way around.
Adventuring is essentially to proceed despite risk. Risk to get lost, risk
to die, risk to lose your gear. The following 5 questions will ask you
about your adventuring strategies. These strategies will be very useful
in the development of new user interfaces. Feel free to elaborate!
* Question 1:
Do you know how to get from the church to the shop without looking at your
screen?
* Question 2:
How do you learn your way around in a new area?

* Question 3:
What strategies do you use to recognise where you are and where to go?
* Question 4:
What do you do when you are totally lost?
* Question 5:
Do you avoid getting lost or do you get lost on purpose, and if yes, why?

You can answer all questions by typing "answer", or answer a
particular question by typing "answer n", where n is the number
of the question. After answering all questions, please put this
questionnaire in the answer box. Thank you!
> put form in box
Ok.
> examine box
A closed box with a slot on top. When you have filled in a
questionnaire, just put it in the slot.
> examine pile
A pile of questionnaires. You can take one by typing
get form or get questionnaire.

You can answer all questions by typing "answer", or answer a
particular question by typing "answer n", where n is the number
of the question. After answering all questions, please put this
questionnaire in the answer box. Thank you!
> examine desk
The desk looks quite solid, there is a box and a pile of papers on it.
> get box
You cannot take that!
> look
You are in a strange little room with a low ceiling, black walls, and a
blood red curtain in front of the exit. There is a desk here and a sign.
    There is one obvious exit: out
An answer box.
A pile of questionnaires.
> examine curtain
The curtain is made of velvet.
> out
You are in the local village church.
There is a huge pit in the center and a door in the west
wall. Beside the door is a button. Ghosts can be revived
here. Dead people and people who have lost their
heart beats come to the church and pray.
There is an exit south to the village green.
There is a clock on the wall.
A newbie area is north of here.
      Obvious exits: west, north and south.
Toran, Norfa and Druz are here.

```
Toran smiles happily..
Norfa waves.
Norfa leaves south.
> s
You are at an open green place south of the village church.
You can see a road further to the east and an arena
to the south.
There is a shimmering door here.
      Obvious exits: north, south, west and east.
Norfa, Hardwark, Gnuram the flying dragon and a Newspaper Stand(Valentine's
The dragon looks restless.
Gnuram, the dragon flies off into the sky.
Hardwark tells you: come visit me at home!
Hardwark is picked up by a big black limo.
> home
This is Pixy's workroom floating in the sky above the church.
You can see the church, a road further to the east and an arena
to the south far below through a hole in the floor.
      Obvious exit: down.
A thesis, a CD player, a bunch of CDs, a couldron, and a broom are here.
> get thesis
Ok.
> goto hardwark
This is Hardwark's workroom.
It looks just like an ordinary office with a desk and a chair.
On the desk stands an X-terminal among some heaps of laserwritten
papers, sun documents, forms with accounts to register, empty plastic
cups and coke bottles.
There's a cute little picture on the desk.

To the west is an elevator to the penthouse at the top.
The other exits         cc to the church
are as noted on the             pb to the pub
right side of this              po to the post office
little text.                    ad to the adventurers guild

There is a bell and a README sign here.
Hardwark is the Bastard Operator From Hell (reincarnated) (bangin' his headа
> say Hi!
Ok.
Hardwark says: Hi there, how are you!
Hardwark hugs you.
> hug hardwark
> smile
You smile happily.
Hardwark smiles happily.
> sit hardwark
```

```
You sit on Hardwarks lap.
Hardwark giggles merrily.
> give thesis to hardwark
Ok.
> cough
You cough loudly!
Hardwark peers at you.
> say Since you are the  system admistrator of the machine Igor Mud is runni
Ok.
Hardwark smiles happily.
> say It is probably not the last version. :-)
Ok.
> smile
You smile happily.
Hardwark bows solemnly.
You fall from Hardwark's lap!
> people
There are now 16 players (15 active). 0.00 cmds/s, 0.00 comp lines/s.
130.115.1.5     Norfa           5       1 D             ~raylend/town/town7
192.153.12.1    Squibbage       21      75 D            ~squibbage/workroom
192.153.12.1    Regnak          23      36 D            /room/adv_inner
145.18.113.132  Druz            21      41 D            ~/pheelya/workroom
192.70.225.78   Rakhal          15      10 D    I       ~carlsson/park/stora
128.205.7.4     Pheelya         21      45 D    B       ~pheelya/workroom
144.92.8.75     Francis         19      18 D            /room/adv_guild
145.18.114.17   Pixy            27      65 D            ~hardwark/workroom
147.188.128.3   Krystal         20      99 D            ~mort/eviltemp/on_th
129.125.10.147  Nino            22      87 D            /room/adv_guild
131.211.24.83   Kring           20      14 D            ~electra/Rooms/lands
129.125.10.220  Root            20      73 D            ~mysse/castle/hall2
129.16.234.203  Claw            2       4 h                     ~raylend/acm
134.84.144.2    Guest           1       60 D            ~malcomb/newbie/el_b
129.16.60.26    Hardwark        37      145 D           ~hardwark/workroom
143.210.4.56    Toran           1       14 h            ~Edo/for/path12
> wiz?
Wiz-ONLINE:     Squibbage, Regnak, (Cleopatra), Druz, Nino[22], Lotus,Pixy
OFFLINE:        Pheelya, Hardwark
```