CONTEXTUALLY DYNAMIC QUEST GENERATION USING IN-SESSION PLAYER INFORMATION IN MMORPG

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Shangwei Lin

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AUTHOR: Shangwei Lin

DATE SUBMITTED: June 2023

COMMITTEE CHAIR: Foaad Khosmood, Ph.D.
Professor of Computer Science

COMMITTEE MEMBER: April Marie Grow, Ph.D.
Assistant Professor of Computer Science

COMMITTEE MEMBER: Rodrigo Canaan, Ph.D.
Assistant Professor of Computer Science
ABSTRACT

Contextually Dynamic Quest Generation Using In-Session Player Information in MMORPG

Shangwei Lin

Massively multiplayer online role-playing games (MMORPGs) are one of the most popular genres in video games that combine massively multiplayer online genres with role-playing gameplay. MMORPGs’ featured social interaction and forms of level progression through quest completion are the core for gaining players’ attention. Varied and challenging quests play an essential part in retaining that attention. However, well-crafted content takes much longer to develop with human efforts than it does to consume, and the dominant procedural content generation models for quests suffer from the drawback of being incompatible with dynamic world changes and the feeling of repetition over time. The proposed solution is to dynamically generate contextually relevant quests with real-time information collected from the players. This thesis is to show that it is possible to generate contextually dynamic quests that could fit into the background story with only the information gathered from the players in real-time.

To validate the proposed solution, a text-based MMO scenario is generated from the Panoptyk Engine, an information-driven game engine designed to run massively multiplayer online games (MMOs) without the distinction between NPCs and human players. The engine is intended to serve as a platform for simulating human/robot interaction. In this case, a quest simulation is built where quests are given by the NPC faction leaders utilizing the information gathered through ongoing events; players or robots belonging to certain factions will be taking and completing the quests.
The results of the 14-person survey showed some successes and some limitations. There was strong agreement in players understanding of what the quest was asking for, quests were related to other agents the player had seen in the world, quests involved agents that the player had interactions with, quests were related to things happening in the game world, quests were interesting. There was regular agreement on players understanding of quests that were designed entirely before the player started playing, quests were generated using a basic template with details filled in based on the player’s actions, and quests were dynamically generated. It was inconclusive with players understanding of quest motivation and previous quests the player had completed having an impact on the next quests.
ACKNOWLEDGMENTS

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- My family for their emotional and financial support unconditionally
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</table>
Massively multiplayer online role-playing games (MMORPGs) have become more popular in the late 1990s; the genre is known across the world with the release of Blizzard’s World of Warcraft[5]. One of the most important components of an MMO game is quests, which can be seen as the challenges players take to progress through the game, and at the same time to become familiar with the settings and background story of the game. Varied and challenging quests play an essential part in retaining that attention. However, well-crafted content takes much longer to develop with human efforts than it does to consume, and the dominant procedural content generation models for quests suffer from the drawback of being incompatible with dynamic world changes and the feeling of repetition over time.

Project Panoptyk is an open-source MMO game engine hoping to overcome the research barriers such as insufficient financial investments for bootstrapping audiences, hardware support, and ongoing generation of compelling content for indie developers and researchers. All interactions in Panoptyk result in information being exchanged[20]. With information as the core of the engine, new content can be easily generated through more interactions among players or robots and can serve as a great testbed for testing contextually dynamic quest generation.

As MMO games have become more popular, research has been performed into this genre and quests in general. The TRUE STORY architecture presented by Pita, Magerko, and Brodie offered a modular approach for dynamically generating and presenting compelling content that results in user experiences worth telling a story about
Though the framework showed that it can utilize the pre-defined rules required before assigning quests to a player and to dynamically generate unique quests, it is hard to expand on as it required a set of valid constraints and interesting interactions between objects and players to be able to generate compelling quests. Young-Seol Lee and Sung-Bae Cho introduced an algorithm to generate quests dynamically using Petri-net planning [14]. With planning, the process to generate a quest is to extract a sequence of events for a player to transition from an initial state to a goal state. It shows dynamic with many branching opportunities through the Petri-net. However, the method provided only a plot for a quest, but in practice, detailed contents including narratives or dialogues are important for a quest as well. Markov chains model and neural language model also show novelty and content coherence in the paper “Toward Automated Quest Generation in Text-Adventure Games” [6]. Nevertheless, the automated process can be hard to generalize to other themes without enough data. In 2014, Lima, Feijo, and Furtado proposed a method for generating dynamic quests based on hierarchical task decomposition and planning under nondeterminism [25]. It was able to generate dynamic story plots that were affected by the player’s actions in real-time but limited the number of things the player can do which eventually leads to repeated quests. The Grail Framework presented by Sullivan introduced a great framework for dynamic quest generation [28]. The social interaction mechanism brings more dynamics to the quest generation. The adaptive quests generation was able to increase player impact in the game by reducing the negative aspects of competition in quest completion but the scope of the dynamic was too narrow [30]. Dynamic quest generation in Micro Missions was able to populate current quests based on whom the player encountered, however, the goal and motivation of the quests were not well understood by the players [16].

To overcome the shortage of procedural content generation, a text-based MMO was built to validate that the system was able to dynamically generate quests within
information gathered in real-time. A survey was conducted to collect data aimed to prove that players are able to experience dynamically generated quests that are related to events happening in real-time, quests players have completed in the past, and quests completed by other players.

Taking into account the effective votes of 7 participants who completed the tutorial quests, 11 participants who completed the first official quests, and 8 participants who completed two or more official quests, the data showed the system could dynamically generate personalized quests based on the events happening in real-time and quests completed in the past by other players. The system was not able to show that the quests can be generated based on the quests players have completed in the past, and the quest motivation is clearly given in the game.
Chapter 2

BACKGROUND

2.1 Procedural Content Generation

Game content is crucial for retaining players’ attention in gaming worlds. While demanding new and more engaging content, Procedural Content Generation for Games (PCG-G) has become necessary as an alternative to manual content production. By definition, PCG is the algorithmic creation of game content with limited or indirect user input [24]. Originally PCG was only considered as a method to overcome storage limitations as such for the space exploration game Elite to generate a large universe based on pseudo-random number generation (PRNG). Later, as storage was no longer a limiting factor, it now served as a method to create unique and endless content for enhancing the gaming experience. Popular games such as Minecraft (2011), Dwarf Fortress (2006), and World of Warcraft (2004) immerse players into the virtual world with great complexity and utilize PCG in every aspect including but not limited to games rules, maps, levels, stories, items, quests, and etc. [27].

2.2 Dynamic Quest Generation

Dynamic quests are quests that respond to the player’s actions and change accordingly [9]. Dynamic quests help to enhance the gaming experience by bringing players the feeling that their actions could have an impact on the outcome of the game. Of the frameworks that boast dynamic content generation, they are not truly dynamic but heavily rely on pre-defined rules and scripted consequences. As stated, a truly
dynamic quest means that it is available for any kind of player and in every world state [29]. It should not have any prerequisites before it could respond to the changes in the world.

2.3 Contextually Linked Quests

Contextually linked quests are quests in which the problems and solutions are generated based on the player’s current game state, the player’s action history, and the overarching story [9]. Contextually linked quests make sure that the quests are logically compatible with the storyline while incorporating players’ in-session information into the quests [26].

2.4 Tools

2.4.1 Typescript

The majority of the code for the Panoptyk engine and bots simulation is written in TypeScript. Typescript is a strongly typed programming language that builds on Javascript [1]. TypeScript’s advanced features such as interface and classes can help organize code and make it more maintainable, which is important in complex projects like simulation engines [13][4]. Its static type checking can also help to catch errors before run-time.

2.4.2 Socket.io

Socket.io is in used for the communication between client and server in Panoptyk as it supports bidirectional and low-latency communication for many platforms [3]. It
has the ability to handle multiple connections simultaneously and efficiently, which is necessary for the text-based MMO to enable multiple players to interact with each other and for collecting real-time data from players.

2.4.3 ReactJS

In the text-based MMO build for validating the thesis, ReactJS is leveraged as the primary front-end framework for rendering the game’s UI and handling real-time updates. ReactJS is an open-source JavaScript-based UI framework developed by Facebook [11]. The key feature used here is ReactJS’s virtual DOM. The virtual DOM is a lightweight representation of the actual DOM, which ReactJS uses to track changes to the UI components. When a change is made, ReactJS updates the virtual DOM, compares it to the previous version, and generates a minimal set of DOM updates needed to reflect the changes [8]. This process is much faster than updating the entire DOM tree, which can improve the performance of the application as there will be ongoing interactions between the text-based MMO (client) and Panoptyk (server) for many players simultaneously.

2.5 Statistical Analysis

For the experimental design, there were 5 options given for all likert scale questions including, “Agree”, “Somewhat Agree”, “Neutral”, “Somewhat Disagree”, and “Disagree” as shown in Figure 2.1. Likert scale item is a set of ordered categories and cannot be quantified [7]. Some researchers assume likert scale as numerical data. Lubke and Muthen found that it is possible to find true parameter values with likert item data [15]. Similarly, Glass et al. found that F tests in ANOVA could return accurate p-value on likert items under certain conditions [10]. On the other hand,
Jamieson claimed that any mean, correlation, or other numerical operation applied to the categorical numerals is invalid [12]. For the purpose of the study, likert scale options are categorized into three groups, “Agree” representing both “Agree” and “Somewhat Agree”, “Neutral”, and “Disagree” representing both “Disagree” and “Somewhat Disagree”. The statistical standards are defined as the following. A strong majority is defined by the number of votes for the option “Agree” is two times greater than the number of votes for the option “Disagree”. A regular majority is defined by the number of votes for the option “Agree” is greater than the number of votes for the option “Disagree”. The result is defined as inclusive if there are the same number of votes between option “Agree” and “Disagree” or the number of votes for option “Agree” is less than the number of votes for option “Disagree”.

<table>
<thead>
<tr>
<th>State to what extent you agree with the following statements? *</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neutral</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
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<tbody>
<tr>
<td>“I understand what the quest is asking for”</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>“I understand the game story motivation for this quest”</td>
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Table 2.1: Likert scale questions
Chapter 3

RELATED WORKS

3.1 TRUE STORY Architecture

TRUE STORY was a framework designed to offer a modular approach for dynamically generating and presenting compelling content that results in user experiences worth telling a story about [22]. TRUE STORY was implemented as a text-based persistent world. Constraints or pre-defined rules were required before assigning a quest to a player. Constraints used in the framework include the relationship between the quest giver and receiver, the player’s past experiences (quests), and other performances in the game such as attack or thievery skills [22]. Character and object interactions would be stored in memories and quests are generated based on the memories stored for each player with some pre-defined constraints. For example, if character A steals from character B, as the interaction is created and stored for both characters, character C comes by. If character C happens to be a lawman well known by character B, the quest for character C to find and bring the thief to justice would be assigned to character C from character B. The framework showed that it is able to utilize the constraints and dynamically generate unique quests for players. However, it is hard to expand on as it required a set of valid constraints and interesting interactions to be able to generate compelling quests.
3.2 Petri Net Planning

In the paper “Dynamic Quest Plot Generation using Petri Net Planning” authored by Young-Seol Lee and Sung-Bae Cho, an algorithm was introduced to generate quests dynamically using Petri net planning [14]. With planning, the process to generate a quest is to extract a sequence of events for a player to transition from an initial state to a goal state. The first step is to randomly select an initial and goal state. The second step is to extract appropriate events for the goal state. The final step is to make a logical sequence from the selected events. Petri-net has been used in modeling many asynchronous elements, and in this case, Petri-net is used to represent an event. The event defined in the paper contains a main action and sub-actions [14].

There are four components representing events in a standard Petri-net. A set of places P, a set of transitions T, input function I, and output function O. A place P represents a condition to do an action. Transition T represents a player’s action. Input function $I(t_j)$ represents the condition-action relationship between transition $t_j$ and input places in an event. Output function $O(t_j)$ represents the action-result relationship between transition $t_j$ and output places. In the experiment conducted in the paper, the conditions are extended from places to items, conversation with NPC, location, killing NPC, and general condition [14]. Players are classified with the use of Bayesian networks based on their past actions and play styles to generate the content they will enjoy. Based on the given content, the player is categorized into either casual or hardcore players. Then a quest can be generated through a sequence of events filling in elements needed such as characters and locations through the Petri-net with many branching opportunities. The method provides only a plot for a quest, but in practice, detailed contents including narratives or dialogues are important for a quest as well.
3.3 Hierarchical Generation of Dynamic and Nondeterministic Quests in Games

In the paper “Hierarchical Generation of Dynamic and Nondeterministic Quests in Games”, Lima, Feijo, and Furtado presented the concept of hierarchical quests. The method defines the game narratives as a combination of story-related quests, and a quest can be decomposed into sub-quests or primitive events [25]. Primitive events are referring to primitive actions such as picking up or dropping an item. Each quest is represented by a planning problem and controlled by the Quest Planner and the Quest Monitor. In their implementation, the Quest Planner is responsible for generating a logical plan of action for achieving the desired goal of the quest, and the Quest Monitor is responsible for monitoring the execution of the plan and requiring a new one to incorporate current changes in the game world [25]. Quests are modeled to have multiple goal states so that the results of different sub-quests depending on the player’s actions could dynamically change the storyline of the quest. The hierarchical structure of the quest makes it easier to generate complex quests. The solution is able to generate dynamic story plots that are affected by the player’s actions in real-time but limit the number of things the player can do which eventually leads to repeated quests.

3.4 Toward Automated Quest Generation in Text-Adventure Games

In the paper “Toward Automated Quest Generation in Text-Adventure Games” [6], a Markov model and a neural generative model were trained to generate cooking quests on recipe data. Content generation for a quest in this case is thought to be equivalent to generating a sequence of events in which prior elements affect the probability of subsequent events [6]. With the Markov chains, an ingredient graph is generated with
domain knowledge provided by allrecipes.com. Each node within the ingredient graph represents a possible ingredient and the weighted connections between nodes represent how well the ingredients go together. With the ingredient graph, the instruction can be generated based on sub-graph mining and prior generative methods based on probabilistic graph walks. The neural language model uses a 4-layer LSTM to generate a sequence of ingredients. The recipe model is trained with GPT-2 (Radford et al. 2019) given the same recipe data. The cooking quest can be generated with the trained recipe model given the sequence of ingredients. The result shows that the Markov chains model produces quests that are more surprising and novel while the neural language model offers greater value and coherence [6]. Though the automated process shows novelty, it can be hard to generalize to other themes without enough training data.

3.5 The Grail Framework

The Grail Framework presented by Sullivan introduces a great framework for dynamic quest generation. The narratives of the quests are built around social interactions between the player and NPCs. More specifically, it utilizes the artificial intelligent system Comme il Faut (CiF) [17] to model how NPCs behave. CiF is able to reason how the character should perform given varied social contexts with high-level rules governing expected character behavior [17]. Each NPC is given a set of character traits and the trains can be updated through player-NPC or NPC-NPC interactions. Story quests are dynamically generated from the overarching story combining the player’s current state which depends on what NPCs the player has interacted with [28]. The framework also provides the system GrailGM as the game manager to model quest selection guided by the user’s input function [28]. The social interaction
mechanism shown in the Grail framework shows its usability of bringing in more
dynamics to the quest generation.

3.6 Adaptive quests for dynamic world change in MMORPGs

An incremental model of adaptive quests was introduced in the paper “Adaptive
Quests for Dynamic World Change in MMORPGs” by Tomain, Salazar, and Salinas
in order to mitigate the incompatibility of dynamic world changes and narratives for
the gameplay [30]. Two problems were identified in the context of the most prevalent
quest type *kill* quests: lack of player impact as the same narrative would appear
disregarding whether the kill quests were actually completed, and the competitions
among players in order to finish the same quest first could be frustrating. The pro-
posed solution was to increase player impact by letting them reduce and defeat the
mob population. The frustration of competition among players was reduced by the
load balancing of the players. The locations and mob populations were altered with
an adaptive narrative for the quests as the number of players increases [30]. In the
end, they were able to increase player impact in the game by reducing the negative
aspects of competition in quest completion.

3.7 Dynamic quest generation in Micro Missions

Micro Missions is a mini adventure game trying to increase a player’s agency by
reacting to player actions dynamically and populating quests based on current world
state and story-related goals [16]. Most of the states that drive the quest selection are
the goals and needs of the non-player characters. Depending how whom the player
might encounter, the quest can be dynamically formed. The basic premise is the same
for every player. Though the game was able to generate different quests based on the
player’s selection, it suffered from the difficulty for the player to understand how and why the goal was given.
4.1 Panoptyk

Project Panoptyk was first introduced in FDG 2019. As a game engine, it is designed to run Massive Multiplayer Online (MMO) games with information creation, sharing, and exchange as central gameplay focus [21]. The first version of the Panoptyk was created by Nathan Philiber as a senior project [21]. In 2020, Mitchell Miller proved that Panoptyk was able to provide an environment where it is difficult to distinguish bots and humans in his Paper “Bootstrapping Massively Multiplayer Online Role Playing Games” [19]. The same year, Sean developed a primitive quest system for his thesis on dynamic quest generation [18]. The current version of Panoptyk is contributed by Shangwei Lin with a complete quest system, trading system, and more information predicates needed for a self-maintenance quest generation [2].

The overarching design of Panoptyk as illustrated in Figure 4.1 consists of three primary components: panoptyk-client, panoptyk-core, and panoptyk-server.

Panoptyk-client includes the Client API that is available for any custom game clients; it is introduced in Section 4.1.1 Client API.

Panoptyk-core stores the models existing in the game world. Each model contains a definition of itself that describes its characteristics and functionality. A detailed introduction to different models is included in Section 4.1.2 World Representation.
Figure 4.1: Panoptyk System Architecture

Panoptyk-server encompasses the game mechanics available for users through the manipulation of models corresponding to the requests from Client API; relevant game mechanics supporting the project are discussed in Section 4.1.3 Game Mechanics.

4.1.1 Client API

The Client API defines all APIs accessible to game clients. An initialization call with the address of the Panoptyk server must be initiated before any other API calls. An API call usually represents an action in order to interact with other players or any other models in the game world. Here are some examples of actions: requesting a
conversation with a player, accepting a conversation request from a player, requesting an item trade with a player, asking a question to a player, passing information to other players, etc.

4.1.2 World Representation

These are the crucial models in Panoptyk that are relevant to this project.

4.1.2.1 Agent

An agent is defined by a name, faction, a role within the faction (patrol, merchant, faction leader, or quester), an inventory to collect items, the currency for trading, and most importantly a knowledge base. An agent’s knowledge base comprises all the events happening in the world or interactions with other agents. Events are saved in the form of information it has received from other agents or through observations.

4.1.2.2 Faction

A faction is defined by a faction name and a list of its faction members. Faction increases players’ involvement in the game with a sense of belonging. A faction can also bring a pre-established hierarchy that might increase variety in-game settings. With a hierarchy, a quest given by a faction leader and assigned to a faction member naturally comes to play.
4.1.2.3 Item

An item is defined by its name, its rareness, and its location. An agent can own the item if it is picked up when spotted or given by other agents. Items are important for trading and questing, which are the two major game mechanics the current version of Panoptyk supports.

4.1.3 Trade

A trade keeps track of the involved traders, a list of items traded, the amount of gold exchanged, a list of answers to the questions asked, and trade status.

4.1.4 Quest

A quest keeps track of the quest giver, quest receiver, the actual quest in the form of action-generated information, completion status, rewards, and a deadline for completing the quest.

4.1.4.1 Information

Information is the key to Panoptyk as it is defined to be an information-driven system. Information is represented by First Order Logic (FOL) as shown in Table 4.1. It is used to describe the actions of players or interactions among players. For instance, whenever an agent moves from location A to location B at time t, a piece of information with agent information, previous and current location, and the time that happened will be generated and sent to whoever is present in the location in order to witness this incident. The same rule applies to the rest of the actions listed.
Many agents might witness the same information, and thus information is separated into master and reference copies [19]. With keeping only one master copy, multiple reference copies can be created with unique IDs to keep track of ownership of the same event while minimizing duplicate data at the same time.

### 4.1.5 Game Mechanics

#### 4.1.5.1 Trade Support

Trading is supported in Panoptyk which allows players to do item trades or in-game currency exchanged. Trading freely among players can result in a vibrant economy that is driven by players’ demand and supply. This can lead to a more immersive and engaging game world, as players have more control over their in-game assets and can make strategic decisions about what to buy and sell. Trade can also facilitate cooperation between players, as they work together to acquire the items they need to progress in the game. This can foster a sense of community and social interaction within the game, which can be a major draw for many players. Trade can add an extra layer of depth and replayability to an MMO, as players can continually explore.

<table>
<thead>
<tr>
<th>Action</th>
<th>Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move</td>
<td>(Time, Agent, Location, Location)</td>
</tr>
<tr>
<td>Conversed</td>
<td>(Time, Agent, Agent, Location)</td>
</tr>
<tr>
<td>Picked_Up</td>
<td>(Time, Agent, Location, Item)</td>
</tr>
<tr>
<td>Dropped</td>
<td>(Time, Agent, Location, Item)</td>
</tr>
<tr>
<td>Asked</td>
<td>(Time, Agent, Agent, Location, Information)</td>
</tr>
<tr>
<td>Told</td>
<td>(Time, Agent, Agent, Location, Information, Information)</td>
</tr>
<tr>
<td>Quest_Given</td>
<td>(Time, Agent, Agent, Location, Quest)</td>
</tr>
<tr>
<td>Quest_Completed</td>
<td>(Time, Agent, Agent, Location, Quest)</td>
</tr>
<tr>
<td>Trade_Completed</td>
<td>(Time, Agent, Agent, Location, Trade)</td>
</tr>
<tr>
<td>Commanded</td>
<td>(Time, Agent, Agent, Location, Information)</td>
</tr>
<tr>
<td>Killed</td>
<td>(Time, Agent, Agent, Location)</td>
</tr>
<tr>
<td>Item_Traded</td>
<td>(Time, Agent, Agent, Location, Item)</td>
</tr>
<tr>
<td>Item_Spawned</td>
<td>(Time, Location, Item)</td>
</tr>
<tr>
<td>Kill_Attempt</td>
<td>(Time, Agent, Agent, Location)</td>
</tr>
</tbody>
</table>
different trading strategies and interactions with other players. This can help keep the game fresh and engaging for longer periods of time.

4.1.5.2 Quest Support

Quests are the heart and necessity of the study. Quests can provide players with a clear sense of direction and purpose in the game world. They can serve as a guiding force, leading players through the game’s narrative and providing a sense of progression and accomplishment. Quests can also encourage players to explore different areas of the game world, as they seek out the objectives and challenges required to complete each quest. In Panoptyk, quests can be categorized into two major types. One is a query type of quest, and the other one is an action-based (task) quest. A piece of masked information with an action: picked up, given a known time, a known agent, and the name of the item, but with an unknown location. If the masked information were to defined as a query, the quest derived from this information would be where is the room that the item is picked up by the agent at this particular time. If the masked information were to be defined as a task, the quest generated from this information would be please go find the room to pick up this particular item. A variety of quests can be generated with just the same information but masked differently. It brings more variety with different types of quests and different action-based information.
4.2 Bots Simulation

4.2.1 Game World

The game is featured in a fantasy world and set in a medieval town that is divided into thirty sub-areas. There are two rival factions in the world: Templar Order and Shadow Oath. On a larger scale, the area can be divided into three sections, one for each faction, and one as the common area for both factions. One is only allowed to communicate with their own faction members directly or else it can be treated as a betrayal. Upon joining, players will be randomly assigned to one of the factions. The goal for faction members is to get quests from their faction leader and have the quest completed before reporting back to the leader. The goal for the two factions is to take over as many resources as possible from each other for survival.

4.2.2 Agents

The game world predominantly comprises four distinct roles: faction leader, patrol, merchant, and quester. Faction leaders will be the ones assigning quests for their quests to complete. There will be one faction leader for each faction. Patrols are pre-assigned the task to patrol around in each of their own territories by their faction leaders. The goal of patrols is to collect the information they observed from the events happening and pass it around to fellow patrols and eventually to their faction leaders. There are ten patrols serving the same faction leader. Merchants are the ones that would like to make profits out of members from both factions. Merchants would explore both factions to collect items that are randomly spawned in the world. They would also sell it to both factions for profits and sometimes even their rival faction’s information that they brought or observed from the outliers in each faction.
There are seven merchants existing in the world and usually spawn in the common area. The questers are the ones completing the quests/tasks assigned by their faction leaders for item or currency rewards in order to survive.

4.2.3 Quests

Quests are generated with players’ real-time information. As for the scenario design, bots are supposed to emulate human players’ behaviors backed by some motivations that could generate real-time information through their interactions with other bots or actually players and the world. Bots are driven by Hierarchical Finite State Machines (FSMs) [19]. The lowest level of states is action states, which represent a single action such as moving to a room, joining a conversation, or asking a question that is wrapped in an API call for server communication. The higher level of states is referred to as behavior states, which are encapsulations of multiple actions. For instance, a trading behavior requires the actions of moving to the target, requesting a conversation with the target, and performing the trade. A strategy is formed with related behavior states. As an illustration, a quester strategy comprises getting the quests and completing the quests.

Every bot is backed by a motivation given through the role it plays in the world. Merchant bots are designed to behave for gaining more profits. They would be exploring the world with the motivation that the items that they gathered can be traded for more profits. Patrols are designed to share and pass information to their peers and eventually to the faction leaders for quest generation. There is about a ten percent of chance that a patrol might betray one’s faction leader and sell internal information to merchants. Merchants would also actively wait for patrols in order to and to initiate a trade with patrols for information about their rival faction. Faction leaders are to
wait for all the information they received from their faction members. Questers are actively looking for faction leaders to complete quests.

The information gathered will be categorized into the following categories: kill, kill query, revenge, trade query, trade quest, and quest query. When a trade is spotted, if it is related to a rival faction, an investigation for what exactly is traded will be assigned. Once the investigation is done and the faction is informed of the result, a kill quest might set out for obtaining the items traded. When a corpse is observed by its peer, an investigation is requested for finding out who is the murderer. Once the identity of the killer is unveiled, a revenge quest might be assigned. Whenever there is a traitor, internal information might be leaked. A quest to figure out what quest the other faction is going after might be worth an investigation as well.

Every bot is driven by its own motivation and thus forms a self-maintainable circular information generation system. With actual players involved, the same sets of events might happen differently at different times and in a different order, which will be considered a different story.

4.3 Text-based MMO Client

Figure 4.2 an overview of the game user interface (UI). There is a simple visualization of the current player and players within the same area in the middle. A world map for the areas one has explored. A feedback console is on the right. A foldable table of player stats is on the left. There is a knowledge base that comes along with a search bar at the bottom.
4.3.1 Visualization

The main visualization in this text-based MMO is the top-down overview of the player’s current location and its surroundings as shown in Figure 4.3. Players are
represented with a simple dot with one’s name showing on the top. The red dot represents the current player. The rest of the white dots represent other players. Whenever there is an interaction such as a conversation or trade established in the same area you are located, there will be a line drawn between the parties that are involved.

![Figure 4.4: Player UI](image)

![Figure 4.5: Action Selection Details: move](image)

By clicking on the dots, it shows the player’s action UI which contains all the player actions available shown in Figure 4.4. Once an action is selected, a more detailed window is prompted corresponding to the action. In this case in Figure 4.5, the
action "move" is selected, and it is asking for the destination location where the player wants to move towards.

A world map is available as a visual representation of the game world. Each location is shown as a node connected by a line if the two locations are adjacent to each other. The green node represents the player's current location, and the rest of the blue nodes represent all the locations the player has explored. It can be useful for players to plan out their movements by navigating through the world map.

![World Map](image)

**Figure 4.6: World Map**

### 4.3.2 Information

#### 4.3.2.1 Player Stats

Every player has their own player statistics table that shows the current status of a player in the game world. The player stats include the most basic information about the player, a player’s name, the faction it affiliates with, its inventory, and the amount of currency (gold) in the game. There is also information regarding the current location and adjacent locations that are available for the next move. When the player wants to initiate a conversation, a waitlist for entering the conversation
would be updated in real-time. It is also useful for checking the status of current conversations, current trades, and most importantly current quests. It will be mainly used for keeping track of the progress of questing.

![Player Statistics](image)

**Figure 4.7: Player Statistics**

### 4.3.2.2 Knowledge Base

All the information related to past events that the player has observed is stored in the knowledge base. It is designed to serve as the memory of an actual human. As shown in Figure 4.8, each column represents a predicate in the information such as the action performs, the time the event happens, the players that are involved, the location where the event happens, any items or another piece of information involved in a conversation or a trade. Each row represents one piece of information. Just like recalling from memory, the knowledge base is searchable by entering any related keywords or filtered by the predicates. It is beneficial when it comes to turning in
the related quest information in order to prove that you have completed the quest as the game is all information-driven.

4.3.3 I/O Interaction

4.3.3.1 Command Console

A command console is a user interface that allows players to input commands for the actions they would like to perform in the game. Like most of the command prompts, entering ”help” opens up a help menu with a list of commands available and its usage as shown in Figure 4.9. It is an alternative to the player UI mentioned in Figure 4.4 for those preferred the command prompts.
4.3.3.2 Feedback

To better engage players for a better user experience, a feedback window is provided. The feedback window provides feedback for each action player performs. Feedback is included for both failures and successes that are wrapped in the callback of executing the action from the server; with a failure, an error message is added explaining why it fails. There are also messages regarding the events happening to emulate how players would make observations about the world visually.
Chapter 5

EXPERIMENTAL DESIGN

With the text-based MMO that was described in System Design and Implementation, a study was conducted where participants were asked to join the game as one of the questers in order to complete quests. Then they were asked to fill out the corresponding survey questions regarding how they think about the quest narrative, quest motivation, quest dynamics, whether or not requests are related to events they witnessed, quests they completed in the past, and quests other players completed in the past. All questions asked were aimed to prove that the system is able to dynamically generate quests that are related to events happening in real-time, quests players have completed in the past, and quests completed by other players.

5.1 Procedure

Prior to the study, players will not be informed whether the agents they are interacting with are bots or actual human players except the two faction leaders who are designed as quest initiators. The user study is divided into three sections. In the first part, participants will be asked to participate in a tutorial quest which is for helping participants to get familiar with how to interact with the world and complete the actual quest for the study. There are special agents in the game available for tutorial quests. In the second part of the study, participants will be asked to complete one quest before returning to the survey. The first actual quest is looking for the player’s first impression of the quest narrative itself, intuition about the motivation of surrounding players, and how the world operands. In the last part of the study,
participants will be asked to complete more than one quest. The last part aims for the player’s impression of how dynamic the quests are, whether the quests are related to the events they witnessed, or whether the quests they completed are related to each other.

5.2 Survey

The survey starts off with a formal content form containing information regarding the purpose, benefits, and risks of the research study. It also gives out a brief introduction to the research project itself. If the participants are willing to proceed with the survey, the survey is revealed.

The only demographic part of the survey is asking whether the participants are over eighteen or not. If the participants were under-aged, the survey exists out early.

The second session of the survey is for gauging participants’ experience with game playing. Participants were asked whether they play video games or not, what kind of video games they play in the form of multiple-choice, and how many hours they spend on video games.

The third session of the survey is for feedback on the tutorial quest. Participants were asked a free-response question on how they think the quest is generated, whether the quest is written ahead of time, and whether could they tell apart NPCs from other players. There are also linear-scale questions for giving out a score for how well they understand the motivation behind the quests and the narrative itself.

The fourth session of the survey is designed for participants with one actual quest completed. How well the participants understand what the quest is asking for, the motivation behind the quests, and whether the context of the quests is reasonable. It
is for evaluating how interesting the quest is to the players. It also asked participants to identify how many of the quests are pre-written and provide additional details on how they think the quests are generated.

The final section of the survey contains questions aimed at participants who have finished two or more quests. It asked with more detail whether the participants think the quest they completed previously has an impact on their next quests, whether the quests other players completed might have an impact on their next quests, and how they think the quests they received related to events happening in the world.
Chapter 6

RESULTS

6.1 Primary User Study

The Primary user study was conducted in the class Interactive Entertainment Engineering hosted by Dr. Grow. All the instructions for how to interact with the game and where the game is hosted were given in the survey. 14 participants provided survey data within the lab session. Here is an overview of the number of participants involved in different sections of the survey summarized in Table 6.1. There were 7 (50%) participants who completed the tutorial quests. There were 11 (78%) participants who completed one quest. There were 8 (57%) participants who have completed two or more quests. It is worth noting that were more participants who completed the tutorial quests than the ones who completed the first official quest. The number of participants who completed the tutorial quests was extracted from the participants who answered “Yes” to the survey question “Have you completed the tutorial quest”. The rest of the participants counts for those who completed the first official quest and two or more were added up from those who put in non-zero and valid duration for the survey question “How long did you take to complete the quest”. Participants might get confused about the definition of the first quest with the tutorial quest and the data inaccuracy in the duration measurement for quest completion time.
Table 6.1: Number of participants in different sections

<table>
<thead>
<tr>
<th>Completed Tutorial Quest</th>
<th>Completed 1 Quest</th>
<th>Completed 2+ Quests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Participants</td>
<td>7 (50%)</td>
<td>11 (78.57%)</td>
</tr>
</tbody>
</table>

Do you play video games?

Figure 6.1: Do you play video games?

6.1.1 Game Experience

A majority of participants responded that they had experience with video games as shown in Figure 6.1. There were 12 (85.7%) out of 14 participants who had experience with video games and 2 (14.3%) who had zero experience with video games.

Out of the 12 participants who had experience with video games, role-playing games (8), shooter games (7), and simulation and sports (7) were the most popular ones. A decent amount had played puzzles and party games (4), action-adventure games (5), and massively multiplayer online games (4). More details are in Figure 6.2.
6.1.2 Linear Scale Questions

Here is the summarized table for all likert scale questions as shown in Figure 6.3.

6.1.2.1 Story Context and Quest Motivation

As shown in Figure 6.4, for the tutorial quest, there were 100% of participants agreed or somewhat agreed to understand what the quest is asking for. There were 57% of participants who agreed or somewhat agreed to understand the game story motivation for the quest and 42% of participants who disagreed or somewhat disagreed to understand the quest motivation.

As shown in Figure 6.5, for participants who had completed one quest, there were 100% of participants agreed or somewhat agreed to understand what the quest is asking for. There were 36% of the participants who agreed or somewhat agreed to understand the game story motivation for the quest and 36% disagreed or somewhat
disagreed to understand the quest motivation. 27% of the participants responded with neutral in their opinions.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Total number of participants</th>
<th>Number of participants who agreed on the statement</th>
<th>Number of participants who disagreed on the statement</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;I understand what the quest is asking for&quot;</td>
<td>N=7</td>
<td>7</td>
<td>0</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;I understand the game story motivation for the quest&quot;</td>
<td>N=7</td>
<td>4</td>
<td>3</td>
<td>Majority</td>
</tr>
<tr>
<td>&quot;I understand what the quest is asking for&quot;</td>
<td>N=11</td>
<td>11</td>
<td>0</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;I understand the game story motivation for the quest&quot;</td>
<td>N=11</td>
<td>4</td>
<td>4</td>
<td>Inconclusive</td>
</tr>
<tr>
<td>&quot;I understand what the quest is asking for&quot;</td>
<td>N=8</td>
<td>8</td>
<td>0</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;I understand the game story motivation for the quest&quot;</td>
<td>N=8</td>
<td>3</td>
<td>3</td>
<td>Inconclusive</td>
</tr>
<tr>
<td>&quot;My quest was related to the other agents I had seen in the world&quot;</td>
<td>N=11</td>
<td>9</td>
<td>0</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;My quest involved players that I had interactions with&quot;</td>
<td>N=11</td>
<td>7</td>
<td>2</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;My quests were related to the other agents I had seen in the world&quot;</td>
<td>N=8</td>
<td>7</td>
<td>0</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;My quests involved players that I had interactions with&quot;</td>
<td>N=8</td>
<td>4</td>
<td>2</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;Previous quests have an impact on next quests&quot;</td>
<td>N=8</td>
<td>1</td>
<td>2</td>
<td>Inclusive</td>
</tr>
<tr>
<td>&quot;Quests completed by other human players have an impact on quest I received&quot;</td>
<td>N=8</td>
<td>2</td>
<td>1</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;Quests were related to things that happened in the game world&quot;</td>
<td>N=8</td>
<td>4</td>
<td>1</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;The quests were interesting&quot;</td>
<td>N=11</td>
<td>5</td>
<td>2</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;The quests were interesting&quot;</td>
<td>N=8</td>
<td>4</td>
<td>2</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;The quest was designed entirely before I started playing&quot;</td>
<td>N=11</td>
<td>7</td>
<td>2</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;The quest was generated using a base template with the details filled in based on my actions&quot;</td>
<td>N=11</td>
<td>8</td>
<td>1</td>
<td>Strong majority</td>
</tr>
<tr>
<td>&quot;The quest was designed entirely before I started playing&quot;</td>
<td>N=8</td>
<td>3</td>
<td>2</td>
<td>Majority</td>
</tr>
<tr>
<td>&quot;The quest was generated using a base template with the details filled in based on my actions&quot;</td>
<td>N=8</td>
<td>6</td>
<td>1</td>
<td>Majority</td>
</tr>
<tr>
<td>&quot;Quests were dynamically generated&quot;</td>
<td>N=8</td>
<td>3</td>
<td>2</td>
<td>Majority</td>
</tr>
</tbody>
</table>

Figure 6.3: Table of all likert scale questions
Figure 6.4: Tutorial Quest: State to what extent do you agree with the following statements?

Figure 6.5: One Quest: State to what extent do you agree with the following statements?

As shown in Figure 6.6, for participants who have completed two or more quests, there were 100% of participants agreed or somewhat agreed to understand what the quest is asking for. 37.5% of the participants agreed or somewhat agreed on understanding the game story motivation and 37.5% of the participants who are disagreed or somewhat disagreed with understanding the quest motivation. 25% of the participants stated neutral in their responses.
Figure 6.6: Two or More Quests: State to what extent do you agree with the following statements?

6.1.2.2 Quest Relevance

Here are the questions related to things the participants think the quest is related to as shown in Figure 6.7.

For participants who have completed one quest, there were 81% of the participants agreed or somewhat agreed with the statement that the quest they completed was related to other players they had seen in the world. There were 18% of the participants responded with neutral on the statement. There were 63% of the participants who agreed or somewhat agreed that the quest they completed involved players they had interactions with. 18% of the participants responded with neutral and another 18% disagreed or somewhat disagreed that the quest they completed involved interactions with other players.

As shown in Figure 6.8, for participants who have completed two or more quests, there were 87.5% of participants agreed or somewhat agreed on the quests they completed were related to other players they had seen in the world. There were 12.5% of the participants who provided neither a positive nor a negative response to the statement.
Figure 6.7: One Quest: State to what extent do you agree with the following statements?

Figure 6.8: Two or More Quests: State to what extent do you agree with the following statements?

There were 50% of the participants agreed or somewhat agreed on the quests they completed involving players that they had interactions with. There were 25% of the participants responded with neutral in their opinions and another 25% of the participants disagreed or somewhat disagreed with the statement.

More questions were asked for participants who have completed two or more quests as shown in Figure 6.9.
Figure 6.9: Two or More Quests: State to what extent do you agree with the following statements?

There were 12.5% of the participants who agreed or somewhat agreed that the previous quests they completed had an impact on their next quests. There were 25% of the participants disagreed or somewhat disagreed on the previous quests they completed had an impact on their next quests. The majority and about 62.5% of the participants responded with neutral opinions.

There were 25% of the participants who agreed or somewhat agreed with the statement that the quests other players completed had an impact on the quests they received. There were 12.5% of participants who disagreed or somewhat disagreed with the statement. The majority and about 62.5% of the participants responded with neutral opinions.

There were 50% of the participants agreed or somewhat agreed that quests are related to events happening in the game world. 37.5% of the participants neither agreed nor disagreed. 12.5% of the participants disagreed or somewhat disagreed that the quests are related to events happening in the game world.
6.1.2.3 User Experience

Figure 6.10: One Quest: State to what extent do you agree with the following statements?

For participants who had completed one quest as shown in Figure 6.10, 45% of the participants agreed or somewhat agreed that the quest was interesting. There were 27% of the participants disagreed or somewhat disagreed that the quest was interesting. The rest of the 27% responded neither agreed nor disagreed with it.

For participants who had completed two or more quests as shown in Figure 6.11, 50% of the participants agreed or somewhat agreed that the quests were interesting. There were 25% of the participants disagreed or somewhat disagreed that the quests were interesting, and another 25% responded with neutral opinions.

6.1.2.4 Quest Generation

As shown in Figure 6.12, for participants who had completed one quest, 63% of them agreed or somewhat agreed that the quest was designed entirely before they had started playing. 18% of the participants disagreed or somewhat disagreed on the
**Figure 6.11: Two or More Quests: State to what extent do you agree with the following statements?**

quest was designed entirely before they had started playing. The rest of the 18% responded with neutral opinions.

The majority of the participants with a percentage of 72% agreed or somewhat agreed that the quest was generated using a basic template with details filled in based on their actions. 18% of the participants neither agreed nor disagreed with it. 9% of the participants disagreed or somewhat disagreed with the statement.

**Figure 6.12: One Quest: State to what extent do you agree with the following statements?**

41
As shown in Figure 6.13, for participants who had completed two or more quests, 37.5% of them agreed or somewhat agreed that the quests were designed entirely before they had started playing. The same amount of participants (37.5%) responded with neutral opinions. The rest of the 25% disagreed or somewhat disagreed that the quests were designed entirely before they had started playing.

There were 75% of the participants agreed or somewhat agreed with quests were generated using a basic template with the details filled in based on their actions. 12.5% of the participants responded with neutral opinions and another 12.5% of the participants disagreed or somewhat disagreed with it.

![Bar chart showing responses to questions about quests being designed before or generated using a template.]

**Figure 6.13: Two or More Quests: State to what extent do you agree with the following statements?**

For participants who completed two or more quests, they were also asked whether or not they thought the quests were dynamically generated shown in Figure 6.14. 37.5% of the participants agreed or somewhat agreed that the quests were dynamically generated. 25% of the participants disagreed or somewhat disagreed that the quests were dynamically generated. The rest of the 37.5% of the participants neither agreed nor disagreed with the statement.
Figure 6.14: Two or More Quests: State to what extent do you agree with the following statements?

6.1.3 Free Response Questions

6.1.3.1 Human and Bots Identification

Participants were asked if there were agents in the game controlled by human players and how could they tell. There were 14 responses collected. Of the 14 responses, 4 mentioned that they were able to tell human players from the path or movement in the world. There was an assumption that bots don’t move around and players tend to have the same path movement as other players as they were all aiming to complete the quest. 5 participants responded that it was difficult to tell but the names seemed to give it away. The names pre-assigned to the bots fit into the medieval theme but players who joined on the fly did not get assigned a name. There were 2 participants who answered they cannot tell the difference between bots and human players. The rest of the 3 oversaw the names of the players they joined the game with and they were able to tell some were human players.
6.1.3.2 Quest Generation

Participants who had completed two or more quests were asked how did they think quests were generated toward the end of the survey. There were only 6 valid responses to this open-ended question. 3 of them responded with “random”, “random based on the player”, and “dynamically based on other things happening”. 1 participant responded with “Game AI” and 1 with “auto-generated”. 1 participant input the quest generation was taking in input from the previous quests.
Chapter 7

CONCLUSION

7.1 Summary

From the survey result as shown in Figure 6.3, we could conclude that there was a strong majority in players understanding of what the quest was asking for, quests were related to other agents the player had seen in the world, quests involved agents that the player had interactions with, quests were related to things happening in the game world, quests were interesting. There was a regular majority of players understanding of quests were designed entirely before the player started playing, quests were generated using a basic template with details filled in based on the player’s actions, and quests were dynamically generated. The results were inconclusive with players understanding of quest motivation and previous quests the player had completed having an impact on the next quests.

Taking into account the effective votes of 7 participants who completed the tutorial quests, 11 participants who completed the first official quests, and 8 participants who completed two or more official quests, the data shows the system was able to dynamically generate personalized quests based on the events happening in real-time and quests completed in the past by other players. The system was not able to show that the quests can be generated based on the quests players have completed in the past, and the quest motivation is clearly given in the game.
7.2 Limitations and Future Work

7.2.1 Need a larger sample size

The number of participants was very small (14), and that leads to a small number of effective answers on the survey. Since the study was conducted for a specialized group, more specifically the group that had gaming experience and happened to be enrolled in the class Interactive Entertainment. A small sample could limit the generalization of the findings to the broader population. This can be improved by spreading out the survey to a broader audience, such as the whole Computer Science department.

7.2.2 Need a longer study session

The study sessions were short, and that limits the probability of developing a long story and the ability to get into repetitions. One of the key requirements for measuring the dynamic in content generation is repetition. It is hard to tell how dynamic was the content if there were not enough repetitions for comparisons. It would be better if the study could involve a group of people for a relatively long-term commitment to the game.

7.2.3 Need better visualized UI

Currently, the game was designed as a text-based MMO. The current UI prevents the immersive experience and visual engagement that players could gain from graphic-based games. With more time spent on graphics and animation, the game could provide a better user experience. It is hard to make a straight comparison to other existing MMOs, so that might result in some inaccurate feedback on the survey.
7.2.4 Need better study design

When the study was conducted, all students were in the same room, so it is relatively easy to oversee the information from other players, and that gives away identifying players from bots in the game. The ability for the player to arbitrarily defined a user name for themselves also makes it easier for others to identify them as actual players from the bots. The nature of their human names does not fit into the theme of the game. Some of the results are conflicting because of the introduction of confounding words. Some of the terms mentioned in the survey were not well defined such as “dynamic” or “template” are lacking an explicit definition. All terms related to the validation of the survey should be carefully defined and introduced in the survey before participants answer any questions.
BIBLIOGRAPHY


APPENDICES

Appendix A
INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT: “Studying MMO Quests in Games”

INTRODUCTION

This form asks for your agreement to participate in a research project on quests in video games. Your participation involves playing an experimental game and filling out a survey on your experience. It is expected that your participation will take approximately 30 minutes. There are no risks anticipated with your participation. If you are interested in participating, please review the following information.

PURPOSE OF THE STUDY AND PROPOSED BENEFITS

• The purpose of the study is to further research of quests in video games.

• Potential benefits associated with the study include the potential for better quest creation techniques in video games.

YOUR PARTICIPATION

• If you agree to participate, you will be asked to play our game for approximately 20 minutes and then fill out a survey on your background and experience from the playtest.

• Your participation will take approximately 30 minutes.
• As an incentive for students who are currently in CSC 378 at Cal Poly, you may do the extra credit QA assignment on this experience. There are other QA extra credit choices available.

PROTECTIONS AND POTENTIAL RISKS

• Please be aware that you are not required to participate in this research, refusal to participate will not involve any penalty or loss of benefits to which you are otherwise entitled, and you may discontinue your participation at any time. If you decide to withdraw your participation you may leave at any time. You may omit responses to any questions you choose not to answer.

• There are no risks anticipated with your participation in this study.

• Your responses will be provided anonymously to protect your privacy.

• Identifying information collected as part of the research, even if the identifiers are removed, will not be used or distributed for future research studies. All original responses will be destroyed by the end of Spring quarter, 2023.

RESOURCES AND CONTACT INFORMATION

• This research is being conducted by MS Student Sherry Lin and Associate Professor Foaad Khosmood in the Department of Computer Science and Software Engineering at Cal Poly, San Luis Obispo. If you have questions regarding this study or would like to be informed of the results when the study is completed, please contact the researcher(s) at foaad@calpoly.edu.

• If you have concerns regarding the manner in which the study is conducted, you may contact Dr. Michael Black, Chair of the Cal Poly Institutional Review Board, at (805) 756-2894, mblack@calpoly.edu or Ms. Trish Brock, Director of Research Compliance, at (805) 756-1450, pbrock@calpoly.edu.
AGREEMENT TO PARTICIPATE

If you are 18 or older and agree to voluntarily participate in this research project as described, please indicate your agreement by clicking “Yes, I volunteer” below. Please retain a copy of this form for your reference.

Thank you for your participation in this research.

* Indicates required question

1. Do you volunteer to participate? *

Check all that apply.

☐ Yes, I volunteer.

Age

2. Are you over 18? *

Mark only one oval.

☐ Yes    Skip to question 3
☐ No

Participant Information

Information required of the participants

3. What's your email address? *
4. Do you play video games? *

*Mark only one oval.*

- ☐ Yes
- ☐ No
- ☐ Decline to answer

5. What kind of video games do you play?

*Check all that apply.*

- ☐ Sandbox
- ☐ Real-time strategy (RTS)
- ☐ Shooters (FPS and TPS)
- ☐ Multiplayer online battle arena (MOBA)
- ☐ Role-playing (RPG, ARPG, and More)
- ☐ Simulation and sports
- ☐ Puzzlers and party games
- ☐ Action-adventure
- ☐ Massively Multiplayer Online games (MMO)
- ☐ Other: ____________________________
6. How many hours do you spend on video games?

*Mark only one oval.*

- [ ] Less than 1 hour per week
- [ ] 1 to 5 hours per week
- [ ] 5 to 10 hours per week
- [ ] 10 to 20 hours per week
- [ ] 20 to 30 hours per week
- [ ] 30 hours+
Tutorial Quest

Before starting, here's a brief introduction to the game. Upon login, you will be joining one of the two major factions in the world, either as a member of the Templar Order or a member of Shadow Oath. It will show on the left side under 'player stats' once you are logged in.

The goal here is to get a quest from your faction leader and have the quest completed before reporting back to the leader. The first quest is a tutorial quest that could help you familiar with how to interact with the world and complete the actual quest for the study.

To interact, you could either type in commands in the command line or select the options in the player UI (prompted by clicking on the red dot after logging in). Type in 'help' in the command line or click on help on the player UI to get a list of available commands.

Here is a list of steps for completing a tutorial quest:

1. **Login**: log in with command `login <username>`, ex: `login sherry`
2. **Move around**: `move <roomName/roomID>` to move around and try to find your leader. (try to look for player names that contain your faction name and the word 'leader')
3. **Get the quest**: request a conversation with your faction leader with the command `request_convo <playerName/playerID>`, ex: `request_convo Leader_of_Shadow_Oath` or `request_convo 2`
4. **Find the target player**: `move <roomName/roomID>` to move around and look for the target player
5. **Complete the quest**: once you see the target player, request a conversation with `request_convo <targetName/targetID>`. After the conversation is established, request an item trade with the command `request_item_trade <itemName/itemID>`. You will be requested some amount of gold in return for the item you requested. To pay the item with gold, use the command `pass_gold_request`. To complete the trade, get ready with the command `ready_trade 1`
6. **Return to faction leader**: return to your faction leader with the move command. Find the piece of information with `item_traded`, itemName, or other information available given by the quest in the search bar below. Note the information ID that you found.
7. **Turn in quest-related information**: request a conversation with your faction leader again, then turn in the quest with the command `turn_in_quest_info <infoID>`

After you have completed the tutorial quest, please come back and answer the following question.

Play the game here [https://panoptyk.com](https://panoptyk.com).
7. Did you complete the Tutorial Quest? *
   
   *Mark only one oval.*
   
   ☐ Yes
   ☐ No

About the Tutorial Quest

8. How do you think the quest is generated? *

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

9. Do you think the quest is written ahead of time, and why? *

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

________________________________________________________________________
________________________________________________________________________
10. Are there some other agents in the game that are controlled by humans? How can you tell? *

11. State to what extend you agree with the following statements? *

   Mark only one oval per row.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neutral</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
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</table>

   "I understand what the quest is asking for"

   "I understand the game story motivation for this quest"

12. How long did it take to finish the quest? *

   Example: 4:03:32 (4 hours, 3 minutes, 32 seconds)
Complete one quest

Please now go back to your faction leader in the game and request a conversation with your faction leader in order to start with an official first quest.

Anytime in the quest, you could enter 'help' in the command line or click on the 'help' option in the player UI for actions available.

Here are some commands that might be helpful for completing the quest:
- 'move': 'usage: move destination',
- 'help': 'usage: help [command]',
- 'drop_item': 'usage: drop_item item1 [item2] ...',
- 'pickup_item': 'usage: pickup_item item1 [item2] ...',
- 'ask_question': 'usage: ask_question',
- 'request_convo': 'usage: request_convo agentName',
- 'request_item_trade': 'usage request_item_trade itemName',
- 'accept_convo': 'usage: accept_convo agentName',
- 'leave_convo': 'usage: leave_convo',
- 'reject_convo': 'usage: reject_convo agentName',
- 'withdraw_convo_request': 'usage: withdraw_convo_request agentName',
- 'request_trade': 'usage: request_trade agentName',
- 'accept_trade_request': 'usage: accept_trade_request agentName',
- 'reject_trade_request': 'usage: reject_trade_request agentName',
- 'offer_answer_trade': 'usage: offer_answer_trade infoID',
- 'offer_items_trade': 'usage: offer_items_trade item1 [item2] ...',
- 'request_gold_trade': 'usage: request_gold_trade gold_amount',
- 'pass_gold_request': 'usage: pass_gold_request',
- 'ready_trade': 'usage: ready_trade (1: ready, 0: unready)',
- 'cancel_trade': 'usage: cancel_trade',
- 'tell_info': 'usage: tell_info knowledgeID',
- 'turn_in_quest_info': 'usage: turn_in_quest_info infoID',
- 'knowledge': 'usage: knowledge [knowledgeID]',
- 'kill': 'usage: kill agentName | agentID',

with another quest along with the instructions provided for the tutorial quest.

Once you are done with at least one quest, please come back and answer the following questions.
13. State to what extend you agree with the following statements? *

Mark only one oval per row.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neutral</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;I understand what the quest is asking for&quot;</td>
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<tr>
<td>&quot;I understand the game story motivation for this quest&quot;</td>
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<tr>
<td>&quot;The Non-player characters have a purpose in this quest&quot;</td>
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<tr>
<td>&quot;The story context for the quest makes sense&quot;</td>
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<td>&quot;My quest was related to other agents I had seen in the world&quot;</td>
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<td>&quot;My quest involved players that I had interactions with (other than faction leader)&quot;</td>
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<tr>
<td>&quot;The quest is interesting&quot;</td>
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<tr>
<td>&quot;This quest was designed entirely before I started playing&quot;</td>
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<tr>
<td>&quot;This quest is generated using a basic template with the details filled in based on my actions&quot;</td>
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</table>
14. How do you think the quest is generated? *

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

15. How long did it take to finish the quest? *

Example: 4:03:32 (4 hours, 3 minutes, 32 seconds)

Complete 2+ quests

After you have completed at least two quests, please answer the following questions. Feel free to complete as many quests as you like.

16. State to what extent you agree with the following statements? *

Mark only one oval per row.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neutral</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
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<tbody>
<tr>
<td><em>I understand what quests are asking for</em></td>
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<td><em>I understand the game story motivation for quests</em></td>
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<td><em>The Non-player characters have a role in quests</em></td>
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<td><em>The story context for quests make sense</em></td>
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<tr>
<td><em>My quests were related to other</em></td>
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</table>
17. How do you think quests are generated? *

## Quest Generation Patterns

<table>
<thead>
<tr>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>agents seen in the world&quot;</td>
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<tr>
<td>&quot;My quests involved players that I had interactions with (other than faction leader)&quot;</td>
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<tr>
<td>&quot;Quests are designed entirely before I started playing&quot;</td>
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<td>&quot;Quests are generated using a basic template with the details filled in based on my actions&quot;</td>
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<tr>
<td>&quot;Previous quests have an impact on next quests&quot;</td>
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<tr>
<td>&quot;Quests completed by other human players have an impact on quests I received&quot;</td>
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<td>&quot;Quests are related to things that happen in the game world&quot;</td>
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<td>&quot;The quests are dynamically generated&quot;</td>
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</table>
18. How long did it take to finish quests on average? *

Example: 4:03:32 (4 hours, 3 minutes, 32 seconds)

Thanks for participating!

19. Please provide any feedback or insight you have from this experience.

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