

Towards Procedural Quest Generation: A Structural Analysis of RPG Quests

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Abstract

An analysis of several role playing games indicates that player quests share common elements, and that these quests may be abstractly represented using a small expressive language. One benefit of this representation is that it can guide procedural content generation by allowing quests to be generated using this abstraction, and then later converting them into a concrete form within a game’s domain.

Keywords: Procedural content generation, quests, role-playing games.

1 Introduction

A *quest* in a role-playing game (abbreviated RPG) asks the player to complete a set of tasks in return for a reward. Quests function as a storytelling mechanism by encouraging players to interact with non-player characters (abbreviated NPCs) and allowing them to observe dramatic events unfolding as the game progresses. In addition to providing players with concrete goals [17], quests can be a vital aid in orienting new players.

Current RPGs use hand-crafted *static* quests generated before gameplay by a designer. Players will eventually complete all of the static quests in a game, and will be forced to repeat quests. The

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first time a player completes a given quest it is a new experience, but if the player is allowed to repeat a quest then they will probably recall most or all of its details. We believe that a player needs the sense of mystery that accompanies never-before-seen quests to maintain interest in a game and will therefore need additional quests added to the game as they play.

Publishers of RPGs have a business interest in providing new quests in order to retain players and generate revenue from the sales of expansion packs and subscriptions. In single-player RPGs such as the games in the Elder Scrolls series, player interest maintains the value of the game franchise and encourages players to buy new titles in the series. In online RPGs, player interest translates into revenue in the form of continued subscription fees or real-money transfers (the purchase of in-game assets for real money). There is therefore pressure to produce expansion packs for these games, which is a labor-intensive operation. Procedural generation of quest data would allow publishers to provide more of this novel content to their players without increasing their labor costs. It seems reasonable to believe that a publisher who successfully generates quest content will have a competitive advantage. Procedural generation also allows quests to be reactive to the current state of the game world, which is impossible to achieve with pre-generated static quests.

We will demonstrate through an analysis of quests in current online RPGs that quests can be expressed using a small set of player actions, and that the motivations of an NPC can be used to guide the generation of these actions. An NPC's motivations can be inferred when the NPC is in a conflicted state. As an NPC is faced with unsatisfied needs or desires, we infer that the NPC is motivated to satisfy these needs. Our analysis has shown that NPCs with similar needs will seek to satisfy that need in similar manners. As a result of this, we are able to show how a quest generator may use the motivations of an NPC to determine the rough structure (or strategy) for a quest, and in turn how they can expand this structure into a complete quest. Our focus is on providing a taxonomy of quests to be used when creating a procedural quest generator.

The remainder of this paper is divided into twelve sections. In Section 2 we discuss the contributions of this paper in comparison with previous related work. In Section 3 we provide definitions for terms that may be unfamiliar to some readers, or for which there may not be a single accepted definition. In Section 4 we discuss the online databases that we used to obtain details on quests

that were used as the basis of this research. In Section 5 we explore the role of quests in motivating players to play a game. In Section 6 we provide an overview of a procedural quest generation algorithm that makes use of the structure we describe. In Section 7 we define a number of atomic actions that we observe being used by quests in existing games. We hypothesize that this list of actions is complete, and argue that all quests we studied could be implemented as combinations of these actions. In Section 8 we introduce the concept of non-player character motivations, and show how quests may be described in terms of the motivations NPCs have for assigning these quests. In Section 9 we show how various strategies may be employed to meet the NPC’s needs, and provide examples of strategies found in current online RPGs. In Section 10 we discuss how strategies may be converted into abstract quests that satisfy a motivation. In Section 11 we then describe how an abstract quest may be converted into a concrete quest. We finish with a series of examples. In Section 12 we provide examples of common abstract quests, and in Section 13 we provide examples of several concrete quests and illustrate the quest generation process that created them.

2 Previous Work

Anne Sullivan [15] classifies 133 World of Warcraft quests, finding that 55% are combat-based, and 22% are quests that require collecting items. Her paper presents a technique for generating environmental puzzle quests, but relies on human interaction during the quest generation process. She concentrates on player co-authorship of quests, rather than having them be purely computer generated as is our aim.

Ashmore and Nitsche [5] propose procedural quest generation using key-lock structure quests, rather than NPC interactions. We agree with the need to generate meaningful content in a procedural quest generation system, as opposed to random content. They emphasize player context and goals, while we feel that NPC context and goals will result in quests that better fit the game world.

Jill Walker [18] classifies World of Warcraft quests into exploration and combat quests, which is significant as it is an early attempt to classify quests. We provide examples of a number of quests that would now fit into those categories (such as delivery quests), and as a result we believe our classification is more general.

Jeff Howard [8] discusses a process for translating literary narratives into quests, which supports the idea that quests are a form of narrative. While Howard’s definition of a quest appears to be broader than the one we use, his paper is useful as it looks at the problem of quest design from a different viewpoint.

3 Terminology

A number of terms used in this paper may be unfamiliar to those who have not played RPGs. Some other terms are unique to this paper, so for clarity we define them here.

- **Character:** A person in a game world, who may either be controlled by a player, or by the computer. Often a distinction is made between a character and a creature based on the ability to interact with a player. Characters are typically interactive in contrast to creatures that are typically reactive.
- **NPC:** a Non-Player Character. A character in the game not controlled by any player. NPCs are the cast in the various story arcs that unfold as the game is played. NPCs have independent needs and desires, and can be affected by player actions.
- **Originating NPC:** When a quest starts with an NPC, that NPC is referred to as the originating NPC for that quest. Quests typically begin with a single NPC who asks the player to perform a series of tasks that assists the NPC. Note that some games may assign quests to a player when they pick up an item or visit a location in the world, in which case the players will be directed to an NPC who becomes the originating NPC.
- **Faction:** A group of like minded NPCs, similar to a clan or tribe. NPCs may belong to more than one faction, and typically are enemies of certain factions. Player actions may modify how a faction responds to the player, causing NPCs which belong to that faction to become friendlier or more hostile. Faction is sometimes used to represent a quantitative measurement of how much a given group of NPCs likes a player. Actions that benefit or harm a faction member (or its enemies) will change this numerical faction value.
- **Quest:** A series of player actions that benefit an NPC or faction in the game. All quests are

motivated by the needs and desires of this NPC or faction. Games typically reward players for completing a quest.

- **Motivation:** A need or desire of an NPC that causes them to offer a player a quest. Motivation places some constraints on the actions that may be part of a quest. An example of one possible motivation would be the desire of an NPC to learn more about an enemy.
- **Quest Strategy:** An ordering of actions that is the bare minimum needed to meet the requirements imposed by the quest's motivation. A motivation corresponds to one or more of these strategies. The strategy in turn corresponds to one or more abstract quests. Figure 1 shows the relationship of quest strategies to other phases of quest construction.
- **Abstract Quest:** A quest represented by abstract actions that the generator has not yet mapped to assets in the world. For example, an abstract quest may require the player to talk to an NPC and will assign a placeholder for that NPC that does not refer to any specific NPC in the world. Abstract quests are useful since they represent an outline of the player's actions, and allow us to compare the structure of multiple unrelated quests. One abstract quest can be turned into a large number of concrete quests by changing the assignment of assets, yet each will share the same structure.
- **Concrete Quest:** An abstract quest that has real world assets assigned. Abstract quests will use an abstraction like NPC, while the concrete version of that quest will refer to a specific NPC in the world. Concrete quests also specify actual lines of dialog rather than just noting a conversation with an NPC is required.
- **World Entity:** An NPC, Item or Location in the world. Something the player is allowed to interact with.
- **Role Playing Game (RPG):** A game where players assume the role of a character in the game world, and advance in power through combat and by performing quests.

4 Source Material

Our list of abstract player actions and NPC motivations is obtained from descriptions of quests from Allakhazam.com [1], Mmodb.com [2], and Thottbot [4] for the games Everquest, Everquest II,

Motivation	Quests Using	Percent of Total
Equipment	135	22.2%
Knowledge	119	19.6%
Conquest	105	17.1%
Protection	85	14.0%
Serenity	79	13.0%
Reputation	49	8.1%
Profit	12	2.0%
Ease	9	1.4%
Ability	8	1.3%

Table 1: Distribution of NPC motivations

Vanguard: Saga of Heroes, and World of Warcraft. We used quest dialog to determine NPC motivations, and the quest descriptions listed the steps required for successful completion of the quest.

Our analysis consisted of a brief survey of almost 3000 quests in order to determine rough categories, followed by the creation of a detailed quest database. This database currently contains around 600 quests represented in abstract form, each tagged with the motivation of the originating NPC and the goal of the player. While the definition of various motivations are discussed later, we provide the summary shown in Table 1 as an overview of the sampled data.

We employed a geographic sampling technique that selects all quests for various locations in the world for each game. We believe this gives us the best coverage of the variety of NPC motivations and player actions.

5 Quests as Motivating Forces

Quests provide players with purpose and direction, and encourage the players to explore the world and interact in ways which might not otherwise occur to the player. A game publisher will want to provide players with a large assortment of quests so that the player always has new experiences available. These quests provide motivation for the player to continue playing the game, and in turn motivate the player to continue financially supporting the publisher.

A player who is unsure of what to do next may appreciate a choice of quests that allows them to select from a set of possible goals. Quests also serve as a story telling device, since a player

completing a quest is required to interact with NPCs who can explain why various tasks need to be performed and entertain the player with stories set in the game world.

When we look further into the factors that can motivate a game player we consider Harackiewicz *et al.* [7] who provided a list of factors that determine intrinsic motivation. In particular we wish to focus on the concept of *perceived task value*, which was defined as a belief that a task is meaningful or important. In the context of a computer game we interpret this as meaning that in order to maintain a player’s interest the player must associate meaning with their actions. We believe meaning for a player comes from the belief that their actions have an impact on the world, in other words that the world state has somehow changed as a result of their actions.

Current games for the most part use static quests, as opposed to procedurally generated quests, which can either result in the player exhausting the available content, or in the player experiencing repetative content which they might find boring. In a world with static quests, nothing can really change as a player’s actions must be undone in order for the quest to be performed again. This is in contrast to a procedurally generated quest that would be ran one time, and then replaced with another procedurally generated quest. Consider the Vanguard quest “Kill Tryndykavlen”, which asks the player to kill an enemy leader: If a player succeeds in killing this NPC, after a short time Tryndykavlen will be reincarnated so that he can be killed again at some future time [2]. In an evolving history of this world, the death of Tryndykavlen is only meaningful if he stays dead. Procedural generation of quests can ensure that the game does not present duplicate quests to the players, which would eliminate the repetition of content, and in turn the need to undo the effects of previous actions in the world. As a result, we believe that static quests lack the potential for motivating players that could be found in procedurally generated quests, and therefore static quests do not meet the needs of the game designer as efficiently as procedurally generated quests.

6 Overview of Quest Generation

Quest generation starts with the generator noting a need for a new quest in some part of the game world and then selecting an NPC in that region who could use the player’s help. The generator may be trying to maintain a certain number of quests of various difficulties throughout the world,

and as players solve these quests new quests will be needed to replace them. Once the generator has identified such a need, it must select an NPC in that region who has unmet needs or desires and use these as motivations for new quests. We have identified a small set of core motivations used in existing RPGs that can account for all of the quests we studied. These motivations will be used to determine the structure of the generated quest. For example, an NPC who is motivated by revenge may offer a quest that involves the death of another NPC.

We believe the illusion of reality within a game is strengthened by a consistent selection of NPC motivations that dynamically change in response to world events. We feel that it is reasonable to organize each NPC’s needs and desires into a hierarchy, similar to human motivations defined by Maslow’s hierarchy of needs [9], and to then select the highest priority unmet need. The purpose of this prioritization of needs is to allow different NPCs to have different goals, while encouraging consistent behavior from that NPC. We assume that these orderings of needs and desires will vary from one NPC to another, and that an NPC will tend to focus on generating quests that address needs it feels have a higher priority. There is no need for an NPC’s ordering to be fixed throughout its lifetime, and we imagine that having this ordering adapt to world events might increase the sense of realism felt by the player. We do caution against allowing an adaptation mechanism to cause all of the NPCs’ motivations to converge to a common value, or allowing the adaptation to occur with such frequency that the NPC appears to change goals constantly.

Once the generator has determined a motivation for an NPC, it is then able to select an applicable quest strategy and use this strategy to form an abstract quest. Figure 1 shows the relationship between motivations, quest strategies, and abstract quests. Each motivation corresponds to one or more strategies, each of which may be later expanded into a complete abstract quest. Each strategy provides a list of required actions and their temporal ordering. Additional actions will need to be added to the strategy to determine how the player learns of the quest. For example, in most cases the player talks to the originating NPC and the quest is communicated at that point, although there are a large number of quests in World of Warcraft that begin with the player finding an item and taking it to an NPC. Additional actions may be added if a longer quest is desired. The final list of actions is an abstract quest that identifies the types of game assets required for the quest

and the steps needed by the player to complete the quest.

The generator completes the quest by instantiating this abstract quest into a concrete quest. This process replaces abstractions like NPC, Item, and Location with references to actual assets in the game. The generator will also need to create dialog for situations where a player needs to talk to an NPC. During this phase of quest generation, some assets like items and NPCs may need to be created and added to the world so that the quest may make use of them. The decision to create new assets or to reuse existing ones will depend on how many assets the designer wishes to have in the world. A small number of assets may result in competition between players and as a result quests that players are not able to complete. Such would be the case if more than one quest used a single item. The player who found the item first would be able to continue with their quest, while other players needing the item would be prevented from continuing. A large number of assets on the other hand will reduce the interconnectivity between elements in the world, as items and NPCs might be used by only one active quest at a time. Only the designer will be able to determine the appropriate number of assets needed for a particular game.

7 Actions

We have identified a small set of player actions that allow us to express quests in an abstract notation. These actions are abstractions of the steps players would need to take to complete the quests, and always result in some change in the world state when performed. For example, the quest of delivering a letter to an NPC might require the player to obtain the letter, move to the NPC, and then give them the letter. As a result of performing these actions the player's position changes, and the NPC gains possession of the letter. To preserve generality, we further abstract these actions by referring to the letter as an item. The abstract form of this quest is for the player to obtain an item, move to an NPC and then give them the item. If we replace the letter by another item, say a key, we have another quest that is identical in structure, but not in the details. The value of such an abstraction is that it allows quest designers to work at an abstract level and then to move to a concrete representation of their design. This technique will be useful when automatically generating quests. We believe the list of actions presented in Table 2 is complete, in the sense that

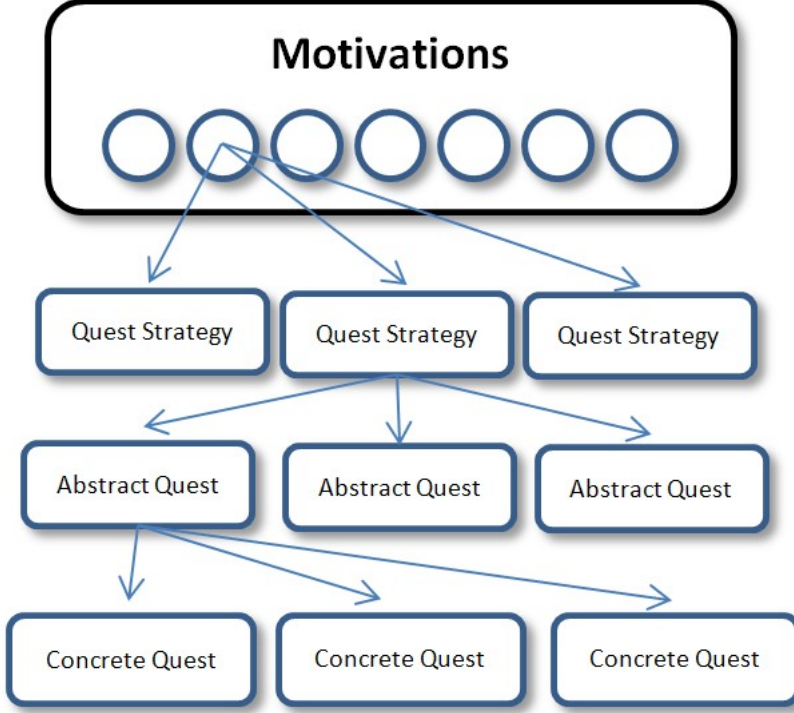


Figure 1: The relationship between different stages of quest construction

all of the quests we studied could be expressed as combinations of these actions.

This notation is a terse representation of a quest, and as such has a number of conventions that may not be immediately clear to someone reading it. We number entities such as items, NPCs, and locations so that subsequent steps in a quest description may refer back to specific entities. For example, Item1 would refer to the first item in the description of a quest. We use square brackets to enclose individual actions, and also to indicate optional modifications to an action. The notation “xN” means to perform the action one or more times. We use braces {} to indicate a choice of entities. For example, the notation [**Attack** [xN] {NPC, Item}] means to attack an arbitrary number of NPCs or Items of a given type. Designers use this arbitrary repetition when one NPC in a group has a needed item and when the player may only obtain upon that NPC’s death. The player is forced to kill NPC after NPC until they find one with the item.

The actions in Table 2 serve the purpose of advancing the quest, bringing the player closer to achieving the originating NPC’s goal and earning the player their reward. Each part of a quest

Section	Action	Meaning
1	[Attack [xN] {NPC, Item}]	Damage an entity
2	[Talk NPC]	Talk to an NPC
3	[Assemble Item]	Assemble a new item from parts
4	[Give Item to Entity] [Take Item [from Entity]] [Trade Item for Item with Entity]	Trade items with an entity.
5	[Defend Entity]	Defend an entity against attacks.
6	[Goto Entity]	Visit an NPC, item or world location
7	[Use {Item,Skill} on Entity]	Use an item or skill on a world entity.

Table 2: Possible player actions during quests

is part of a story, and the individual steps guarantee that the player has played their part of the story’s unfolding. We consider quests to be a form of narrative, as the NPCs describe conflicts and seek the aid of the players in an attempt to resolve these conflicts. The nature of the conflict gives us insight into the motivations for the NPC, and we believe these motivations will be useful during quest generation. Given an arbitrary NPC in a world, the NPC’s circumstances suggest possible motivations, and a mapping from motivations to quest structures suggests possible quests that can be of use to the NPC.

Such a list of actions is an aid to further analysis, as we can study existing quests that use a particular action and perhaps gain insight into common elements for these quests. For example, the defend action is rarely used. When this action occurs in a quest we observe that there is a world entity (NPC or Item) that is going to come under attack but is not able to defend itself, such as a relatively weak NPC traveling through hostile territory. If a quest generator identifies such an NPC in its list of assets, this NPC would reasonably become a candidate for a quest using a defend action.

We classify actions into seven categories as listed in Table 2, each addressed in a separate subsection below.

7.1 Damage an NPC or Item

The action [**Attack** [xN] {NPC, Item}] encompasses all damaging actions that may be performed on an NPC or an item. For the most part these actions are requests to kill one or more NPCs.

However, there are examples where the player is asked to damage or destroy an object in the world. In very rare cases we see requests to use non-lethal force on another NPC.

The most common form of this action is a request to kill one or more NPCs. This may be part of a military action such as invading an enemy’s territory or repelling an enemy’s invasion. Sometimes the player must kill an NPC for revenge or to remove a threat. In each case, the death of an NPC demonstrates that the player has located the NPC, and was victorious in combat. Evidence of an NPC’s death is often expressed as a trophy that the player may deliver to other NPCs, for example the victim’s head, or some item associated with the victim such as a signet ring. Examples include the Everquest quest “The Traitor”, which requires the player to kill a traitorous guard and return his tunic as proof of his death [1]. Game mechanics prevent the player from obtaining the tunic by means other than the guard’s death, so possessing the tunic is proof of killing the NPC. Another example is the Vanguard quest “Sharptooth” which asks that the player assassinate an enemy leader and return his tooth as proof that the enemy is dead [2].

Rarely a quest will call for the destruction of an item, as in the case of the Vanguard quest “Coming of the Wyrmtide” where the player is asked to destroy enemy siege engines. In the Vanguard quest “Resource Denial” the player is asked to either destroy or steal enemy food supplies [2].

In very rare cases, a quest will require the use of non-lethal force, as in the case of the Vanguard quest “Pathetic Soldiers” where the player is asked to beat cowardly soldiers. Although game mechanics implemented this action as a right-click on the NPC rather than an attack, conceptually the player was attacking and damaging the NPC [2]. The Everquest quest “Interrogator’s Badge” requires the player to attack an NPC without a weapon to force him to confess [1].

7.2 Talk to an NPC

Conversations between NPCs and players allow the exchange of information, as well as telling the players stories about the game world. NPCs may also use conversations to learn how far a player is into a quest. In each case the quest determines the information that needs to be conveyed and the corresponding text. This action is the hardest to generate, as seen by the difficulty of previous narrative generation projects such as Meehan [11] and Mateas and Stern [10].

NPCs use conversations to guide the player, for example asking them to kill an NPC or recover a stolen item, and these conversations also make the game world appear more realistic. NPC guidance is very helpful for new players, who may be uncertain where to begin when they first encounter a seemingly open-ended game world. NPCs sometimes will explain their motivations to a player, which helps maintain the illusion of realism. For example, if an NPC wants the player to kill another NPC they might tell the player a story about how a close family member was killed and ask the player for help obtaining revenge. These explanations show that the requests are not arbitrary, but instead are appropriate responses to events which occurred in the game world. We believe that NPCs which communicate realistic motivations and responses will appear to have more realistic behavior.

Players may be asked to provide information to an NPC to demonstrate that they are executing the task steps in order as opposed to skipping steps. For example some quests have one NPC provide the player with a phrase that will be recognized by another NPC in the future. Players who have not yet talked to the first NPC will not know the phrase, and the second NPC will not advance the quest. This also prevents players from initiating random conversations with NPCs and identifying quests originated by other NPCs, since an NPC would only discuss a quest with someone who knew this phrase. This use of conversations to identify how far into a quest a player eliminates the need to record the player's progress, as the player carries the state with them in the form of a phrase to be spoken. This is analogous to how older console games used passwords to work around their inability to save a player's progress. An example of this type of pass-phrase is the Everquest quest for the Shaman Epic 1.5 "Crafted Talisman of Fates". Early in the quest the player talks with an elder spirit, and then later the player visits an NPC named Kimm McShannel. The player must say "the elder spirit sent me" in order for Kimm to tell them the next step in the quest [1].

7.3 Assemble a new item from parts

Quests sometimes ask players to create new items using other items as raw materials. The player may perform some of these assemblies using tradeskills commonly found in the games studied (for example blacksmithing or woodworking). Other assemblies may be unique to a quest such as

transforming a set of collected objects into a single object representing the collection.

The mechanism for assembling an item depends on the game. Everquest uses special containers that hold the raw materials, and allow the player to combine the items into a new item. The success rate for an Everquest trade skill will depend on how proficient the player's character is in that skill, failure will result in the raw materials being destroyed without creating a new item. World of Warcraft players will select a tradeskill recipe, and the raw materials will be taken from their general inventory. In contrast to Everquest's system which allows an assembly attempt to fail, World of Warcraft tradeskill combines always succeed.

Regardless of how the one creates the item, assembling an item from collected raw materials demonstrates that the player has obtained the raw materials needed to make the item, and in some cases that the player has a certain level of proficiency in a tradeskill.

7.4 Trade items with an Entity

Many quests involve the player acquiring an item and then giving it to an NPC, placing it inside of another item, or dropping it on the ground at some location. The opposite is also seen, where the player acquires an item from an NPC, removes it from another item, or picks it up off the ground at some location. An exchange of items between the player and one of these entities is also possible.

The transfer of items forms the heart of what has become a cliché in RPGs: the delivery quest. An NPC gives the player an item and asks them to deliver the item to another NPC. The delivery may require a lot of hazardous travel, and some searching to find the right NPC to deliver the item. So while the structure is trivial, the quest itself may not be. These type of quests can be used to encourage players to move about the world, which is desirable as the more the players explore the world the more new content they will encounter.

Most item trades are between the player and an NPC, but in rare cases, an NPC may ask the player to deliver an item to a specific location in the world instead. The Everquest quest "Sabotage" requires the player to place a bomb in an enemy supply depot, and after some time the bomb explodes destroying the supply depot [1]. Quests may occasionally need the player to collect items from the world, either through tradeskills like harvesting or by picking up ground

spawns (items that appear on the ground). The World of Warcraft quest “A Tisket, a Tasket, a Noblegarden Basket” requires players to collect 10 ground spawn eggs [4].

Obtaining an item is necessary when an NPC wants the item, or wants the player to use the item in some way. In some cases prior actions by the player may determine how the item is obtained, for example the player may need to kill an NPC and then return the victim’s head. In this case the death is explicitly required by the quest, and obtaining the head is a trivial action once the target is dead. An example of this would be the Everquest quest “Trumpy Iron toe” which requires the player to kill Trumpy and return his head. After Trumpy is killed, the head is found in the corpse and may be picked up [1]. In most cases the NPC does not care how the item is obtained, only that the player has it in their possession.

Most quests would work the same if the player stole the item or purchased it. This is an example of where the intent of the originating NPC determines which actions may be used in the quest. An NPC who is interested only in the item would require the item to be obtained, leaving it up to the player how best to accomplish this task. For example, the Everquest quest “Recover the Lost Map” asks the player to recover pieces of a map lost when wild animals killed a cartographer [1]. The quest giver specifically expresses regret that the death of these animals may be necessary, but this NPC is more concerned that the map pieces may fall into enemy hands. If the player were to obtain these map pieces without the death of the animals, the originating NPC would presumably be satisfied. However the NPC is also satisfied if the player kills these animals in order to recover the map pieces. In either case the NPC is not going to ask questions when the player later shows up with the map pieces. (For this particular quest though, game mechanics do not permit the player to obtain these map pieces without killing the animals.)

Gaining possession of an item can be accomplished in one of several ways. The previous owner could be robbed, or they could be persuaded to voluntarily part with the item (for example by trading another valuable item). Certain trophy items may only be obtained upon the death of an NPC. In each case, at some point in a quest the player is asked to obtain an item to be used in some subsequent step in the quest.

7.5 Defend an entity or location

Occasionally the player will be called upon to defend one or more entities or world locations that may come under attack. Entities in turn may either move around or remain in one place, which results in the player escorting the entities or performing a point defense. The defend action ends when the last attacker is defeated or when some predetermined time has expired without an attack.

Another case where players defend an entity is found in the escort quest, where players are required to defend mobile NPCs while they travel to some destination. Typically the attacking NPCs make one or more waves of attacks against their target rather than attacking one on one. In the case where multiple NPCs are to be escorted it is possible that these NPCs will split up and take different routes to the destination. We see examples of escort quests in the World of Warcraft quest “Freedom to Ruul” which requires the player to escort a captured NPC to safety [4], and the Everquest quest “Protecting Lerin Sardor” which requires the player to escort a merchant through a dangerous zone so that he can reach a bazaar.

Occasionally a player is asked to defend a non-moving NPC as is the case with the World of Warcraft quest “Death from Below” [4]. It is less common to have quests ask players to defend an item, but we see this in the Everquest quest “Trial of Perseverance” where the player surprises enemy guards and must keep them from ringing an alarm bell [1].

7.6 Visit an NPC, item or world location

Some quests require the player to visit a particular location in the world, perhaps the current location of an NPC or item. This is the case when a quest needs the player to interact with an entity and the player is not currently at the entity’s location. During quest generation this step can usually be implicit, as a request to interact with an entity implies that the player is near the target. For example, if a quest needs the player to talk to a particular NPC, the quest does not need to explicitly require the player to move near enough to the NPC to talk. As the player will be unable to talk to the NPC until they are in close proximity, the implied requirement is satisfied when the conversation occurs. There are situations, however, where the movement of the player cannot be implied by other steps, such as a quest that asks a player to visit a particular shrine, or

scout out enemy territory. Visiting a location is a means to an end, and never the end itself. In other words, there is always a purpose behind sending a player to a location as part of a quest.

We classify destinations as either mobile entities or fixed locations. In the case where an NPC or item moves around, there is no fixed location for the player to visit, rather the player must go to wherever their target is at the moment. But in the case of a non-moving NPC, or in the case where a player is asked to visit a particular landmark, the quest step is fulfilled solely by moving to the required location.

7.7 Use an item or skill on a world entity or location.

Quests sometimes require players to use an item on an NPC, on another object in the world, or use the item without a target at a location. In rarer cases we see requests to use a skill instead of an item. In each case the request is to move near a target and perform some action on that target.

An example of this type of action can be found in a Vanguard quest “The Purification of Fullmoon Spring” that asks players to purify a poisoned spring. The player is given a magical potion that they must use on the spring once they reach it [2]. The Everquest quest “Healing Touch – Rodcet Nife’s Favor” asks players to use a magic item to heal a number of NPCs. The player must therefore locate the target NPCs and then use the item on them [1]. The World of Warcraft quest “Help Tavera” asks the player to locate an NPC and heal them. No items are involved, instead the player is expected to cast a healing spell on this NPC [4].

7.8 Wait

Players may occasionally need to wait at a location for some period of time, for example while a nearby NPC is performing some action. The Everquest quest “Test of Patience” (part of the Shaman epic quest) requires the player to wait underwater while other NPCs try to convince the player to leave. The quest is completed merely by waiting patiently [1]. The World of Warcraft quest “Breaking the Ward” asks the player to wait while a ritual is performed [4]. This is similar to the quests that ask the player to defend an NPC, as they need to wait for something to happen, however no enemies attack the player or nearby NPCs. Time just passes while the player watches.

8 Motivations

By studying the motivations of the NPCs who offer quests we gain insight into the problems these NPCs are trying to solve, which aids us in generating quests for other NPCs. NPCs are motivated to fulfill unmet needs and desires, which allow us to associate quest goals with the needs and desired satisfied by the completion of the quest. This means one may start with an NPC's need, and determine an appropriate motivation, which can then be used to determine the structure of a quest appropriate to the situation.

We suggest organizing NPC needs into a hierarchy, similar to Maslow's hierarchy of needs [9], since this allows us to prioritize them. By studying the dialog between NPCs and players, we have identified a small list of motivations that cover each of these quests. These motivations in turn suggest a set of needs and desires common to RPGs. During gameplay, the process may be reversed to generate quests. An NPC's state determines which of its needs and desires are unmet, which in turn suggests possible motivation, and ultimately which quests would be appropriate for meeting these needs. A prioritization of these needs provides some rationality in the NPC's behavior, as well as differentiating the NPC from other NPCs. A designer has the choice of either fixing these need hierarchies when an NPC is created, or allowing them to change over time. A hierarchy of NPC needs ensures consistency in an NPC's actions, which should contribute to the sense of realism in the world, and in turn add to player immersion in the game.

We disagree with Maslow's view that a single hierarchy is applicable to all individuals. Maslow [9] applied an idealized model of human psychology, believing that damaged people led to a damaged model. When considering NPCs in RPGs we value elements that increase diversity of behavior and further note that most characters in RPGs would have been considered damaged by Maslow's criteria. We also note that real people do not all share the same ranking of the needs Maslow lists. Bobby Sands, an IRA member who starved to death as a result of a hunger strike clearly placed ideology ahead of his personal safety [12]. While this is an extreme example, it is sufficient to demonstrate that Maslow's hierarchy is not an absolute. Our preliminary experiments indicated that random orderings do produce hierarchies that make sense provided we force basic needs to have the highest priority.

We have observed some quests where NPC motivation is unclear. Aside from the player receiving a reward for their effort, no one in the game world appears to benefit. This behavior appears artificial and results in an uninteresting quest, since the lack of observable benefit to the NPC suggests that no change in the world state occurred. This can cause the player to question the perceived task value of the quest, since if the player’s actions are not important to the NPCs then they are less likely to be important to the player. We believe that this type of inconsistency interferes with the player’s immersion into the game world. If the loss of player immersion were to cause players to lose interest in the game, these types of quests will hurt game publishers in the long run.

As mentioned earlier, quests are a form of directed storytelling, so the comparison with other works of fiction is useful. Implied in the existence of a quest is an NPC or faction in conflict who needs some assistance from the player in performing actions they are either unable to or unwilling to perform themselves. This is analogous to the existence of conflicts within works of fiction since they are used to advance plots in stories. At various times, individuals have attempted to abstract the plots of works of fiction into categories, and we have made a similar abstraction of NPC motivations for quests. Ronald Tobias [16] wrote that he believed there were twenty basic plots in fiction, Christopher Booker [6] believed that there were only seven basic plots, George Polti [13] believed there were 36 basic plots. In a similar fashion, our analysis of RPG quests show 7 basic NPC motivations as listed in Table 3.

One potential problem with lists of basic plots for fiction is that they are not based on character motivations, but instead concentrate on events. Our analysis shows that existing RPG quests can almost always be explained in terms of character motivations, in particular the motivations of the NPC assigning the quest. This raises the question of whether there are plots in written fiction that could not be expressed in a quest framework. We note that the presence of characters who observe the events will trigger a response by the character, which in turn implies a motivation. For example, if a storm suddenly occurs and capsizes a boat that the protagonist was on, plot analysis would categorize this in a man-vs-nature genre. However we note that the protagonist’s desire for survival will motivate his response to the disaster.

Section	Motivation
8.1	Knowledge
8.2	Spirit
8.2.1	Comfort
8.2.2	Reputation
8.2.3	Serenity
8.3	Protection
8.4	Conquest
8.5	Wealth
8.6	Potential
8.6.1	Ability
8.6.2	Equipment

Table 3: NPC Motivations

NPC motivations for offering quests can always be categorized as self interest, but the nature of the benefit to the NPC allows us to create a more informative classification of motives, as follows: Each of these motivations will be described in a separate subsection below.

8.1 Knowledge

Knowledge is power, in the sense that it allows a character to accomplish goals that would otherwise be denied them. NPCs will often wish to acquire additional knowledge to advance their own agenda, and players can be a good resource for them to use. As a result, NPCs can originate quests for knowledge which ask the player to either obtain new knowledge, or transfer existing knowledge from another NPC.

Knowledge of another friendly faction can be useful when coordinating activities. For example, learning that an ally has a supply of some needed resource can promote trade, or NPCs could coordinate an attack on a common enemy.

Knowledge of another NPC faction can be obtained by scouting an area, spying on members of the faction, stealing items, or capturing members of the faction. NPCs assigning these quests wish to learn an enemy’s location, capabilities, and intentions. Examples of this type of quest include the World of Warcraft quest “Magic Dust”, which asks the player to obtain samples of magic dust used by an enemy [4], the Everquest quest “Message Intercept” which asks the player to intercept enemy communication [1], and the Vanguard quest “Liquid Metal” which asks the player to investigate an

enemy forge [2]. In each of these cases the enemy faction knows something that would benefit the originating NPC, therefore the NPC asks the player to acquire this information. When an NPC asks the player to obtain knowledge from another faction, this faction does not necessarily need to be an enemy, as there are quests that ask the player to obtain information from friendly sources. Such is the case with much of the Everquest Magician epic quest which involves learning about a historical character [1], and the Vanguard quest “Warding the Kaon” where the player is asked to inspect the defenses of an allied faction [2].

An NPC may ask the player to provide knowledge of the other things in the world. Players may be asked to provide knowledge of the environment by scouting an area, collecting samples of fauna, flora or resources in an area. For example, the Vanguard quest “Ursagor Minor” requires the player to obtain tongues from animals that are behaving erratically in order to determine the cause of this behavior [2], and the Everquest quest “Fleshy Orbs” similarly asks the player to obtain samples from rabid animals [1].

8.2 Spirit

We found a number of quests to be motivated by an NPC’s desire for physical or emotional comfort. There is no tangible result to the quest, rather the NPC feels better or is happier after the quest is completed. We examine these motivations in the following three subsections.

8.2.1 Comfort

Some quests have the sole motivation of increasing the comfort of a group of NPCs. This can be a request for luxuries, entertainment, or the removal of annoyances. Examples include the Everquest quest “Fabian’s Strings” which requires the player obtain new strings for a bard’s lute, so the bard may continue playing in an inn [1], and the Vanguard quest “Endless Clatter”, which asks the player to remove pests bothering nearby NPCs [2].

8.2.2 Reputation

Increasing reputation is a motivation for many characters, as one’s reputation influences how other characters react. An NPC who is well liked in a community will find it easier to obtain the assistance of other NPCs, and will therefore be more powerful than an NPC with a lesser reputation. An NPC may wish to collaborate with a player when undertaking a quest to increase the NPC’s reputation, or the player may choose to perform such a quest on their own to increase reputation with a faction. Most of the games studied have implemented some form of faction reputation system, where a player’s reputation with a faction is modified by their actions. By selecting appropriate actions, a player reputation may be changed at will. While we have not seen any cases where an NPC experiences a faction change, this is most likely due to the static nature of current game worlds. These games attempt to ensure that no permanent changes occur to the world state. As a result, NPCs act as if faction changes matter, but in reality no changes to their faction ever occur. We note that someone could create a game that implements dynamic faction changes for NPCs, where the NPC’s reputation changes over time as a result of their actions and the quests that NPC assigns.

As any action may potentially modify a character’s reputation, any quest may therefore modify a character’s reputation. Some quests exist primarily to modify faction, such as the Everquest “Bone Chips” quests in various home cities [1], or the World of Warcraft quest “Proving Grounds” [4].

On rare occasions a reputation change will not result in a change to a numerical faction value, but will instead be represented by a character flag. The Everquest Monk epic 1.5 prequest is an example of such a quest, as the player is asked to prove themselves worthy of starting work on the quest for their epic 1.5 weapon. The reward for completion of the prequest is not a faction adjustment, but a character flag that demonstrates the player has “the ability to follow the path of the Enlightened” [1]. These flags are in effect boolean values that indicate whether a player has completed some required step in progression. Everquest makes occasional use of these flags for important quests, but normally uses other mechanisms to track quest progress.

8.2.3 Serenity

A quest may focus on the peace of mind of some member of a faction, and as a result may ask a player to help an NPC. Included in this category are quests that ask the player to correct injustices, bring criminals to justice, motivate members of a faction, set a good example for others, and recover lost or stolen property. In general, no harm will come to members of the faction if this request is not met, but they will feel better if it is completed.

A large group of quests ask the player to investigate something that is missing. This could either be an item that is lost or stolen, or a missing person. In each case the originating NPC's concern over the loss is the motivation for enlisting the player's aid, as seen in the Everquest quest "Frostbite's Fish", where an NPC is responsible for a sacred fish, and asks the player to help recover the corpse after a bear has eaten the fish [1]. An example of recovering stolen property is found in the Vanguard quest "Thieving Gremlins", which asks the player for help recovering stolen money [2]. The World of Warcraft quest "Sunken Treasure" is an example of a request to locate lost items [4].

Some quests ask the player to check on the safety of an NPC's family member, to locate a missing NPC, or to investigate an NPC's death. The Vanguard quest "The Unforgotten" asks the player to recover the remains of an NPC [2], as does the Everquest quest "Ivan McMannus' Remains" [1].

A quest may be a request for heroic actions that motivate members of a faction, as is the case with the Vanguard quest "Soldier Morale" where the player must speak to a group of soldiers to get them to follow orders. In Vanguard's "Pathetic Soldiers" the player is asked to provide beat soldiers who are not following orders [2].

We include quests that involve revenge in this category, as the injured faction will feel better knowing the player has avenged them. We see examples of this in the Everquest quests "Troll Pirate Heads" and "Brother Trintle" [1].

8.3 Protection

NPCs often need to protect entities or locations against enemy attacks or natural disasters. In each case the originating NPC has the goal of maintaining the status quo against some external force threatening an unwelcome change. If this status quo is threatened the originating NPC will seek player assistance to remove the threat and reverse any damage that may have occurred.

When a player is guarding an entity or location against possible attack they may choose to either engage the attacker in combat or draw the threat away from the target with a diversion. Most of the quests that involve guarding an entity have the attackers appear from random locations not known ahead of time, making it difficult to intercept them until they are close enough to engage their target in combat. Fighting off the attackers is therefore the only practical choice open to the player. This is the case in the Everquest quest “Protecting Lerin Sardor” [1], the World of Warcraft quest “Death from Below” [4] and the Vanguard quest “The Ulvari Disruption” [2]. When the enemy’s location is known ahead of time, it is possible to create a diversion before the enemy is aware of their target, as seen in the Vanguard quest “The Vaelwyn Plot” [2] and the Everquest quest “Signal Fires” [1].

Another aspect of protecting entities is healing or repairing them when they take damage. Examples include the Everquest quest “Bandages for Honeybugger” that asks the player to assist a wounded NPC [1], the World of Warcraft quest “Strange Findings” that has the player clean up an infestation [4], and the Vanguard quest “The Purification of Fullmoon Spring” where the player must cleanse a contaminated spring [2].

The player may need to take proactive steps to remove a threat. For example, the Vanguard quest “Vector Control” has the players destroy the source of a disease [2]. This is also seen in the Everquest quest “Diseased Pumas” [1] and the World of Warcraft quest “Search Stillpine Hold” [4].

8.4 Conquest

The desire to prevail over one’s enemies can motivate an NPC to collaborate with a player. In general the NPC wishes to reduce an enemy faction’s effectiveness by killing enemies, or depriving it of materials. A request to kill a faction’s enemies can be general, such as a request to kill a

certain number of enemies, or specific as in a request to assassinate an enemy leader. Requests to deprive an enemy of materials can either require players to take materials away from an enemy, or prevent the enemy from obtaining new materials. In each case the enemy's loss will lessen their ability to continue a fight.

When a request is made to kill a certain number of NPCs of a type, it does not matter which NPCs are killed, only how many. For example the Everquest quest "Protecting the Forest" requires the player to kill 25 burnt protectors, to help keep the protectors from moving into a forest [1]. Any 25 of these burnt protectors will be sufficient to complete the quest. The Vanguard quest "Monks of Shang Village" requires killing 4 monks to punish their defiance of the Emperor [2].

Assassination of an enemy leader requires the player to gain access to the leader, and then defeat them in combat in order to complete the quest. The World of Warcraft quest "Blood Elf Spy" requires the player to kill an enemy spy who is leading a scouting party. The hope is that by killing the leader the scouting party will retreat [4].

Factions need materials to fight, so depriving a faction of items such as raw materials, supplies, or equipment can lead to their defeat. Some materials are naturally available as part of the terrain, such as an ore deposit or a stand of timber. Quests that request players to assault an enemy's supply lines usually involve the theft or destruction of the materials, or the displacement of an enemy's forces from a valuable parcel of land. The World of Warcraft quest "The Essence of Aku'Mai" requires the player to collect sapphire clusters before an enemy can obtain them [4], the Everquest quest "Fire Goblin Runner" requires the player to cut off an enemy supply line [1], and the Vanguard quest "Resource Denial" requires the player to steal supplies from an enemy [2].

8.5 Wealth

NPCs sometimes offer quests that are designed to increase the NPC's wealth. The NPC may not have an immediate need for the money, so the motivation is classified as economic gain rather than an intent to buy something. Usually these quests involve the accumulation of assets for later sale. For example, gathering damaged armor and weapons as salvage, collecting raw materials, and stealing valuable items.

We see an accumulation of salable assets in the Vanguard quest “Shang Treasure”, where the player is to bring back two chests of treasure from houses in the Shang Village [3]. An NPC in the World of Warcraft quest “Satyr Horns” requires the player to obtain satyr horns for resale in another town [4]. The Everquest quest “The Cigar” requires the player to collect wax that will be used by a candlemaker to make candles for later sale [1].

8.6 Potential

While a game’s mechanics may not permit an NPC to improve, the NPCs often seek to gain power in the game world. In general these actions are either attempts at acquiring new skills and abilities or attempts at acquiring new equipment. In each case the perceived value of completing the quest is the ability to do something the NPC was not able to do before the quest, and that the NPC believes gives them an advantage over other characters. If an NPC improves their sword fighting skill then they are better able to use a weapon they currently own. If they obtain a better sword, they are better able to use their current sword fighting skill. These desires are explained further in the following two subsections.

8.6.1 Ability

The acquisition of new skills and the improvement of existing ones results in an increase in a character’s capability. The World of Warcraft quest “Junkboxes Needed” asks the player to obtain samples of lockboxes so that NPCs can learn how to pick locks [4]. Vanguard has some quests that teach the player skills such as harvesting, for example “Harvest a Sapling Log” [2]. The originating NPC’s primary goal appears to be teaching the player harvesting skills, so that the player may later help the faction by harvesting lumber.

8.6.2 Equipment

Factions need items in order to perform certain actions, and being able to perform more actions makes a faction more powerful. For example, having weapons allows a faction to defend itself and attack other factions, so it is common for NPCs to seek weapons and provide allied players with

new weapons.

Most of the quests in this category have the player collect materials for new armor and weapons. Everquest has armor quests such as “Dismal Armor” and “Moss Snakes” [1], as does Vanguard with quests like “Lizard Scale Armor” [2]. World of Warcraft has the quest “The Windwatcher” which has players gather items needed to assemble a new weapon [4].

Factions will seek to increase their supply of consumable items, such as food or items used up during spell casting. The Everquest quest “Ordin’s Tasks” has the player bake food use on board a ship [1]. The Vanguard quests “Turtle Soup” and “Meat for Tanvu” similarly have the player collecting food for NPCs [2]. The World of Warcraft quest “Feeding Arngrim” has the player gather food for a hungry spirit [4]. The player needs to gather components for spell casting in the Everquest quest “Majik Power” [1] and the World of Warcraft quest “Magic Dust” [4]. The Vanguard quest “Supplies for Master Yaol” asks the player to deliver supplies to trapped soldiers [2].

9 Selecting strategies based on motivation

We believe that NPC motivations are the starting point for quests, as every NPC in the world should have some unmet needs or desires. This allows a designer to use the motivations of selected NPCs in areas of the world that are lacking quest content to suggest new quests. Motivations imply a set of strategies that may be used, and these strategies imply a set of quests that may be generated. A strategy provides some high level structure to the quest. It is important to note that the strategies we list are only examples, based on observed quests. One may, in general, create different strategies that satisfy a motivation and which would produce acceptable quests.

Motivations can be converted into a list of actions that will serve as a template for the generated quest. By studying quests in existing games we noted patterns in how players were asked to satisfy the demands of quests with a given motivation. Quests would cluster into groups with similar orderings of basic actions, and yet have additional actions interspersed that did not affect the outcome of the quest. We refer to this minimal ordering of actions as a strategy, and note that for a given motivation one strategy is as good as another. Figure 2 shows such a minimal list, along with an expansion of the strategy into a quest.

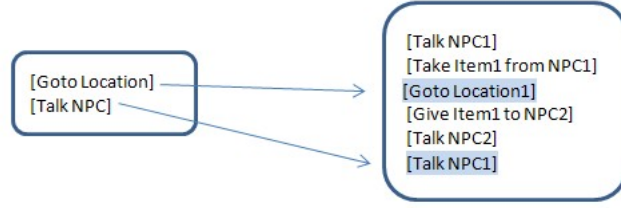


Figure 2: Expanding a strategy into an abstract quest

Once a strategy is determined, the corresponding list of actions can be expanded into an abstract quest. The abstract quest can be instantiated into a concrete quest by assigning specific NPCs, Items and Locations to roles defined in the strategy. Instantiation also requires the generation of dialog for NPC-Player conversations.

We have also observed that quests where the originating NPCs have similar motivations will satisfy the NPCs’ needs and desires in similar ways. We now consider the strategies that may be used to satisfy each of the motivations listed earlier.

9.1 Knowledge

Knowledge is important to NPCs since it enables them to perform actions they wouldn’t otherwise be able to. For example, knowing an enemy’s location allows an NPC leader to plan an attack or retreat. Asking a player to help gather knowledge on various subjects is a good way to encourage a player to explore areas of the world they might otherwise avoid, and interact with NPCs they might never have met.

Knowledge can be gained by interacting with NPCs, Items and world locations. Specifically, one can observe or talk to NPCs, collect items and either study them or deliver them to someone else for study, and explore locations in the world. Table 4 summarizes these strategies.

9.2 Comfort

While most of the NPCs studied did not express concern for their personal comfort, a few did. These NPCs employed two main strategies: obtaining luxury items and removing pests. This list

Strategy	Sequence of required actions
Delivering an item for study	[Obtain [xN] Item] [Give Item to NPC]
Observing	[Goto Location] [Talk NPC]
Interviewing NPCs	[Talk NPC] [Talk NPC]
Using an item in the field	[Take Item from NPC] [Goto Location] [Use Item on {Item,NPC,Location}] [Give Item to NPC]

Table 4: Strategies for gaining knowledge

Strategy	Sequence of required actions
Obtaining luxuries	[Obtain [xN] Item] [Give Item to NPC]
Killing pests	[Attack [xN] {NPC, Item}]

Table 5: Strategies for increasing comfort

of strategies appear incomplete, which is likely the result of our finding so few quests that addressed this motivation. Table 5 summarizes these strategies.

9.3 Reputation

It was very common to find NPCs who desired to increase their fame, or to prove themselves to a faction. These NPCs would ask players to help them with some task that would bring fame to the NPC, such as killing powerful enemies, or obtaining rare and valuable items.

Quests that increase fame are nontrivial tasks, whose completion demonstrated something about the NPC (for getting someone else to perform this task), or the player (for successfully completing the task). Examples include killing powerful enemies, obtaining difficult to find or well guarded items, and demonstrating bravery by visiting some dangerous place in the world. Table 6 summarizes the strategies used to increase fame and recognition.

Strategy	Sequence of required actions
Obtaining rare items	[Obtain [xN] Item] [Give Item to NPC]
Killing enemies	[Attack [xN] NPC, Item]
Visiting a dangerous place	[Goto Location]

Table 6: Strategies for increasing reputation

9.4 Serenity

Peace of mind is a nebulous concept, but we use it to categorize quests that result in an NPC feeling better, and where other motivations do not appear to apply. Capturing or killing criminals, and avenging a wronged ally are good examples, as there is not necessarily a shift in power. This is in contrast to the desire to defeat enemies, which is not emotionally driven but instead seeks a change in relative power. Recovery of lost or stolen items, particularly when these items have no intrinsic value are also good examples, as an NPC can miss a memento and desire its return. A related motivation is the desire to recover the bodies of fallen comrades, or family.

The mechanism for capturing an NPC varies from game to game, and will determine the exact form of the strategy used. We provide a couple of examples that correspond to different mechanisms used by Everquest and World of Warcraft. Table ?? summarizes the strategies used to increase peace of mind.

9.5 Protection

Protection means removing threats, restoring damage caused by past threats and guarding against future threats Table 8 shows common strategies used to protect a faction and its resources.

The removal of threats usually requires killing NPCs, or destroying items that threaten a faction. Players can help repair damage by using an item or a skill on a damaged NPC, item or world location, for example healing an NPC with a magic spell or by applying bandages, using potions to cleanse contaminated springs, repairing a damaged wall. Players may help protect against future threats by building fortifications and acting as guards.

Strategy	Sequence of required actions
Revenge, Justice	[Attack [xN] {NPC, Item}] [Talk NPC]
Capture Criminal(1)	[Take Item from NPC] [Use Item on NPC] [Talk NPC]
Capture Criminal(2)	[Take Item from NPC] [Use Item on NPC] [Obtain Item] [Give Item to NPC]
Check on NPC	[Talk NPC] [Talk NPC]
Recover lost/stolen item	[Obtain [xN] Item] [Give Item to NPC]
Rescue captured NPC	[Attack [xN] {NPC, Item}] [Defend NPC]

Table 7: Strategies for increasing Serenity

Strategy	Sequence of required actions
Attack threatening entities	[Attack [xN] {NPC, Item}] [Talk NPC]
Treat or repair	[Obtain Item] [Use Item on Entity] [Talk NPC]
Treat or repair	[Use Skill on Entity] [Talk NPC]
Create Diversion	[Obtain Item] [Use Item on Entity] [Talk NPC]
Create Diversion	[Attack [xN] Entity] [Talk NPC]
Assemble fortification	[Assemble Item]
Guard Entity	[Defend Entity] [Talk NPC]

Table 8: Strategies for increasing Protection

9.6 Conquest

We have observed that quests ask players to kill enemy NPCs; destroy enemy fortifications, equipment, and supplies; or steal equipment and supplies from an enemy. Players who undertake these actions weaken an opposing faction, which serves the interests of the NPC originating the quest. Table 9 summarizes these strategies.

9.7 Wealth

NPCs attempted to increase their wealth by having players gather raw materials that the NPC would presumably turn into salable items. On some occasions the NPC would ask the player to steal some item or make an item that the NPC could resell. Table 10 summarizes these strategies.

9.8 Ability

NPCs would attempt to improve skills, or have allied players improve skills in order to increase faction power. This could be done by creating new items that allowed a skill to be practiced, such as fabricating a weapon or lockpicks; practicing a skill when the appropriate tools are already available, such as attacking enemy NPCs or practice dummies. The player may need to collect raw materials so that a tradeskill may be practiced. NPCs have also requested items be collected for study as part of magical research that attempts to create new spells. Table 11 summarizes these strategies.

9.9 Equipment

NPCs will want to acquire additional supplies and equipment for their faction, in order to increase faction power. This could be done by assembling these items, such as forging a weapon or baking bread; by delivering existing items to another member of the faction who is in need. Existing items may be acquired by stealing them or trading for them. Table 12 summarizes these strategies.

10 Converting a strategy into an abstract quest

Quest strategies are partial quests, and may be expanded into full abstract quests by the addition of more actions. A strategy provides an assurance that the actions satisfy a particular motivation, but for the most part lack a way of bringing the quest to the player’s attention. Almost all of the quests we studied began with the player talking to an NPC, who would tell the player why they needed help and what the player could do to assist them. In rare cases quests would begin with the player finding an item that they would need to take to an NPC who would begin the quest. It is up to the quest generator to select a starting technique, and to prepend its actions to those given in the strategy.

Additional actions may be added to the middle of a quest, to pad the quest to the desired length. There are a few constraints that must be honored when adding these new actions, but other than that padding actions may be selected at random. For example, we also that actions that require the player to give away an item (dropping it in the world, or trading it to an NPC) or use an item require the player to have the item in their possession first. This means that **[Obtain [xN] Item]** must occur before the **[Give Item to NPC]**, **[Trade Item for Item with NPC]** or **[Use Item on {Item,NPC,Location}]** actions. The acquisition of an item does not need to be immediately before its use, other actions may be interleaved. It is only necessary that the ordering of actions in the working quest be preserved.

Similarly we note that actions that result in the player acquiring new items must have these items used in some subsequent step, otherwise there would be no point in requiring the player to obtain or create the item. This is analogous to Chekhov’s advice that a pistol mentioned in Act 1 must have fired by the end of the story (Rayfield [14]).

Determining the proper length for an abstract quest is a subjective matter. We would like to note that a larger list does not necessarily correspond to a harder quest, nor one that takes longer to complete. It is possible for an abstract quest to require that an NPC be killed, and upon instantiation have this NPC be heavily guarded. That single action of killing the target NPC could require a great deal of effort to bypass guards. Alternatively one might consider a quest with a long series of **[Talk NPC]** actions, where the target NPCs are nearby and which the player may easily

reach. This type of quest may keep a player occupied for a while, running from NPC to NPC, but the player would find it easier and quicker to complete this quest than killing the one NPC in the previous example.

Determining the difficulty of a quest is therefore something that occurs during the instantiation phase (where one converts abstract quests into concrete quests), which is the subject of the next section.

11 Converting an abstract quest into a concrete quest

Abstract quests may be considered to be templates for the concrete quests. They utilize abstract entities such as Item and NPC rather than specific Items or NPCs, and as a result a single abstract quest may be expressed as a large number of concrete quests merely by changing the assignment of world assets to these tags. For example, in a world with 10000 NPCs, an abstract quest with the tag NPC1 could have 10000 different versions each using a different NPC in the world. Given the finite number of tags (Item, NPC, Location), in the limit the number of concrete quests should grow as a factorial function of the quest size.

Since any selection process that maps real assets onto these abstract tags will result in a valid quest, random selection is a valid technique for converting abstract quests into concrete quests. Some advice can be given when the quest generator considers the difficulty of the generated quest. NPCs differ in the ease of reaching them, and how tough they are to defeat in combat. Some items will be commonly available in the world, and others will be quite rare. Selection of these assets has a direct effect on the difficulty of the generated quest, and so the generator should take care to ensure that the quest reward reflects the risk and difficulty of the concrete actions, as well as ensuring the the overall difficulty of the quest is consistent with the needs of the world. We observed that most games have more easy quests than difficult quests. In general, the more difficult a quest was to complete, the better the quality of the quest reward.

12 Commonly observed abstract quests

Several abstract quests were frequently seen when studying quests in current games. We mention these for completeness, and to demonstrate how one may represent the common patterns as abstract quests.

The delivery quest (sometimes called a FedEx quest) involves transporting an item from one NPC to another.

[Talk NPC1]

[Take Item from NPC1]

[Trade Item1 to NPC2 for Item2]

The “collect N” quest requires players to collect N objects and return them to the quest giver:

Talk NPC1

Obtain xN Item1

[Trade Item1 to NPC1 for Item2]

The “kill N” quest requires players to kill a certain number of NPCs:

[Talk NPC1]

[Attack [xN] NPC2]

The basic “kill N” quest asks the player to kill N NPCs of a given type, at which point they are free to move on to the next step in the quest.

Sometimes a “kill N” quest is combined with a collection quest in the form of trophies, where a trophy is an item that is obtained by killing an NPC. A collection of N trophies is evidence that the player has killed at least that number of NPCs. Typically these trophy objects drop off a certain percentage of the killed NPCs, requiring the player to continue killing NPCs until they have acquired enough trophies for their reward.

13 Examples of how abstract quests map to concrete quests

What follows is a random sample of quests from different games that illustrate how one expresses them as a sequence of actions, and how can translate these abstract quests into concrete quests.

13.1 Death From Below (World of Warcraft)

[Talk NPC1]
[Defend NPC1]
[Talk NPC1]
[Take Item1 from NPC1]

This indicates that the player is to talk to an NPC, defend him against several attacks, talk to him again, and obtain an item as a reward. The concrete version of this quest is formed by replacing NPC1 with the NPC Shakes O’Breen, and Item1 with a ring. The dialog associated with the quest is shown below [4].

[Talk Shakes O’Breen]
[Defend Shakes O’Breen]
[Talk Shakes O’Breen]
[Take ring from Shakes O’Breen]

This is bad. It seems the Daggerspines are amassing for an attack.

Naga are known for their ruthlessness in battle. They will keep attacking until I am dead.

I don’t value my own life above that of my crew members, but you must help to defend me. The crew will not be able to make it back to Booty Bay without my knowledge of the seas.

The naga will be coming from the sea. I need you to remain up here with me to fend off the attack. Man the cannon and drive them back.

Are you ready, *<name>*?

Several waves of attacks occur, and afterwards the following conversation occurs with Shakes:

We survived the attack!

We could not have done it without you, *<name>*.

We'll be heading out as soon as the tide rises. If you weren't such a promising hero I'd offer you a place on my crew. But I can tell you have bigger fish to fry.

Even if you are a puny *<race>*....

The player is then given a choice of two rings as a reward.

13.2 Diseased Pumas (Everquest)

This quest asks the player to kill 15 of the various stillmoon creatures, and then kill as many infected pumas as needed before they acquire 4 samples of blood. Note that any given puma does not necessarily have usable blood for this quest, so the player does not know the exact number of pumas they need to kill. As a result, we omit the action **[Kill xN Infected Puma]** since the request for blood implies the pumas will die. The player then returns the collected blood samples to another NPC. Upon completion, the quest rewards the player with some radiant crystals. These do not come from any NPC, but instead appear in the player's inventory automatically.

[Talk to Kanethus Forestwalker]

[Kill x15 Stillmoon creatures]

[Obtain x4 Infected puma blood]

[Give x4 Infected puma blood to Boldger Bristlebeard]

[Take Radiant Crystals]

13.3 The Vaelwyn Plot (Vanguard)

Talk to NPC1
Take Item1 from NPC1
Use Item1 at Location1
Obtain Item2
Trade Item2 for reward with NPC1

This quest asks the player to create a diversion and then steal a vial of poison. NPC1 gives the player a locket (Item1) which will summon other NPCs to act as a diversion.

It seems the Vaelwyn are guarding something in the Southeastern portion of the citadel. We can only assume it is the poison mentioned in the message. Frontal assault is hopeless but, with a diversion, you may be able to slip in without notice. The time has come for you to call on the power of Lao'Jin, the very aura of nature. Take this locket, as it contains a minor essence of Lao'Jin. Use it to call for aid in the Southwestern portion of the citadel, and you will have your diversion.

Once the poison is obtained, it is returned to the NPC and the player is paid.

14 Conclusion

Procedurally generated quests have the potential to provide players with novel content on demand rather than requiring players to wait for designers to release new content. This in turn implies that publishers may be able to make more efficient use of content creation resources, as a quest generator would augment the abilities of content creators. Based on study of quests from several online RPGs we believe that quests have a well defined structure that may be used to generate new quests. We further believe that through analysis of the reasons NPCs grant quests we are able to determine the types of quests that are appropriate in various situations, and that this may lead to a greater sense of realism.

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Strategy	Sequence of required actions
Attack enemy	[Attack [xN] { NPC , Item }] [Talk NPC]
Steal supplies and equipment	[Obtain Item]

Table 9: Strategies for increasing Conquest

Strategy	Sequence of required actions
Gather raw materials for tradeskills	[Obtain Item]
Steal valuables for resale	[Obtain Item]
Make valuables for resale	[Assemble Item]

Table 10: Strategies for increasing Wealth

Strategy	Sequence of required actions
Assemble tool for new skill	[Obtain Item] [Assemble Item] [Use Item]
Use existing tools	[Obtain Item] [Use Item]
Practice combat	[Attack [xN] { NPC , Item }]
Practice skill	[Use Skill]
Obtain materials for training	[Obtain Item] [Use Item]
Research new magic spell	[Obtain Item] [Use Item]

Table 11: Strategies for increasing Ability

Strategy	Sequence of required actions
Assemble equipment and supplies	[Obtain Item] [Assemble Item]
Deliver equipment and supplies to another faction	[Obtain Item] [Give Item to NPC]
Steal equipment and supplies	[Obtain Item]
Trade for equipment and supplies	[Trade Item for Item with NPC]

Table 12: Strategies for increasing Equipment