Thoughts on Creating Better MMORPGs
By: Thomas Mainville

Final Paper: The Potential Path to a Better MMORPG

I. Introduction

Today millions of people worldwide live dual lives, with one foot in the real world and one in the virtual worlds of Massively Multiplayer Online Role-Playing Games (MMORPGs). As the name implies, these games allow for simultaneous play by thousands or even millions of players worldwide, all of whom compete and interact within virtual worlds. Some popular examples of MMORPGs are World of Warcraft, Everquest (I & II), Warhammer Online, Lineage (I & II), Final Fantasy XI, and Asheron's Call. These games combined have a subscriber base in the millions, with World of Warcraft being the undisputed leader and Warhammer Online being today's most promising contender. In combination, these players log a considerable amount of play time, with the average player spending on average 22 per week in-game, exploring the large volume of content these games offer, but also interacting socially.

For many of the millions who play them, the attraction to MMORPGs comes not only from the many hours of game play they offer, but also the social relationships and reputations that can flourish in a virtual world. In fact, when considering MMORPGs, it is almost improper to think of them as "games" in the traditional sense, as they can be more accurately imagined massive virtual worlds or settings "filled with a range of narrative vectors" which players can experience. Accepting this definition of games as settings for the unfolding of unique player narratives, MMORPGs can ideally be thought of as the vehicles through which players define these vectors with their unique their actions during play. It is this ability to define the game's narrative through individual play that sets the MMORPG genre apart from other game genres. This ability is, however, constrained by the rules and limitations of the virtual worlds in which it takes place (hence my "ideally" qualifier). These rules an constraints, I believe, can and should be overcome through innovations inspired by biological systems we see in the real world, thereby ushering in more immersive and compelling MMORPGs.

In this paper I will first consider the case of a hypothetical MMORPG player (who is modeled based on personal experience) to examine the play "life cycle" of an MMORPG and to highlight some areas in which I believe MMORPGs can be improved. I will then propose some ideas for improvement in the areas I've identified. For each of the ideas I describe I will then discuss pertinent research, industry trends, and tools or technologies which are potentially applicable to their solution. In doing so I will reference each of the previous three papers I've written on this subject covering trends in MMORPG technology, the application of self-concepts, and tools and methodologies.

II. MMORPG Life Cycle: A player's perspective

MMORPGs offer a unique chance for large populations of players to experience a virtual world together. However, retaining player interest and loyalty is a problem that even the best designed MMORPGs face. As a MMORPG matures and grows, its developers must guard constantly against emergent threats to its sustainability. These threats range from player boredom to abandonment of large parts of the virtual world to economic inflation. It is important when considering these shortcomings to remember that they are not necessarily the result of software deficiencies. Rather, they emerge as a result of unforeseen systemic complexity introduced by interaction between players and the MMORPG world. However, since the majority of MMORPGs maintain revenue through subscriptions, preventing these problems and preserving the subscription base is in the interest of game makers. It is incumbent on the MMORPG maker to justify a subscriber's monthly subscription fee. We will now consider the case of a subscriber.

In order to illustrate emergent factors that can threaten the long-term viability of a MMORPG, let us consider the case of a hypothetical MMORPG player. For the sake of pronoun simplicity, we will imagine this player to be a male in his mid twenties, as is supported by demographic evidence. Having heard good things about a given MMORPG, our player decides to give it a try. Once he installs the game client (which was either purchased or downloaded at cost or free) onto his personal computer, the player logs into the game network and uses a built in tool or wizard to create a character (or avatar) which will be his/her representative in the virtual world. The options offered in this character creation process are somewhat limited, but serve to offer some basic level of uniqueness. Once the player is satisfied with the options selected for his avatar, play begins.

When our player first enters the world of an MMORPG, it can initially seem an endless expanse offering endless possibilities for new experiences and adventures. As he begins to explore the game environment, interacting, collaborating, exploring, and competing with other players, this initial impression is quickly reinforced. The challenges presented to our player early in the game are simple, and gains in the stature of his character come quickly and with little effort. As he "climbs the experience ladder" of success in the game, each figurative "rung" gets further apart, by design. Quests become more difficult, computer controlled adversaries become more difficult to defeat, and the risk to reward ratio for each endeavor tips in favor of risk. In this way, the game attempts to grow with the player, ensuring a consistent level of challenge as his skills and his characters powers increase.

In spite of the steadily increasing difficulty, before long the player achieves a considerable measure of success in the game, amassing powerful weapons and equipment, gaining experience, acquiring new skills and powers, and gaining a degree of notoriety with the game's computer-controlled non-player characters (NPCs). In addition, the player has made contact with other human controlled avatars or player characters (PCs) with whom he has established friendly or even adversarial relationships. Such relationships may even have been made formal through the player's association

with a guild, faction, or alliance. Indeed, it easily be said that our player has by this time established a second identity within the world of the MMORPG. As he enters his playing "prime", the player is truly immersed in the game, and the line between the player and his character avatar blurs.

Weeks, months, and even years pass, and the player continues to form new relationships with other players while his avatar grows by all measures of success within the virtual world. However, as he nears the top of the figurative experience ladder, the world begins to lose its luster. The player tires of performing the same repetitive types of actions such as killing monsters, gathering treasure, participating in guild events, fighting rival PCs, etc. Furthermore, whole swathes of the world which once offered fertile ground for play are now beneath the player's stature such that venturing there would offer virtually no possibility of adventure or gain. The player has begun to outgrow the world, becoming personally less satisfied with the play even as his/her avatar's power narrows the ways in which adventure can be sought. The player becomes a member of an increasingly crowded set of dissatisfied "end game" players who have advanced through the games levels of achievement, and are now finding themselves running out of things to do. At this point our hypothetical player, along with many others, begins to consider leaving the game, prompting the game's manufacturer to take corrective action.

To forestall and exodus of their game population, the MMORPG creators rush to produce an expansion pack which promises new possibilities for advancement as well as new world content and features. This action causes our player to stick with the game a bit longer, but this action only prolongs the inevitable repeat of the "rush to endgame", and before long players are once again butting up against the game's ceiling, compelling the manufacturer to produce another expansion. Thus begins a cycle wherein the game maker is constantly expanding the world in order to retain player interest, all the while leaving previous areas of the world virtually empty. This has the effect of making the game unappealing to new players, who enter the game's beginning areas to find them virtually devoid of players since most of the game's population is concentrated in the endgame content areas.

Given these developments, our player is now seriously considering quitting the game. Many of his friends are bored and moving on to other games, and this is causing his guild to shrink, thereby lowering the social appeal of the game. What's more, it is difficult for him to recruit friends to join the game as new players because they will have nobody to play with at the lower levels since most seasoned players have moved on. In addition, in many cases new players will face a prohibitively inflated economy which makes it difficult for them to afford better weapons, equipment, and other necessary game items. Our player soon finds himself spending more and more time in the game alone. Faced with an exodus of fellow players and able to select from a growing field of competing games, our player finally cancels his monthly subscription, contributing in his small way to the decline of a once popular MMORPG. As the MMORPG's fortunes fall the game maker must how to restore lost revenue, questions arise as to how our player's interest and loyalty could have been retained.

III. My Ideas for MMORPG Improvement

In this paper I propose that more dynamic, responsive MMORPG system that is somewhat self-aware and possessed of an "instinct" for self-preservation would be more successful than current, static MMORPGs when it comes to retaining players. The system, which I define as being comprised both of the executing game software and human minders who act in collaboration with it, could monitor for emergent behavior of its PCs and NPCs, intervening as necessary to keep things "fresh". The ways in which a MMORPG can be made more self-aware and responsive are numerous. I enumerate and briefly describe a few ideas here:

1. Increased personalization

Many MMORPGs suffer from a "cookie cutter" design. The same content is available to all players such that it is possible to write a strategy guide detailing the exact steps to achieve success. In this respect, MMORPGs are as linear as standalone one player video games, with a definitive set of steps to reach a goal (the PCs highest level of advancement, say). Personalizing games by giving each player a unique background, motivation, appearance, and perspective could do much to remove the predictable nature of MMORPGs. In addition, customizations to the user interface to facilitate a more personalized style of play would do much allow players to tailor their experience to their needs.

2. A world that changes

Making virtual worlds change in ways similar to those in which the real world does will do much to retain player interest. In an evolving game world a player venturing into an area one day might return a weeks or months later to find that the area had changed quite radically. This change could be the result of "tweaking" by numerous constantly running environmental agents, each responsible for the evolution of a different aspect of the game. Some areas in which such agents could focus are:

- NPC Evolution - In current MMORPGs, players typically engage in battles against computer controlled NPCs in order to gain experience and treasure. When a player defeats an enemy NPC, it vanishes for a time and is later regenerated. Each time an NPC is regenerated, it can be counted on to have the same attributes and can be defeated using the same methods. In this respect, enemy NPCs are more like plants that grow back after being trimmed than intelligent enemies that adapt to player actions. If NPC populations evolved over time in response to player techniques and strategies, they would provide for a greater challenge. I envision such changes taking places over generations. For example, assume that goblin NPCs are frequently sought out and attacked by PCs, who defeat them using fire-based attacks again and again. Over time, as new goblins appear to replace those who were slain, they would have a higher and higher resistance to fire. This would force players to adapt new strategies for defeating goblins.

- NPC Migration – In the real world populations are not static. They tend to move over time in response to environmental pressures and opportunities. This fact can be observed in migratory animals and even in modern human beings who migrate for economic and social reasons. I believe an integral part of a more realistic, engaging game world would be populations of NPCs who likewise migrate in response to their environment. This would mean players seeking to interact with an NPC population would first have to find it. So, those players who out to do battle with ogres, say, would journey their last known location (as reported by their peers), only to find that they had to do some further exploring in order to find them. The increased challenge to these players is obvious, and it's easy to imagine the increased sense of satisfaction they would feel upon successfully tracking down and defeating their enemies.

- Resource / Monetary Scarcity - Resources in an MMORPG world should be somewhat scarce. Currently, in many game worlds, this is not the case, and this can have an inflationary effect on game economies. One way players obtain wealth in MMORPGs is through defeating enemy NPCs and looting them of whatever coins or items they are carrying. Another way to obtain wealth is by gathering valuable resources directly from the environment (mining for minerals, harvesting rare herbs, etc) and selling them or using them to make items of value. In either case, the wealth is regenerated endlessly. In the case of NPCs this happens when the NPC is regenerated after being defeated. In the case of gathered resources, they reappear in a similar manner after they have been harvested.

  In a more realistic game world, resources would not be infinitely created as described above. Rather, in they would be scarce and subject to the laws of supply and demand. If certain NPCs were targeted for defeat and looting by players, for example, they would carry fewer and fewer items of value. Likewise, if resources were over harvested, they would regenerate at a slower and slower rate. Behavior such as this would reduce the tendency for in-game economies to inflate and would encourage trade between players.

3. Human / agent collaboration

A more dynamic game world would require very sophisticated software in order to run completely automatically. It is easy to imagine, especially in the early days of such a game, times when human minders might want to step in and intervene. For this reason I believe MMORPGs should be designed in a modular fashion such that humans and artificial agents can be used interchangeably to manage certain aspects of their virtual worlds with the eventual goal of turning over control to the agents. The agents could in effect be trained by the game's human minders in order to be better prepared to take over full-time control of certain aspects of the game world. Of course, once the agents take over, the game's human minders needn't be kept in the dark. Agents can be programmed

to keep human minders abreast of developments in the game world through the generation of reports and projections. They can also be made responsive to suggestions their human counterparts might make in response to this feedback.

It should be noted here that by "aspects" of virtual worlds I mean the economy, NPC evolution, resource distribution, and the like. In addition, that these agents as I imagine them needn't be single and monolithic. They can instead be arrayed hierarchically, with global agents interacting with each other and making decisions at the highest level and prompting agents lower in their hierarchy to effect change.

4. Tools for Scripting and Ad Hoc Modifications

Whether in the early phases of a virtual world's existence for the purpose of intervention or in later phases for the purpose of "spicing things up", facilities should be available to the MMORPG's human minders that enable expedient direct intervention. I imagine one such facility as being a suite tools for convenient scripting and/or world modification. These tools should be accessible enough that non-engineers without deep knowledge of programming can use them introduce changes to the game world. Such tools could enable such actions as:

- Creation of generic NPCs or populations of NPCs
- Creation of unique NPCs for one-time quests and "random" world events.
- Scripting of quests or missions and the ability to assign them to players
- Generation of unique reward items to be given upon the creation of said quests or missions
- Causing deviations in the patterns of NPCs (migration paths, behavior, affinity or belligerence, etc.)
- Changing local environmental variables such as the weather

These are but a few of the potential interventions that could be allowed. The effect would be to add an element of "randomness" to the world so that players could enjoy unique achievements and feats, thus boosting their social standing with their peers.

IV. Research Supporting Implementation of My Ideas

In this section I refer to my findings from my previous three papers when discussing ways to implement my ideas for MMORPG improvement.

1. Increased personalization

In my first paper on trends in MMORPG development, I mentioned the research of Yee and Tychsen et al in relation to personalizing narrative in MMORPGs. I think one way around the lack of temporal objectivity proposed by Tyschen's team is to implement a system of intelligent NPCs that react to PCs "historical" data. This would lead to

interesting encounters with NPCs, especially when a group of PCs with differing data encounters a group of PCs.

To illustrate, we can consider a group of three PCs, one of whom has a history of killing goblins, while the other two have had little interaction with them. When the PCs encounter goblins, the goblins' AI evaluates each PC's history in order to determine their action. If the goblins decide that the PC with the anti-goblin history's acts cross a certain threshold, all three PCs will find themselves facing hostilities. On the other hand, if mitigating attributes in the other PCs histories prevail, the goblin-bashing PC would be spared a battle that would normally have been a matter- of-course. Given such a scenario, its easy to see how players would have to tailor their game play given different situations. If our PC who is hated by goblins knows he must cross a geographical region where they are numerous, he must be sure to travel with companions powerful enough to fight them off or friendly enough with them to prevent their attacking.

Considering the seemingly large amount of data exchange that must take place even in such a simple encounter as discussed above, questions regarding performance on the server. Here, schemes which limit information exchange to that pertinent only to near neighbors, such as that proposed by the group who developed Matrix, can likely be employed to great effect. Note that I do not say Matrix middleware is precisely appropriate for this scenario. This is because it involves inter-agent information exchange rather than exchange between client and server, but the notion of balancing consistency and speed of information in such an exchange certainly is.

2. A world that changes

Given the already daunting task for maintaining performance and consistency in a MMORPG, having a dynamic game world might seem on the surface to complicate matters. However, if the dynamic subsystems are modeled before hand to uncover any trends which might adversely affect performance or the user experience (such as NPC population explosions or contraction), it would mean one less "headache" for the virtual world's human controllers to worry about. I propose that a modeling tool such as NetLogo be used to model behavior of subsystems in response to proposed changes prior to their introduction into the game world.

Ideally, this modeling process would be highly automated so that a human or even a game agent could run a simulation and be provided with data that would inform decision making. For example, assuming the agent or human minder responsible for controlling the amount of resources in a world wants to remove a certain resource due to inflationary concerns. The agent/human minder should simply be able to "plug in" the proposed changes and run a simulation to estimate the effects. Obviously, the results of such simulations might not perfectly predict the impact on the game world, but hey could be used in combination with human intuition to gauge the wisdom of taking certain actions, thereby ensuring a dynamic, self-managed game world could continue operation with minimal interruptions. I now consider such modeling as applied to each of the areas described in III.2.

NPC Evolution

Tools like NetLogo seem perfectly suited to modeling scientific phenomena such as the evolution of a population of entities. However, given that such modeling might be time consuming, it does not seem to make sense to initiate it in response to in-game events such as over hunting and loss of habitat. Rather, such modeling could be done in advance; with test populations could be subjected to a series of environmental stressors and stimuli to gauge their effect. The populations' reaction to various events could be captured as a collection of key data points, which could be stored as "reaction approximations", thereby providing the population with the ability to react quickly to stressors during game time (i.e. without having to model "at runtime"). MPML3D (or similar) scripts could be crafted and associated with each stored approximation. These scripts could be applied to NPC populations when thresholds (as determined by the stored data points) were crossed.

For example, a population of orcs could undergo a number of simulations in the modeling tool meant to gauge their reaction to attack by NPCs or PCs. It could be observed that when a certain percentage of orcs are killed, the population becomes unsustainable. This threshold percentage could be stored as a key data point, and a script calling for the orc population to cease regenerating itself when this threshold value is crossed could be stored as an associated event. So, when players constantly attack this orc population, they will soon find that it vanishes. In reality, the population will not have vanished from the system. Rather, it will simply be exhibiting its "decimated" behavior by not regenerating itself, perhaps reappearing after some time in the future due to reduced environmental pressure.

NPC Migration

Another good candidate for modeling is NPC migration. This might make for even more modeling challenges than NPC evolution, for in the course of such a migration, several factors would have to be considered. These include which PC and NPC populations the migrating NPCs would encounter during their migration, how the population would interact with these PCs and NPCs, and what affect the migration population's taking up residence in its destination would have.

Each impact of a NPC population's migration might have to be modeled independently, with "reaction approximations" and associated behavioral scripts prepared for many different scenarios. In addition, the impact on each encountered population would also have to be considered and modeled (if such a model did not already exist) to determine whether such a migration could lead to widespread displacement or disaster. It should be noted here that "disaster" might make for a more interesting game world, and so might not always be undesirable.

<u>Resource / Monetary Scarcity</u>

As an example we can consider the "conservation of objects" mentioned in my first paper. If inflation were running rampant, the agent responsible for object creation and conservation might decide to begin removing gold from the system. However, before doing so, it would run a simulation to see if such an action would have the desired effect. The results of this simulation might validate the decision to begin removing gold from circulation, but they might also point to another culprit behind the inflation, such as the easy availability of certain resources.

3. Human / agent collaboration

In a truly autonomic game world, computer controlled agents would deal with as many of the day-to-day decision making as possible, freeing humans to introduce new content, rules, subsystems, etc. To the extent that humans must intervene, they should be able to do so with a reasonable degree of confidence that their changes will not cause undue system downtime or, worse, a crash. Recalling the self-concepts from my second paper, it's clear that a self-aware, self-optimizing system should be able to deal with such changes in stride, perhaps even refusing to apply human changes immediately if it is aware of an internal state that makes their introduction dangerous. While humans should be able to override such refusal, the system should have such a reliable picture of its own state that this is done only in exceptional situations.

To consider an example, we can think of a situation wherein a human minder wants to introduce new content into a certain area of the game. Having designed, scripted out, and tested his change, he decides to introduce his change, will increase the number of predatory wolves in a given area. Convinced that his change will enhance the game world, he submits it to the system for integration. The system agent responsible for ecology analyzes the change (perhaps consulting model results from a tool like NetLogo) and recommends against the action because of information not realized by the change's designer. It seems bears have been migrating into the area in greater numbers due to hunting pressure from PCs in other areas of the game world. The ecology agent things introducing another predator will unbalance the environment in this area. Considering the agent's reasoning to be sound, the human minder modifies his patch to introduce the wolves elsewhere.

4. Tools for Scripting and Ad Hoc Modifications

During my research, the use of scripting markup languages such as MPML3D as outlined in my third paper stood out as a promising technique for controlling the behaviors of NPCs in the game world. Though game programmers would certainly be able to intervene in game affairs to create new quests and events, it would be ideal to have tools that less technically adept (but not less creative) personnel could use to "script out" such quests and events. The output of such GUI-driven, easy-to-use tools could be markup in a language such as MPML3D which could be used to drive behavior of NPCs. The

interface for creating such markup could be simple, providing options for how an NPC should react in response to other NPCs and PCs. In the below table I present a simple mapping of behaviors for a demon NPC being "scripted" using the proposed GUI:

Subject of interaction	Posessing attribute	Action taken by NPC
PC	Having an anti-demon history	Attack on sight
NPC	Human	Attack on sight
PC or NPC	Adept at demon slaying	Attack only if chance to win is reasonable

In the context of the simple GUI I'm proposing, the selections in the table above would have been made from dropdown controls, with the person "scripting out" the NPCs behavior first selecting the subject with which the NPC will be interacting, then selecting attributes which will trigger a certain behavior, and finally defining the behavior to be taken given the first two conditions.

Such a tool needn't be restricted in its use only to the creation and scripting of new NPCs. It can be used to change behavior of entire classes of NPCs "on the fly" by "broadcasting" the proposed changes to NPCs currently active in the field. In this scenario considerations such as the overhead involved in such an exchange of information come to mind. Here again, a technology like Matrix might be useful to minimize performance impact so users don't experience a performance "hiccup" at broadcast time, which might be a giveaway that something has changed. (*Note: More sci-fi savvy reader may recall a similar hiccup from the movie "The Matrix", when the heroes experience a déjà vu event whenever something is changed*)

VI. Conclusion

As the progression of technology makes them ever more immersive and attractive, MMORPGs and related online worlds will grow, drawing in increasing numbers of people seeking to escape the real world for a more fantastic experience in the imaginary. In order to keep newcomers to these virtual worlds coming back, they must be expanded to provide experiences beyond today's predictable hunt-and-gather schemes. They must evolve to be places in which people want to *live* during their spare time rather than places people simply want to visit. I believe this idea of becoming a resident of a virtual world rather than a participant in it will be more appealing if the world can find the right balance between real-world complexity and fantasy world escapism. The key to finding this balance, I believe, stems from increasing virtual world complexity through the introduction of features found in the natural, biological world as a complement to the wealth of fantastic and imaginative content already present and sure to be present in the future.

In researching ways to create better MMORPGs I have uncovered numerous interesting avenues down which I could pursue research. I feel that each avenue represents an opportunity for deep, intellectually stimulating research upon which one could base a

rewarding academic or professional career. Just the set up of a test MMORPG environment that exhibited only today's common traits using a tool like NeL or Worldforge, for example, would be a considerable (though likely very satisfying) undertaking.

Moving beyond today's technology, I could see a researcher spending a considerable amount of time with a tool like Netlogo, setting up simulations of the various virtual world subsystems I have proposed. Governing NPC behaviors using a markup language such as MPML3D based on the findings of such modeling or, better yet, setting up tools to do so automatically or via a simple UI would also involve countless hours of effort. This effort, in my opinion, along with that spent in pursuit of any of the other areas of interest I have identified, would be very well spent.

As I move forward in my academic and professional career, I will consider carefully how I can pursue research in one or more of these areas, and I will encourage others to do the same. Game creation is an area of computing that has always interested me, and it is one I feel will continually and consistently benefit from advancements in the field of Computer Science.

References

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