# To Burn or Not To Burn: That is the Troll Test

**An Exploration of Interactive Storytelling in Digital Environments and *Neverwinter Nights* as its Epitome**

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The year is 2003. Videogames have come a long way since *Pong* and *Spacewar*, evolving into spectacles of graphics and sound like *Soldier of Fortune II* and *Final Fantasy X*. New engines and other technologies are rapidly increasing the potential for new games—much faster than the videogames are able to realize that potential.

One place where game designs have proven particularly disappointing is in the area of interactive storytelling. The problem, says Chris Crawford, founder of the annual Game Developers Conference, is that game developers create glamorous new technology, and then hire last-minute writers to design storylines to take advantage of it[1]. As a result, we have been plagued with a rash of decently written, but greatly underachieving stories that have barely begun to fill the gap left by the growing technology. I must agree with Crawford that the key to the future of videogame design is the development of true interactive storytelling.

The difficulty lies in the many complications and limitation of interactive gaming, and even more so in interactive storytelling. Because of the constraints of computer intelligence, the only potential for true interactivity lies in the imaginations of other human beings, and digital environments can only hope to facilitate the imaginations of people. To that end, BioWare's *Dungeons & Dragons*-based *Neverwinter Nights* is the closest that a digital game has come to interactive storytelling to date.

In this case study I will explore *Neverwinter Nights*, specifically its multiplayer mode with Dungeon Master, in this capacity. First, I will analyze the concept of an interactive game in general and the specifics of interactive storytelling. Then, I will develop the argument for *Neverwinter Nights* as the epitome of interactive storytelling by exploring its history, strengths, and weaknesses.

**Figure 1**
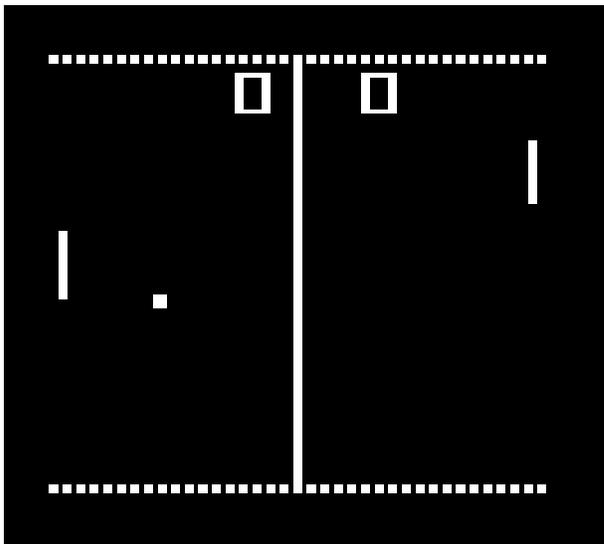


THE DEVELOPMENT OF VIDEOGAME GRAPHICS, FROM THE EARLY GAME OF *PONG* (LEFT) CREATED ON AN OSCILLOSCOPE, TO THE LATEST VERSION OF *FINAL FANTASY* (RIGHT) WRITTEN FOR THE SONY PLAYSTATION2.

### *What is an interactive game?*

The interactivity of games is a fundamental notion of any possible attempt at interactive storytelling. After all, one can't have interactive storytelling without interactivity. The problem with most games is the limited ability to do what one wants. As my friend Dan Yue once told me during a brainstorming session for a game we were designing, "If I see a rock sitting on the ground, I want to be able to pick up that rock and do whatever I want with it."[2] This sentiment is more commonly referred to as the Troll Test, which states that a game is only a true role-playing game (RPG) if when I come to a bridge with a troll guarding it, I can douse myself in gasoline, set myself on fire, and ram the troll. Games that fail the Troll Test are not true RPGs, and hence, not completely interactive in the full sense.

This brings me to a second argument made by Chris Crawford. I asked him what does make a game truly interactive. "Verbs," he replied to me. "Verbs, verbs, verbs!"[1] The need for verbs was recognized by earlier adventure game developers; indeed, it dates back to the programming of the original *Adventure*, the first interactive text-based adventure game[3]. Although the vocabulary was limited, the creators did recognize the desire to be able to affect objects, use one object on another, travel to places, and manipulate the player's environment in other such ways.

It is an unfortunate fact of videogame history since *Adventure* that the number of possible verbs has decreased, not increased, even as computer graphics approach filmic realism. Consider the popular *Half-Life* module, *Counter-strike*. The game has a very limited number of verbs, which can be seen despite the lack of textual mode. For example, one can shoot, switch weapons, duck, walk, run, climb, die, and even manipulate these basic verbs to create others such as hiding, but one cannot throw his gun at another player. Nor can one drop all of her weapons, including her knife, and engage in hand-to-hand combat. Nor can one talk down the terrorist team, leading to a peaceful resolution of a hostage situation. No—the game is designed for one thing and one thing alone: beating the other team, whether by pure bloodshed or by the much less resorted to map objectives.

The previous example described the player's side of interactivity. Crawford explained that there is another difficulty, one at the game's side. He described the case of the relatively new game *The Sims*, a plot-less simulation game in which the player has limited control over the environment of virtual people, and observes them living out their lives. Crawford explained how he once observed a scared child toddle into her parent's bedroom, curl up on the floor next to her mother, and fall asleep. In the morning, the mother got up, took a long, careful step over the girl, and went to brush her teeth[1]. This brings us to the common problem on the game's side—believability. It doesn't matter how many verbs a player is offered if the game does not respond believably and appropriately within its own world! It does me no good to set myself aflame and ram a troll if the result is random, such as twenty pixies materializing and dancing the Macarena.

So far I've identified two key elements to interactive gaming—player control as unlimited as is technologically possible, and appropriate game reactivity. Next I'll explore the more specific domain of interactive storytelling.

**Figure 2**



WORLDS WITHOUT A PLOT ARE A COMMON SOLUTION TO THE DIFFICULTY OF PROVIDING APPROPRIATE RESPONSES TO UNLIMITED USER INPUT. UNFORTUNATELY, POORLY PROGRAMMED WORLDS SUCH AS THE SIMS, SHOWN HERE, CAN SOMETIMES ACT INAPPROPRIATELY.

### What is interactive storytelling?

Unfortunately, some view the term "interactive storytelling" as an oxymoron. As Ernest Adams eloquently explains, "I won't go so far as to say that interactivity and storytelling are mutually exclusive, but I do believe that they exist in an inverse relationship to one another. The more you have of one, the less you're going to have of the other."[4]

This explanation seems fairly intuitive. When one is hearing a story, it is traditionally a passive act, quite the opposite of interactivity. If one takes into consideration the practical limitations of modern computers, whose "artificial intelligence" is a strictly preprogrammed model, it surely seems that a videogame story must be prewritten, and as a result not be truly interactive. Crawford agrees, but notes the distinction between an interactive story and interactive storytelling. "A story, once created, is frozen in place by its plot; interaction is impossible… Storytelling, on the other hand, is a process—which can be interacted with."[5]

The key to solving this paradox lies with people—after all, it's people who write the stories that are programmed into the game. Crawford writes, "You can't converse with a brick wall. It takes two people to have a conversation, and it takes two actors to have an interaction."[6] So why not let people determine the story every step of the way? This was the case with the original pen-and-paper adventure games based on the *Dungeons & Dragons* rule set, where an omnipotent Dungeon Master created the story and controlled the plotline. Thus, the game was able to achieve, without graphics, true interactive storytelling. *Neverwinter Nights* realizes the key of the human element in the digital environment by being the first adventure videogame to give omnipotent control to a human Dungeon Master. Although more restricted than the pen-and-paper Dungeon Master, this has been the first renewed step towards involving humans in the story-telling process of modern videogames.

Patrick Mount explains the subject from a different angle: "Ultimately, a video game enables the user to fully interact with both the technology and the program running on it."[7] The problem has always been that the player could not interact with the program in a real-time manner. There simply isn't the technology to support a program's developing outcomes to unconstrained inputs. After all, "when was the last time you saw a videocassette engaged in deep contemplation?"[8] Although more sophisticated than Crawford's videotape, a program is still bound by its mechanical limitations.

While the player cannot necessarily interact with the program, another human can, changing the story and world as necessary. "The whole point of interactive media is letting the player do something on her own. What that means is that a lot of times your player is going to jump off the rails and go do completely weird, unanticipated stuff,"[4] explains Adams. Only a human has the creative capacity to adjust for this "unanticipated stuff," and hence only a human mind has the capacity for true interactivity. Thus, true interactivity requires a human, who is not a player, to control of the flow of the game.

Even before the development of high-end graphics, Multi-User Dungeons (MUDs), relatively perpetual (explained below) text-based worlds designed for online adventure role-playing, began to pop up. The MUDs provided the first highly interactive adventuring videogame environment, where people provided the majority of the action, with only a supporting role from non-player characters (NPCs, or monsters). The MUDs had the advantages of the original *Dungeons & Dragons* human interactivity, but their drawback was that, although they had many small well-written quests, the lack of an overseeing Dungeon Master caused the quests to be limited and repetitive. In fact, the quests rarely involved other players, and when they did, it was only in the capacity of a party, a team of adventurers who band together to overcome difficult tasks.

**Figure 3**



DUNGEONS & DRAGONS, THE ORIGINAL PEN-AND-PAPER ADVENTURE GAME, ALLOWED TRUE INTERACTIVITY BETWEEN HUMAN PLAYERS, AND THUS TRUE INTERACTIVE STORYTELLING. A HUMAN DUNGEON MASTER INVENTED AND CONTROLLED THE STORY, AND THE POSSIBILITIES FOR GAMEPLAY WERE ENDLESS. PICTURE HERE IS THE PLAYER'S HANDBOOK, EDITION 3.5.

***Neverwinter Nights* is the epitome of today's interactive storytelling**

BioWare's *Neverwinter Nights* is a game based on a game. It was created as the first digital manifestation of the *Dungeons & Dragons Third Edition* pen-and-paper game, implementing the rule set of the game as close as possible to the original version. The game's creators explain, "BioWare's goal with the project was to try to capture the subtleties of a pen-and-paper role-playing session in a computer game, including a fully featured Dungeon Master with full control over the game world as it unfolds, and an extremely approachable toolset to allow nontechnical users to make basic content."[9]

The ultimate result is that *Neverwinter Nights* has been the greatest advance in digital adventure gaming since the creation of the MUDs. BioWare took the tried and true interactive storytelling game from paper to the computer screen. In essence, what they have done is added graphics to the original stories, and simplified the semantics. For the first time, control of the flow of the game has been given to a person rather than a program.

Yet this is only part of the game's triumph over the domain of interactive storytelling. The difference between *Dungeons & Dragons* Dungeon Masters and *Neverwinter Nights* Dungeon Masters is that the latter only controls the prewritten story. To solve this, *Neverwinter Nights*' creators have added the Aurora Toolset (the toolset mentioned in the above quote) that allows players and Dungeon Masters to write their own stories and create their own worlds from scratch. "We just needed a system that allowed the fans to dust off those old modules and translate them into a format readable by *Neverwinter Nights*,"[10] explains another programmer.

This content-writing ability, coupled with the flow control ability of the Dungeon Masters, is what makes *Neverwinter Nights* the closest thing to a digital interactive storytelling environment yet seen. As one reviewer, Christopher Holzworth, feels, "for those with serious ideas and a seriously large amount of time on their hands, a lot of great things can come out of this."[11]

**Figure 4**
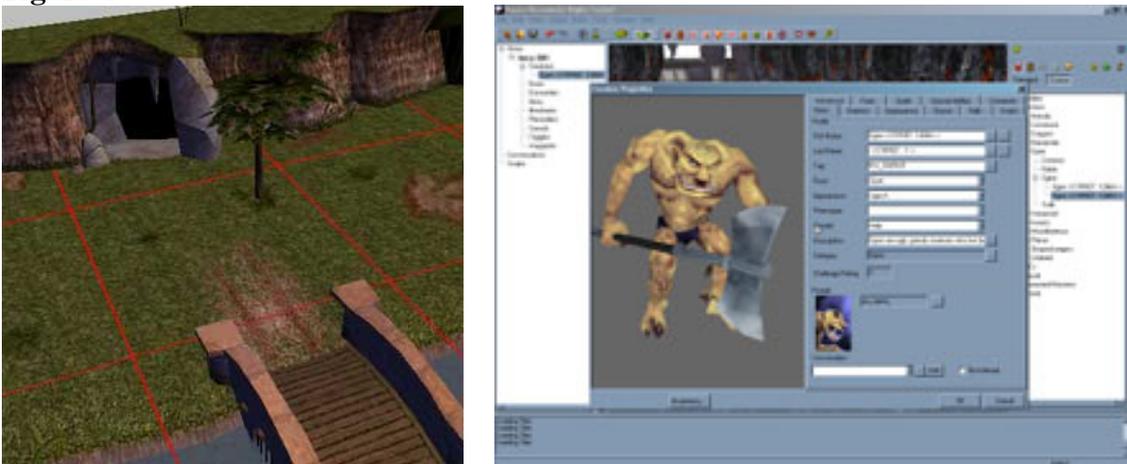


THE AURORA TOOLSET, DISTRIBUTED WITH *NEVERWINTER NIGHTS*, IS DESIGNED TO FACILITATE THE PRODUCTION OF USER-CREATED CONTENT. THE ABILITY FOR USERS TO WRITE THEIR OWN STORIES, COUPLED WITH THEIR ABILITY TO DUNGEON MASTER THEM, HAS MADE *NEVERWINTER NIGHTS* THE CLOSEST THING EVER CREATED TO DIGITAL INTERACTIVE STORYTELLING.

### The history of Neverwinter Nights

"*Neverwinter Nights* was supposed to be the best multiplayer Dungeons and Dragons role-playing game ever made. Not only were we going to tell a story of our own creation, but we were going to enable others to tell their stories."[10] So began the legacy of BioWare that culminated in the game of *Neverwinter Nights*. It was not BioWare's first adventure game. Its predecessor, *Baldur's Gate*, was in itself a very popular single player game. However, the single player mode had been written without the multi-player mode in mind, and the latter suffered as a result.[10]

*Neverwinter Nights* was born with a vision, and that vision has borne it through to the end. "The vision was to build a game where the user-created content was just as important as the content provided by the game creators,"[10] explained Brockington and Grieg, two of the developers. With the knowledge of the ultimate goal, the developers were able to integrate all of the vital features from the start. This avoided the unfortunate hacks needed for *Baldur's Gate*, in order to get the fully functional version working. This also forced the game's designers to think ahead to what problems would surface, and not use the "take it as it comes" mentality.

When *Neverwinter Nights* was finished, "we had a single-player game that we were proud to release, but we also had a relatively stable multiplayer framework for playing through the same story, with or without a dungeon master. We also had a toolset that has been used to create over 2000 modules within the first six months,"[10] claim Brockington and Grieg. The game that had been planned from the start to be the next generation in digital interactive storytelling had turned out to be a success.

**Figure 5**



BALDUR'S GATE, PREDECESSOR TO NEVERWINTER NIGHTS, LACKED THE SMOOTH, INTEGRATED MULTIPLAYER FUNCTIONALITY OF THE NEWER GAME. ALTHOUGH LAUDED FOR ITS EXCEPTIONAL SINGLE PLAYER MODE, IT NEVER HAD THE BENEFIT OF THE VISION FOR TRUE ONLINE ADVENTURING BY WHICH NEVERWINTER NIGHTS WAS CREATED.

*Advantages of Neverwinter Nights*

As has been mentioned, the main advantages of *Neverwinter Nights* over other adventure games are the potential for user-created content and the Dungeon Master-controlled game flow.

Dungeon Masters are given the power to control the flow of the game. They are able to create single instantiations of blueprints provided in the game module, or create several objects at once. They are able to kill or heal creatures, destroy objects, make things invulnerable, and toy with a player's character statistics. Probably the most important functionality provided for the Dungeon Master is the ability to take possession of a creature in the game[12]. While the restrictions of the game environment clearly limit the Dungeon Master powers relative to those of the paper game, this possession feature is the most important. By allowing a human to possess any creature in the game, the developers have provided the opportunity to control the flow of the game *in character*, without destroying the feeling of continuous realism for the players. "The capabilities to control monsters, NPCs, trigger actions, give and take gold, give and take levels, and basically play God are all there,"[13] observed reviewer Raymond Padilla.

Another advantage of *Neverwinter Nights* is its well-integrated online multiplayer mode. While the Dungeon Master controls the flow of the game and can interact with the players as either a supreme being or through possession of a character, it's the other players that make the game a truly worthwhile experience of interaction. Just like children prefer to explore and play in their fantasy worlds with their friends, videogame players prefer to share in their experience with other sentient minds.

The final advantage of *Neverwinter Nights* is the potential for persistent worlds. These worlds, which ideally never shut down, allow the player to come back and not find any surprises they could not have reasonably happened (or at least that some Dungeon Master could not have reasonably imagined). This feature brings the textual world of MUDs, which was so successful back in their day, to the forefront of graphic computer games. Persistent worlds in *Neverwinter Nights* are almost everything a MUD could be, with the benefit of all the additional features that the game has to offer.

Let us combine all of these advantages in an instructive example. A party of players is wandering around a city in a perpetual world, a world that they are familiar with, but in a city that is foreign to them. John, who happened to construct the module that the world is being run with, decides to log on as a Dungeon Master. He wants to lure this party of players into a cave to the north of the city, where he'd like a quest to take place. He has envisioned a heroic rescue of a beautiful damsel from the clutches of an evil goblin king, but has not built such a quest into the world. Without possession, he would have to announce as the almighty ruler that they must proceed to the caves, have them fight off the goblins, save the damsel, and then announce as the almighty ruler (again) that she thanks them, and offers her reward. Now, if he has the power to possess, the quest becomes more of a story—in fact, and interactive story. John chooses to create and possess a child called Kathara, who runs up to the adventuring party asking them to help find her beautiful older sister who was kidnapped by monsters during the night. The party can ask her questions, and eventually figure out that the cave is where they should head. Now, if the party needed equipment, they could ask Kathara if there was any place they could get some. John (as Kathara) can either answer that there is a blacksmith at the edge of town, or, if his highness so felt, reveal to the explorers that Kathara knows of a

secret stash of weapons behind the shed of the old farmer Abel. If he was feeling really creative, he could also force an encounter with the angry farmer in which they are forced to give up some other precious object in exchange for their lives. Alternately, their party could shun Kathara in the first place, kidnap her, and offer her up to the goblins for a price of their own. John could either choose to allow this, or stop it with a sudden platoon of well-armed city guards showing up and forcing the players to run away or die…

This narration could go on forever, with different combinations of choices. That is the very essence of *Neverwinter Nights*. What has just been described is an interactive storytelling environment and, indeed, what Chris Crawford did not envision as possible; by creating the story, and not just controlling the way in which a predetermined story is told, John has provided in a limited fashion what artificial intelligence has not yet achieved—an interactive *story*.

**Figure 6**



PERSISTENT WORLDS, TO A LESSER DEGREE STARTED BY MUDS, ARE AN INTEGRAL PART OF MANY POPULAR GAMES. IN *NEVERWINTER NIGHTS*, THE PERSISTENT WORLD FEATURE ADDS AN ELEMENT OF BELIEVABILITY TO THE GAME'S WORLD, WHICH IS A VITAL PART OF INTERACTIVE STORYTELLING. THE BEHEADING SHOWN HERE IS PART OF THE GAME *ULTIMA ONLINE*, ONE OF THE MOST POPULAR PERSISTENT WORLD GAMES EVER CREATED.

### *Drawbacks of Neverwinter Nights*

Like all games, *Neverwinter Nights* has its drawbacks, too. Although the game does offer the best interactive storytelling to date, it has not been able to break the chains of programming reality.

The first drawback is the game's graphics. Although the graphics are well done, the engine is a few years behind its time due to the long development process. "Compared to other recent PC RPGs, *Neverwinter Nights* looks dated,"[13] comments Raymond Padilla. Considering that the very essence of graphics in an adventure game replaces the element of imagination, having them be of good quality is of critical importance. I remember, when I used to play *Dungeons & Dragons*, how vividly I was able to imagine the world I was placed in. Everything was tailored to my imagination in order to provide the most enjoyable personal experience. Adding graphics to such a game, although it facilitates ease and speed of game play, severely limits the imagination of the player. In much the same way, viewing the new live-action movie version of J.R.R. Tolkien's Lord of the Rings series has been a disappointment. It's not that the movies were poorly done—on the contrary, they are magnificent in their own right—it's just that they have shattered my own imagination of the world of Middle Earth and the way it looks. For someone with an active imagination, forcing it to materialize can only hinder enjoyment.

The other problem with the addition of graphics is the necessity of phantom objects. A phantom object is one that is seen in the picture (such as a desk, chair, chest, rock) but cannot be interacted with. "One aspect of the world that is quite noticeable is the limited degree of interactivity; there are many crates, boxes, chests and tables that neither open nor move, serving no apparent purpose other than being there,"[14] notes another review. Without these objects, the graphics would seem bare and boring, with huge gaps where there should be *something*. In the original *Dungeons & Dragons*, such gaps were compensated for in the imagination. So while my mind can imagine a tree-lined avenue, I don't notice the specific lack of interactivity with the trees, since they were never explicitly mentioned. Furthermore, in the original game, if I got curious as to whether there were in fact trees lining the avenue, I could ask the Dungeon Master and he would let me rest in the shade of one, accordingly. Back in the days of MUDs, quality assurance administrators would tear through a newly developed area before making it user-accessible. One of the first things they looked for was that any noun mentioned in the room description could be examined in more detail. Similarly, these phantom objects should be made more real be allowing interaction with all of them, but at the same time this might add too much complexity with too many objects. Unfortunately, no one has yet discovered an alternative solution to dealing with the problem.

Another issue with the game is the music. Donald Griffin, a music composer for computer games, explains, "Just as good graphics can help them to suspend disbelief, a good soundscape can do so even better. This is partly because computer graphics are not yet capable of the realism that is already possible in the sound department. Making the sound fully interactive is the long awaited key."[15] According to his argument, the music behind the action is equally important to the graphics. This follows from the previous argument made about graphics—that is, when a scene is entirely imagined, the mood is understood by the player. However, when the scene is forced on a player, he or she relies on visual and auditory cues to set the mood. Bad music can ruin a scene in the story

almost as quickly as bad graphics. This is a problem at certain points of the game, especially during battle scenes. The intense battle music, which one quickly tires of, comes on at inappropriate times, such as when an enemy is glaring at the player through iron bars, unable to engage in combat. This falls into the category of game semantics, and can only be fixed with intense debugging to make sure that music only gets cued at appropriate times.

Music isn't the only problem with the game play. Players have noticed numerous other problems. Holzworth notes, "The amount of user-interaction in battles is practically nonexistent. Once battle is engaged, the only options you have are to use status-enhancing items or potions, along with healing paraphernalia."[11] This isn't a semantic problem like the poor cueing of music, but rather a design flaw. Unlike the rest of the game, in which the players can take their time interacting with the Dungeon Master in an interactive manner, most battles do not leave sufficient time to allow communication with the Dungeon Master. Furthermore, unless the Dungeon Master is possessing a creature involved in the battle, any communication would usually have to be handled in an *out of character* manner, which would disrupt the continuity of play.

Finally, there is yet another problem with the Dungeon Master feature. As mentioned, it is restricted by the programming limitations of the game. While it's clear that a *Neverwinter Nights* Dungeon Master will never be as omnipotent as a *Dungeons & Dragons* Dungeon Master, there are still many more powers that can be added. For example, Dungeon Masters could be given the power to teleport players, to control landscape animations, and to suspend players upside down by their toes. This is where Crawford's insistence on "verbs, verbs, verbs"[1] comes into play. While verbs do not create true interactivity, they are necessary for it. The more verbs the players and Dungeon Masters have to toy with, the more interactive *Neverwinter Nights* will become.

**Figure 7**



COMBAT IS ONE OF THE FEATURES OF THE GAME THAT LACKS INTERACTIVITY. THE CHOICES ARE STRICTLY LIMITED TO THE COMBAT CHOICES OF *DUNGEONS & DRAGONS*, AND PLAYERS DO NOT HAVE THE OPPORTUNITY FOR CREATIVE COMBAT—FOR EXAMPLE, LIGHTING THEMSELVES ABLAZE AND RAMMING A TROLL…

*Conclusions*

True interactivity lies in the human imagination. It involves the ability to shape the course of the world around you in a significant manner. For a game to be truly interactive, it must have a human element on at least two ends—as a player, and as a controller. The programming of a videogame can either help or hinder the interactivity of play. Anything that limits the scope of the player's imagination, especially graphics, must be of superb quality, or they will drag down the level of realism.

*Neverwinter Nights* is the pinnacle of interactive gaming to date. The concept of a Dungeon Master allows players to get reasonable, human responses to their inputs. Furthermore, it is the epitome of interactive *storytelling* to date, with the ability of players (Dungeon Masters or not) to create their own modules, including worlds, creatures, objects, and quests. The key feature for Dungeon Masters is the ability to possess creatures, allowing for in-character manipulation of the game.

I will now offer a brief personal experience with interactive storytelling. I have recognized character possession as its key, since my first experimentation with the subject, on a MUD. As mentioned before, the problem with the MUDs is that they never had good quests. The world was an example of peak interactivity, but completely lacked in storytelling. The main problem was that all the stories were fixed ahead of time, making interactive *stories* (by Crawford's definition) the best MUDs could offer. What I created was the first and only (to my knowledge) tool to allow the wizards—the controlling and creating players of the game—to possess monsters. Thus, like the possession feature of *Neverwinter Nights*, I was able to create characters and control them, leading other players through quests without ever leaving character. Through several game sessions, I explained to a party of adventurers the quest upon which I (as the possessed character) was about to embark, and was prepared to lead them through adventures in my (the immortal programmer's) newly created area, that no mortal had ever seen yet.

The new area was a virtual server area, which means that the "rooms" were created on the fly from a map of the terrain. This allowed such a large land area that new special areas (a cave, for example) could be easily added without surprise. With this combination of creation and control, I nearly achieved *Neverwinter Nights*' level of interactive storytelling without the hampering of bad graphics (the entire adventure was textual and visualized in the player's mind). Unfortunately, the specific MUD went offline shortly before we embarked on our adventure, and never returned. I hope to have the chance to retry the experiment on another MUD in the future.

*Neverwinter Nights* is by far the closest a game has ever come to true interactive storytelling in a digital environment. With its user-created content and Dungeon Master control, the game is a graphic version of my failed experiment. Still, there are the aforementioned drawbacks. Bugs, such as false cueing of music, must be found and corrected. The interface between players and the Dungeon Master must be made more instantaneous (perhaps voice communication) in order to facilitate create combat maneuvers. The requirement of "phantom objects" needs to be dealt with in an elegant manner, although none is readily apparent at this time. In short, everything that is meant to facilitate game play but at the same time limits the potential for human imagination must be improved so as to cause the least disturbance.

*Neverwinter Nights* is the best digital interactive storytelling environment to date, but can we ever achieve true digital interactive storytelling?  Not with our current technology.  The problem will always be that the confines of a computer limit imagination, which is the paramount requirement for interactive storytelling.  Perhaps in the future there will be technologies that bring imagination to the physical world without distortion but, until then, we can never have *true* interactive storytelling.

**Figure 8**



A MAP OF NILAV, THE VIRTUAL AREA CREATED ON THE MUD *CIRCLE OF OUROBOROS* FOR USE IN MY INTERACTIVE STORYTELLING EXPERIMENT, WHICH WAS UNFORTUNATELY NEVER COMPLETED.  EACH COLOR REPRESENTS A DIFFERENT TERRAIN, BLACK REPRESENTS AREAS UNREACHABLE BY THE VIRTUAL ROOM SERVER, AND ONE HUE OF GRAY (THAT FOUND SURROUNDING BLACK AREAS) REPRESENTS A ROOM TRANSITIONING FROM THE VIRTUAL SERVER AREA TO STANDARD MUD ROOMS.

Figure Credits:
Figure 1:
 a)	http://members.tripod.com/~gamesmuseum/history/gen1/pong/pongscrn.gif
 b)	http://www.gamers.com/news/509121
Figure 2:
	http://www.pcgameworld.com/screenshot.php/game/1065/page/6
Figure 3:
	http://www.wizards.com/default.asp?x=products/dndcore/175240000
Figure 4:
 a)	http://nwvault.ign.com/modules/wydraz/tutorial/mapping102.shtml
 b)	http://nwn.bioware.com/builders/toolsetintro5.html
Figure 5:
	http://www.ccs-net.com/Sky/bg/screen1.html
Figure 6:
	http://www.uo.com/visitor/scr_events.html
Figure 7:
	http://nwn.bioware.com/downloads/screens.html?galleryID=2
Figure 8:
	Oded Wurman

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