Creating Video Games to Treat Chronic Depression

Neesha Desai*
University of Alberta

Duane Szafron†
University of Alberta

Liliane Sayegh‡
Douglas Mental Health University Institute
McGill University, Department of Psychiatry

Russell Greiner§
University of Alberta

Gustavo Turecki¶
Douglas Mental Health University Institute
McGill University, Department of Psychiatry

ABSTRACT

Serious games is an emerging genre of video games where games are created in order to teach instead of strictly for entertainment and many involve health related issues. We are creating a video game to help treat patients with chronic depression. The game scenarios will simulate a situational analysis with the added benefit of the patients being able to replay the scenario and see how different choices affect the outcome. In order to be an effective treatment, psychologists will need to be able to create additional game scenarios to meet their patients' needs. Since psychologists are unlikely to have any programming experience, a tool is needed to bridge this gap. ScriptEase allows non-programmers to create video game modules and will be used to solve this problem with the addition of patterns specific for these game scenarios.

Index Terms: D.3.3 [Software]: Programming Languages—Language Constructs and Features - Patterns; J.3 [Computer Applications]: Life and Medical Sciences—Health

1 INTRODUCTION

Video games are a multi-billion dollar industry in North America. In 2007 alone, consumers spent $18.85 billion on games and consoles [1]. Video gaming is a fast-growing industry whose profits are quickly catching up to the movie industry [1]. This rapid growth can be explained by a changing consumer market that includes more older gamers and more female gamers, and an increase in length and interactivity of the games that has improved their replay and sequel value [1].

An emerging genre of video games are "serious game". Games designed to teach the user through game play. Many of the games that fall in this category involve health related issues. For example, *Kidney Heroes* [12] teaches pre-teen patients with chronic kidney disease how to manage their condition, and *Darfur is Dying* [10] teaches about living in a refugee camp. One benefit of serious games is that they can teach important concepts without placing the user in a dangerous situation. The user can try various scenarios without having to worry about the possible consequences.

We are investigating the use of serious games for people suffering chronic depression. A common treatment technique for these patients is for them to present a scenario from their life that left them feeling depressed. The patient and therapist then work through a Situational Analysis, in which the therapist asks the patient a series of questions about the scenario. The goal is to have

---

*e-mail: neesha@ualberta.ca

†e-mail: duane@cs.ualberta.ca

‡e-mail: lilian.sayegh@douglas.mcgill.ca

§e-mail: rgreiner@ualberta.ca

¶e-mail: gustavo.turecki@douglas.mcgill.ca

the patient develop coping strategies and techniques to be able to react differently in the future. We are creating game scenarios that simulate the discussion between a patient and therapist to facilitate a situational analysis.

Section 2 presents our proposed method for creating the serious game. Section 3 gives a brief overview of the ScriptEase system. Section 4 concludes with the next steps for the research.

2 PROPOSED METHOD

The game scenarios to be created will translate the concept of a situational analysis into game form. Each game scenario will consist of three stages. The first stage is a short cut scene (similar to a video clip) that presents the scenario. The second stage consists of working through the situational analysis steps. This will be constructed as a dialogue with a virtual therapist (that is, a character in the game) asking the questions and the patient choosing from a pre-set list of responses. The final stage will allow the patient to take control of the main character and play the scenario. However, the patient will be able to choose from multiple dialogue and action choices and see how different choices can change the outcome. The patient will be able to replay the scenario multiple times.

The game scenarios to be created need to meet the following two goals.

1. The resulting game scenarios needs to be effective as a treatment aid.
2. The method to create the game scenarios must be easy enough for non-programmers (psychologists) to create them.

The first goal will need to be evaluated through user studies. The second goal will be achieved by using a tool called ScriptEase for all the programming. We want the content to be created by the domain experts as much as possible. ScriptEase is discussed in more detail in the next section.

2.1 Situational Analysis

A situational analysis is a treatment technique in which the patient presents a scenario in which s/he had trouble obtaining a desired outcome and the patient and therapist discuss the scenario. The following is from the *Patient's Manual for CBASP* [8] and is an example of a patient explaining a scenario to her therapist.

> My son was in his high chair, and I was feeding him lunch. The doorbell rang. I stopped feeding him, left my son in the chair, and went to the front door. It was my next-door neighbour, who is pushy and aggressive. She said that she needed a cup of sugar for a cake she was baking. I told her that this was not a good time and asked her to come back. I opened the door and let her in. She mumbled something about this not taking long and then asked me where the sugar was. I pointed her to the sugar bin on the counter and went back to feeding my son. She got the sugar and left. I was frustrated, mad,

and then I got depressed and thought to myself: "I've been screwed again." [8]

After presenting the scenario, the therapist then proceeds through a set of questions with the patient, discussing the scenario and looking at their interpretations of the events to try and help the patient see other possible responses that can be used in the future.

The situational analysis consists of 6 steps. In the first step the patient provides an accurate summary of what happened in the scenario consisting of only facts without interpretations. In the second step the patient is asked to provide a few interpretations or thoughts they had during the scenario, for example "I want my neighbour to come back at a more convenient time" or "People are insensitive to my needs." In the third step the patient describes her behaviour in the scenario - what actions did she take and how did she act? In the fourth step the patient is asked how the scenario ended. In the fifth step the patient is asked to determine what the desired scenario outcome should be. In the example above, the desired outcome would be for the neighbour to come back at a more convenient time. In the sixth step the patient is asked if the actual outcome was the same as the desired outcome. Finally, after completing the situational analysis, the patient and therapist work through the interpretations the patient provided in step two. They determine if each interpretation is anchored (specific rather than generic), accurate (facts not perception), and contributes (helps get desired outcome) to the scenario and then work on revising interpretations that do not satisfy the three conditions.

2.2   Benefits of using a Video Game

There are many benefits to using a video game as a treatment tool. First, patients would be able to work through scenarios on their own and have a "virtual therapist" work through it with them. The game scenarios could also be used by a therapist during group therapy to provide a more engaging visual version of the scenario.

A second benefit is the ability for patients to replay the scenario after the situational analysis. This gives the patient a chance to try different choices and see different outcomes without any of the risks of doing so in person. They can use what they learned during the situational analysis to try to make better choices that lead to their desired outcome and learn to differentiate between effective and ineffective actions.

A third benefit is that a single scenario can be re-used multiple times for many patients. While a patient will not be able to present a scenario and immediately work through it as a game, patients with chronic depression will likely find similar interpersonal scenarios unsettling. Other patients may not have experienced a specific scenario before; however, they can still benefit from learning the exercise.

3   SCRIPTEASE

For video games to be effective as a treatment tool there needs to be a diverse and growing set of scenarios. Enabling psychologists to create new scenarios removes the necessity for an intermediary and simplifies the process. ScriptEase [13, 9] is a tool developed at the University of Alberta to allow non-programmers to design their own video game modules for BioWare's *Neverwinter Nights* [2] video game. ScriptEase has been successfully used by Grade 10 English students to create their own interactive stories [7, 14, 6, 3, 4, 5]. ScriptEase includes a pattern catalogue consisting of four pattern types - encounters, dialogue, behaviours and quests. Authors choose patterns and set options and ScriptEase generates the scripting code necessary. An example screenshot of ScriptEase is shown in Figure 1.

For this research, the main patterns that will be used are encounter patterns. Encounter patterns are triggered by a specific event and consists of a set of actions to execute in response to that
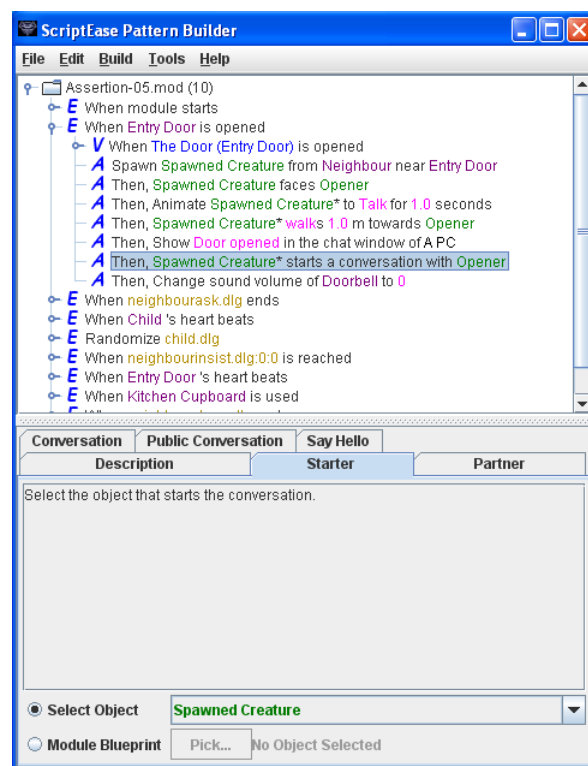

Figure 1: ScriptEase screenshot.

event. For example, an encounter pattern would be the player character opening a door to start a dialogue. The opening of the door is the event that triggers the pattern and the action is to start a conversation. Events are typically caused by the player character's interaction with the game environment such as opening a door, removing an item from a cupboard or giving an item to another character.

Within ScriptEase, encounter patterns are generalized so that they may apply to a number of game objects. Instead of calling a pattern *When the sugar is removed from the cupboard do some action* (where *do some action* can be replaced by any action), the equivalent encounter pattern in ScriptEase is called *When The Placeable loses Specific Item*. This generalization allows the designer to be creative as to what object is removed from what placeable. In our example, the Placeable is the cupboard and the Specific Item is the sugar. However, this pattern could also be used when the player (the placeable) gives the sugar (specific item) to the neighbour. The pattern catalogue would have grown exponentially if the patterns were object specific, which would make this a burden to use.

3.1   ScriptEase Issues

The current pattern catalogue focuses on fantasy role playing video games, in the context of *Neverwinter Nights* which is set during medieval times. Here the world consists of enemies such as dragons and trolls. We think this world would be distracting to a patient who is trying to focus on a modern scenario such as feeding their child lunch and being interrupted by a neighbour as discussed above. Fortunately, *Neverwinter Nights* has had a very involved fan community who have created many additional modules, game resources, and extensions to the original game. One group created a modern toolkit [11] that includes modern game objects such as a fridge, stove, food items (milk, juice, chicken), cars and characters. We used this modern toolkit for *Neverwinter Nights* to produce the patient scenario with a modern setting. Figure 2 shows the scenario

kitchen constructed using the original game objects and Figure 3 shows the same kitchen constructed using the modern toolkit.

Figure 2: A kitchen using original *Neverwinter Nights* game objects.

Figure 3: A kitchen using the modern toolkit.

A second issue with ScriptEase is the lack of cut scene patterns. In order to create the original scenario for the patients to watch, the author needs to manipulate the camera in order to best show the action. *Neverwinter Nights* supports scripting that can be used to create the cut scenes. Unfortunately there is no high level ScriptEase support to generate cut scene scripts. We must determine exactly what patterns need to be created to support cutscenes in ScriptEase.

Dialogue sequences where the player is asked a question, given a set of possible answers, and then told whether their answer is correct or not and why are not common in commercial video games. However, this dialogue structure is necessary for all situational analyses. The player will be asked questions about the scenario (How did it end? Which choice describes the scenario?) and expected to choose a response. If the response is not correct, s/he will be told why, and then asked the question again until they choose the correct response. This dialogue structure requires the author to create complicated dialogues that is more commonly seen in training software. However, this dialogue structure can be captured as a pattern, where the author instead only has to specify the specific dialogue lines and the pattern correctly organizes the dialogue. This

will also make it possible for authors to re-use dialogue from one scenario to another, as the questions themselves do not change, but the possible answers and responses do.

4 CONCLUSION

We are currently working on a prototype game scenario. This game scenario will be used in a user study to see how effective it is as an additional tool for psychologists. Based on the results from this study, we will proceed with other scenarios and make changes to the structure of the game scenarios. We will also work on identifying and creating necessary patterns to support scenario construction so that we can train psychologists to create their own game scenarios.

REFERENCES

[1] E. Bangeman. Growth of gaming in 2007 far outpaces movies, music. Website, 2009. http://arstechnica.com/gaming/news/2008/01/growth-of-gaming-in-2007-far-outpaces-movies-music.ars.

[2] BioWare. Neverwinter nights. Website, 2009. http://nwn.bioware.com/.

[3] M. Carbonaro, M. Cutimisu, H. Duff, S. Gillis, C. Onuczko, J. Schaeffer, A. Schumacher, J. Siegel, D. Szafron, and K. Waugh. Adapting a commercial role-playing game for educational computer game production. In *GameOn North America*, 2006.

[4] M. Carbonaro, M. Cutimisu, M. McNaughton, C. Onuczko, T. Roy, J. Schaeffer, D. Szafron, S. Gillis, and S. Kratchmer. Interactive story writing in the classroom: Using computer games. In *Digital Games Research Association (DIGRA)*, pages 323–328, 2005.

[5] M. Carbonaro, M. Cutumisu, H. Duff, S. Gillis, C. Onuczko, J. Siegel, J. Schaeffer, A. Schumacher, D. Szafron, and K. Waugh. Interactive story authoring: A viable form of creative expression for the classroom. *Computers and Education, in press*, 2007.

[6] M. Cutimisu, C. Onuczko, D. Szafron, J. Schaeffer, M. McNaughton, T. Roy, J. Siegel, and M. Carbonaro. Evaluating pattern catalogs - the computer games experience. In *International Conference on Software Engineering (ICSE)*, pages 132–141, 2006.

[7] M. Cutimisu, C. Onuczko, M. McNaughton, T. Roy, J. Schaeffer, A. Schumacher, J. Siegel, D. Szafron, K. Waugh, M. Carbonaro, H. Duff, and S. Gillisr. Scriptease: A generative/adaptive programming paradigm for game scripting. *Science of Computer Programming*, 67(1):32–55, June 2007.

[8] J. P. McCullough Jr. *Patient's Manual for CBASP (Cognitive Behavioral Analysis System of Psychotherapy)*. The Guilford Press, New York, 2003.

[9] M. McNaughton, M. Cutimisu, D. Szafron, J. Schaeffer, J. Redford, and D. Parker. Scriptease: Generative design patterns for computer role-playing games. In *19th IEEE International Conference on Automated Software Engineering (ASE)*, pages 88–99, 2004.

[10] mtvU. Darfur is dying. Website, 2010. http://www.darfurisdying.com/.

[11] NWNVault. D20 modern mod nwn. Website, 5 2010. http://nwvault.ign.com/d20/.

[12] D. Pozefsky and M. Ferris. Kidney heroes: Improving health management through video games. Presentation, 2009.

[13] ScriptEase. Scriptease. Website, 2010. http://webdocs.cs.ualberta.ca/ script/.

[14] D. Szafron, M. Carbonaro, M. Cutimisu, S. Gillis, M. McNaughton, C. Onuczko, T. Roy, and J. Schaeffer. Writing interactive stories in the classroom. *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning(IMEJ)*, 7(1), 2005.