
Extended Abstract for *Canvas Obscura*

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Abstract

Canvas Obscura is a survival-horror game where the player must locate objects within an ever-changing environment. *Canvas Obscura* pushes the boundaries of the survival-horror genre by including procedurally generated levels.

Author Keywords

Survival Horror; procedural content generation; level generation

ACM Classification Keywords

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Introduction

Since the early days of their development, video games have had a close relationship with the horror genre [5]. Legaspi and Numao [4] describe survival horror as, “a sub-genre of action-adventure where the player leads an avatar character through uncanny and hostile environments, reminiscent of horror fiction or movie.” Seeking to continue with this tradition, as well as push the boundaries of technological innovation in gameplay, our team developed the survival-horror game, *Canvas Obscura*.

The game was built using the Unity engine with C# and JavaScript. The models were created with Autodesk Maya and ZBrush and textured with Adobe Photoshop.

Concept

Canvas Obscura pays homage to acclaimed survival horror games, such as *Amnesia*¹ and *Slender: The Arrival*², while also acting as a test bed for procedural content generation. Procedural content generation (PCG) is the process of creating game content (e.g., maps [6], quests [1], etc.) algorithmically with minimal manual intervention [6]. For more information about PCG, Hendrixx et al. [3] provides an overview of many techniques and applications.

Set in the shell of a once thriving estate, *Canvas Obscura* follows the journey of a struggling painter in his desperate search for inspiration. The painter travels to the estate because of its dark history, thinking that exploring a place with such a brutal past might rekindle his passion for painting, but he soon finds himself just trying to survive. Inspiration for the game's creatures was derived from a combination of the surrealist painting style as well as the game's own narrative.

The narrative of *Canvas Obscura* relies on horror motifs such as murders, ghosts and the living dead. In the background of the game, the creatures and setting are all linked to violent histories. The player's objective is to collect artifacts related to these backstories, such as a noose and a bloody hammer, in order to escape the building.

Gameplay Innovation

Wishing to promote an inherent replay value not traditionally attributed to horror games, we decided to procedurally generate a varied layout for each level on

¹ <http://www.amnesiagame.com/#main>

² <http://www.slenderarrival.com/>

every play-through. The player must navigate these labyrinthine hallways while using kiting or avoidance techniques to bypass the patrolling enemies. However, no two levels will be the same, preventing the player from memorizing the level layout for future plays; the player character's death also results in a new level layout. The ever-changing layout encourages the player to explore the environment and seek out new paths for avoiding enemies. In addition to the level layouts, the placement of the monsters is also unique to each generated level. The player cannot anticipate where a creature may pop out of the floor to strike her, or where an enemy may be patrolling. Lastly, in an effort to follow a narrative arc of rising tension, the level sections themselves are constructed such that they become successively darker, more decrepit, and harder to navigate as the story progresses.

Although a few recent horror games, such as *SCP Containment Breach*³, have experimented with PCG as a primary component of the gameplay, we argue that there are differences that set our game apart. *SCP Containment Breach* also uses PCG to generate a map at start-up, but allows the player to save her game at any point during gameplay, preserving the map layout. The player dies immediately when caught by any enemy, but upon death, the player restarts from the last save and the map remains the same. This allows the player to remember landmarks throughout the level and have multiple chances at getting through the same map. For *Canvas Obscura*, we have chosen not to allow the player to save at all, and we completely regenerate the level upon death. This approach puts more pressure on the player, because of the harsher

³ <http://www.scpcbgame.com/>

consequences. The player also has a health bar and does not die immediately from enemy attacks. The health bar adds rising tension to game (i.e., the less life the player has the more pressure she is under). Conversely, dying from a single hit from an enemy can lead to flat tension, because the player will constantly have the same consequences for getting hit by an enemy. That is, the player has a constant amount of pressure on her, leading to flat tension. These mechanics add a different level of difficulty to the game and teach the player to not perform high risk activities to complete each level. The player must remain vigilant and carefully navigate around enemies, or learn to kite enemies once spotted by them. This player-enemy dynamic provides the main tension in the game (like most horror games), but also discourages the player from resorting to death as a means of escape. Though our game puts more pressure on the player, through harsher consequences and rising tension, it is our intention to keep the game fresh and enjoyable through procedural content generation.

Technological Innovation

Canvas Obscura explores the use of procedural content generation (PCG). PCG, as explained above, is the automatic generation of content with minimal user intervention.

Canvas Obscura uses a designer authored probability distribution and adjustable width and height values in order to place interlocking level sections in the level. We use a set of 8 level sections: **four-way intersections, 3-way (or T) intersections, straight halls, end-rooms, halls with doors, bedrooms, sitting rooms, and corners**. The probability

distribution gives the designer some control over which level sections he would like to show up more often. For instance, the designer can increase the likelihood of four-way intersections and decrease the likelihood of straight hall sections if he wants a more connected level. The width and height values dictate the dimensions of the generated level. This gives the designer another method of control over the level generator by allowing him to decide if he wants, for example, a long and narrow level or an expansive level. In addition to the probability distribution, our method contains several hard constraints to ensure that all levels generated are playable and well-formed. To increase the diversity of the levels generated, our method chooses from several options for each level section each time a section type is chosen. The options for the level sections have differing objects and object layouts. This helps prevent levels from getting repetitive and breaking player immersion. Once the structure of the level is generated, the algorithm randomly distributes enemies, interactive objects (i.e. notes and books), and special events, such as texture changes intended to startle the player. The entire process is repeated if the player character dies.

Canvas Obscura also features relentless enemy AI. Implementing this system advances the game in two key ways. First, the ability of the enemies to chase and damage the player gives a sense of danger to the game, which in turn makes it more frightening. Second, the indefatigable enemies give *Canvas Obscura* more tension and conflict. The player attempts to escape, but quickly discovers that the enemy will follow her no matter where she tries to flee. This combination of tension, the feeling of being hunted, and the

disorientation from the generation of the maps creates a powerful sense of panic and fear in the player.

The relentlessness of the enemies in *Canvas Obscura* was achieved in the following way. An enemy, upon seeing the player, transitions into an attack state and takes chase. This is accomplished by giving the enemy a vision cone and a simulated sense of smell. As the player moves through the level, traces of her position are repeatedly stored. Once the player is noticed by an enemy, that enemy will continually check to see if any trace of the player is within its range. If a trace is found, the enemy will move towards the newest tracked position, making it very difficult for the player to kite around or outrun the enemy. Due to the advanced tracking system, once an enemy has locked onto a player it will not relent until it has either caught her or the player has ended the level.

Target Audience

Canvas Obscura is designed for followers of the super genre “adventure,” and more specifically of the survival-horror genre, which has seen an increase in followers in recent years [2, 5]. We targeted this group by throwing the player headlong into the game and story, after giving her a description of the controls. We increase immersion into the story, an important aspect in any horror game, by including a brief narration in the beginning. The first-person camera view also adds to the immersion of the player. In addition to immersion into the story, our game offers more replayability than many other horror games. The replayability of *Canvas Obscura* stems from the use of procedurally generated

levels, which ensures that no two play-throughs are the same. Additionally, consumers of the puzzle genre may also show interest in *Canvas Obscura* because of the puzzle-like levels introduced by the procedural level generation.

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