A Puzzling Present: Code Modification for Game Mechanic Design

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Figure 1: A screenshot from *A Puzzling Present*.

ABSTRACT

A Puzzling Present is an Android and Desktop game released in December 2012. The game mechanics (that is, the player's abilities) as well as the level designs were generated using Mechanic Miner, a procedural content generator that is capable of exploring, modifying and executing codebases to create game content. It is the first game developed using direct code modification as a means of procedural mechanic generation.

1. DOWNLOAD

A Puzzling Present is available on Android and for all desktop operating systems, for free, here:

http://www.gamesbyangelina.org/downloads/app.html

The source code is also available on gamesbyangelina.org.

2. BACKGROUND

Mechanic Miner was developed as part of PhD research into automating the game design process, through a piece of software called ANGELINA. ANGELINA's ability to develop small games autonomously, including theming the game's content using social and web media, was demonstrated at ICCC 2012[1]. Mechanic Miner represents a large step forward for ANGELINA as the system becomes able to inspect and modify code directly, instead of using grammars or other intermediate representations.

ANGELINA's research has always aimed to produce playable games for general release. *Space Station Invaders* was released in early 2012 as a commission for the New Scientist, and a series of newsgames were released to coincide with several conferences in mid-2012. A Puzzling Present was the largest release to date, garnering over 6000 downloads, and entering the Android New Game charts in December, as well as coverage on Ars Technica, The New Scientist, and Phys.org.

3. A PUZZLING PRESENT

The game itself contains thirty levels split into three sets of ten. Each set of levels, or *world*, has a unique power available to the player, such as inverting gravity or becoming bouncy. These powers can be switched on and off, and must be used to complete each level. Each power was discovered by Mechanic Miner by iterative modification of code and simulation of gameplay to test the code modifications. For more information on the system, see [2].

Levels were designed using the same system - mechanics are tested against designed levels to evaluate whether the level is appropriate. This means the system is capable of designing novel levels with mechanics it has never seen before - there is no human intervention to add heuristics or evaluations for specific mechanics.

We are currently working on integrating Mechanic Miner into the newsgame generation module of ANGELINA, so that the two systems can work together to collaboratively build larger games. This initial work on code modification has also opened up major questions about the relationship between code and meaning in videogames, which we plan to explore in future work.

4. REFERENCES

[1] Michael Cook and Simon Colton. Angelina - coevolution in automated game design. In *Proceedings of the 3rd International Conference on Computational Creativity*, 2012.

[2] Michael Cook, Simon Colton, and Jeremy Gow. Nobody's a critic: On the evaluation of creative code generators. In *Proceedings of the 4th International Conference on Computational Creativity*, 2013.