Ludus Ex Machina

Building A 3D Game Designer
That Competes Alongside Humans

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Computational Creativity Group
Goldsmiths, University of London

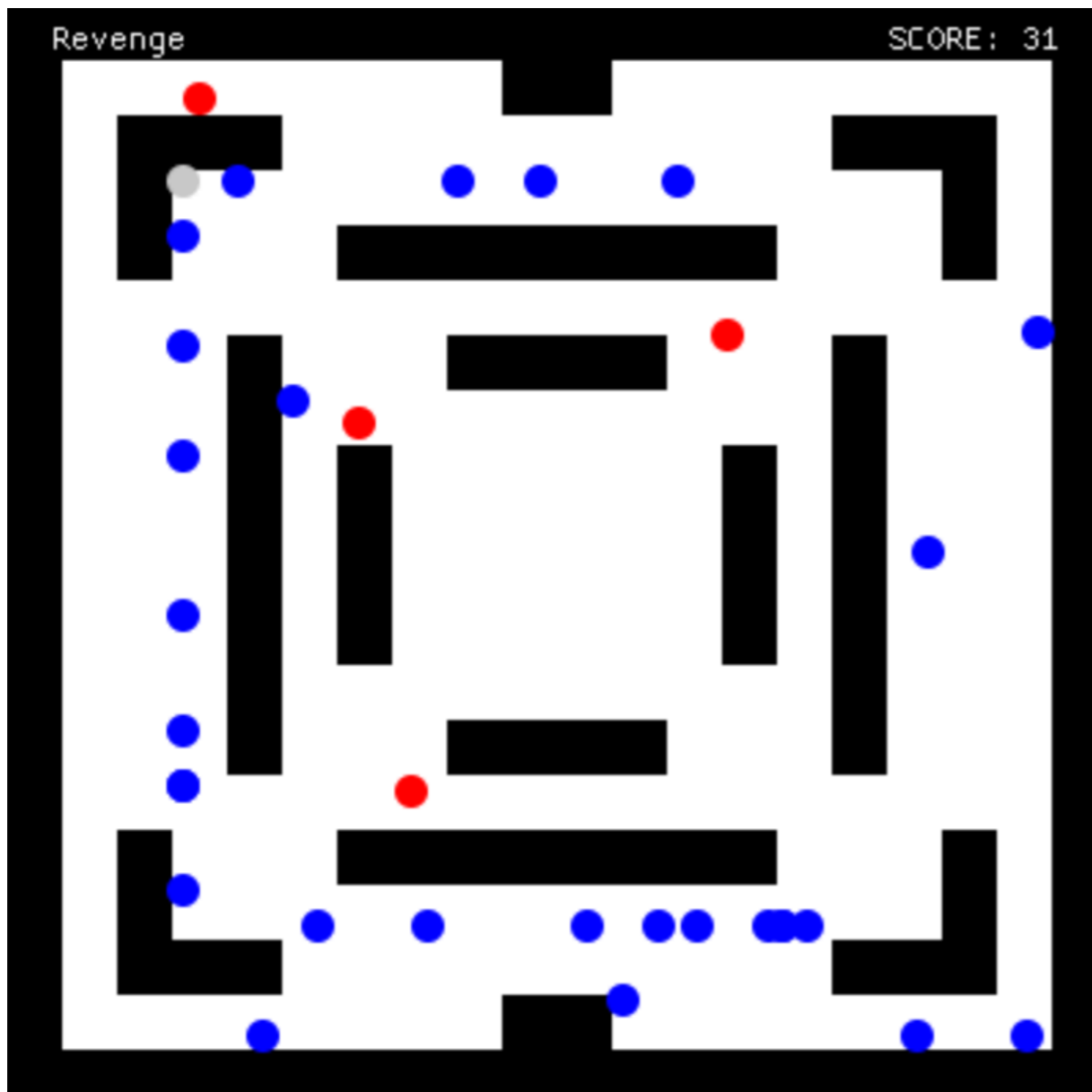**gamesbyangelina.org**   **ccg.doc.gold.ac.uk**

@mtrc

This Talk

- ANGELINA The Game Designer

- Game Jams and Creative Communities

- ANGELINA's Creative Future

ANGELINA

ANGELINA

HTML 5 Arcade Games

Idea: break the design up into distinct phases, and evolve individually.

Rules
Geometry
Layouts

www.gamesbyangelina.org/games

ANGELINA

Flash Platformers

Expanding ANGELINA's freedom in rulesets.

Beginning to look at creative/theming challenges.

Rules
Geometry
Layouts
Theme

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ANGELINA

Java - Desktop + Android

Much deeper look at mechanic invention

Stepping back from theming issues (temporarily!)
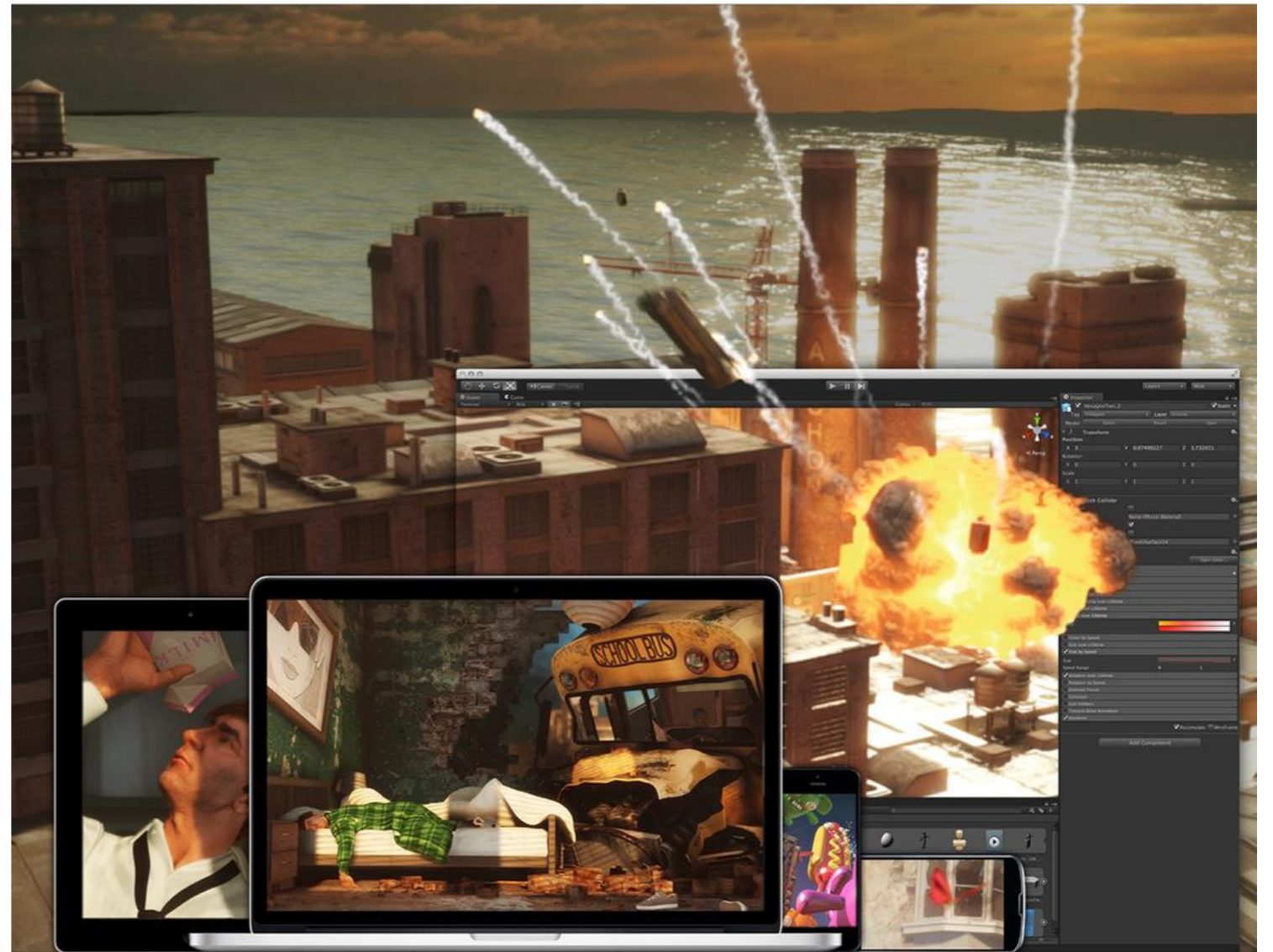
Unity - A Fresh Start

2.5 million registered developers

350 million Unity Web Player installs

Easy to disseminate

Made for extensibility

Contemporary

ANGELINA
Overview

Predesign
What is this game about?

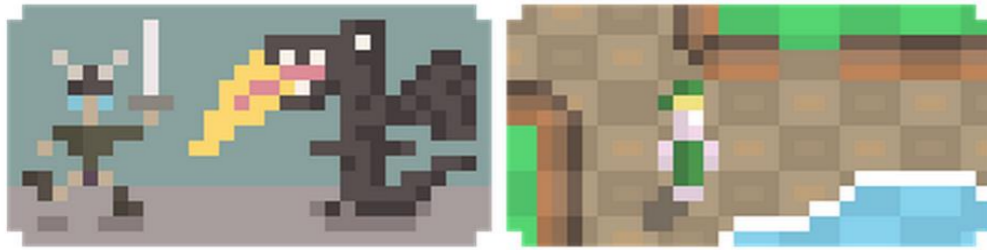**Coevolutionary Design**
Designing the core game components

Postdesign
Export and cleanup

ANGELINA

Predesign

Inspector ANGELINA

Internet available ☐
Tweet development ☐
Level Population Size: 10
Placement Population Size: 10
Ruleset Population Size: 10
Zone Population Size: 10
Number of Generations: 20
Theme: beach ← Make Me A Game About...

Analyse theme
Design me a game
Frequency
Find mood
Start pathing
Generate a ruleset
Get textures

ANGELINA

Theme Expansion

Frequency-based word selection

↓

Word Association

↓

Final Theme

ANGELINA

Theme Expansion

↓

Media Acquisition

3D Models
www.tf3dm.com

Fonts
www.dafont.org

Music
www.incompetech.org

SFX
www.freesound.org

ANGELINA

Theme Expansion

↓

Media Acquisition

↓

Zone Map Gen.
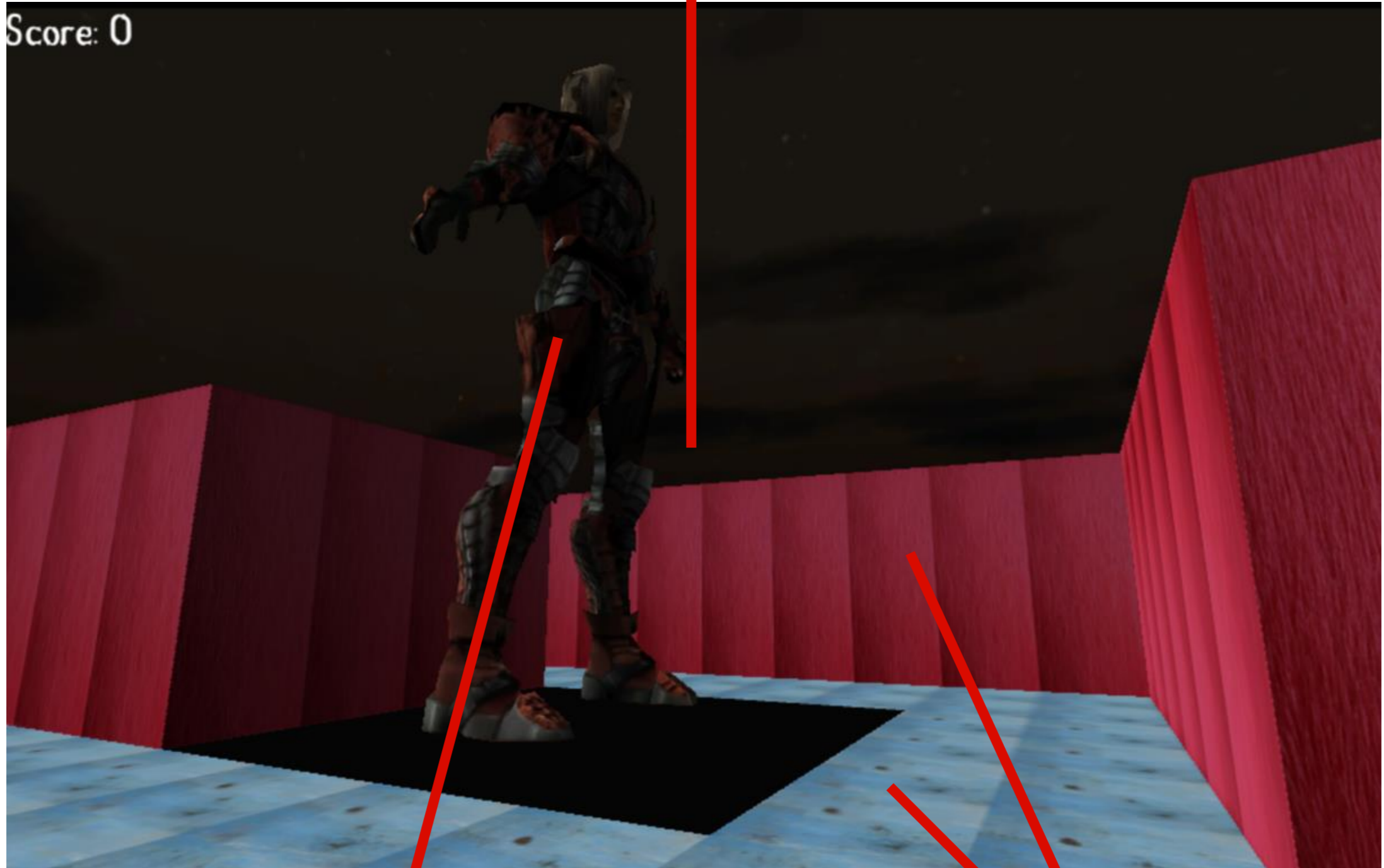
ANGELINA
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everyone! #t93 pic.twitter.com/d8gK7wVS5E

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JouP @JustPlainZhaine · Jan 30
@angelinasgames brick, paint, painted, blue, chipped, worn, wall
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Steve Marinconz @Appleguysnake · Jan 30
@angelinasgames blue
Details   ↩ Reply   ♻ Retweet   ★ Favorite   ••• More

CHIMERA OBSCURA @fabiansociety · Jan 30
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Rose Hepworth @rosehepworth · Jan 30
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Rose Hepworth @rosehepworth · Jan 30
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Details   ↩ Reply   ♻ Retweet   ★ Favorite   ••• More

The Christmas Entity @eegnsma · Jan 30
@angelinasgames blue, wall, bricks
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Michael @IllusoryColthor · Jan 30
@angelinasgames blue, paint, peeling
Details   ↩ Reply   ♻ Retweet   ★ Favorite   ••• More

ANGELINA

Theme Expansion

↓

Media Acquisition

↓

Zone Map Gen.

↓

Title + Music

Pun Generation
Now with idioms!

Music selection:

Metaphor Magnet

↓

Emotions for DisCo

↓

Incompetech Database

ANGELINA
Overview

Predesign
What is this game about?

Coevolutionary Design
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ANGELINA

Co-operative Coevolution

Design Phase

As with *ANGELINA-3* described in (Cook, Colton, and Pease 2012), *ANGELINA* is composed of several evolutionary systems that work in tandem to cooperatively evolve a game design. Each evolutionary system has two aspects to its fitness function: internal, objective rules that are considered to be unchanging regardless of the overall game design, and external, subjective rules that take into account what properties the current most fit game design has to adjust its fitness evaluation accordingly. In order to evaluate these subjective rules for a given member of a population, *ANGELINA* takes the most fit example from every other evolutionary process, combines them together to form a game, and then simulates playing that game in real-time. Currently, this simulation is very basic – *ANGELINA* will attempt to guide the player object from the starting point to the level exit, if such a path exists, and records any rules which activate (as well as how often they activate) during the course

we have supplied a stock of behaviours which can be attached to the entities in *ANGELINA*'s games to form a basic ruleset. These behaviours include providing motion for the entity (such as random walks, or wall following) and adding mechanical rules (such as killing a player, or providing score when collected). Expanding this set with automatically generated code is a point of future work, see (Cook et al. 2013) for details.

Each of these four processes evolve their populations in isolation, according to various fitness criteria, normally expressed as parameters which can be easily varied, so as to give *ANGELINA* the ability to alter its own fitness functions in the future. Currently, all parameters have been set through experimentation to find values which produce an interesting variety of outputs in such terms as maze style variation (a mix of open spaces as well as some labyrinthine designs too) or level layouts (dense and sparse entity placement, varying approaches to extending the distance between start and exit). The fitness criteria are as follows:

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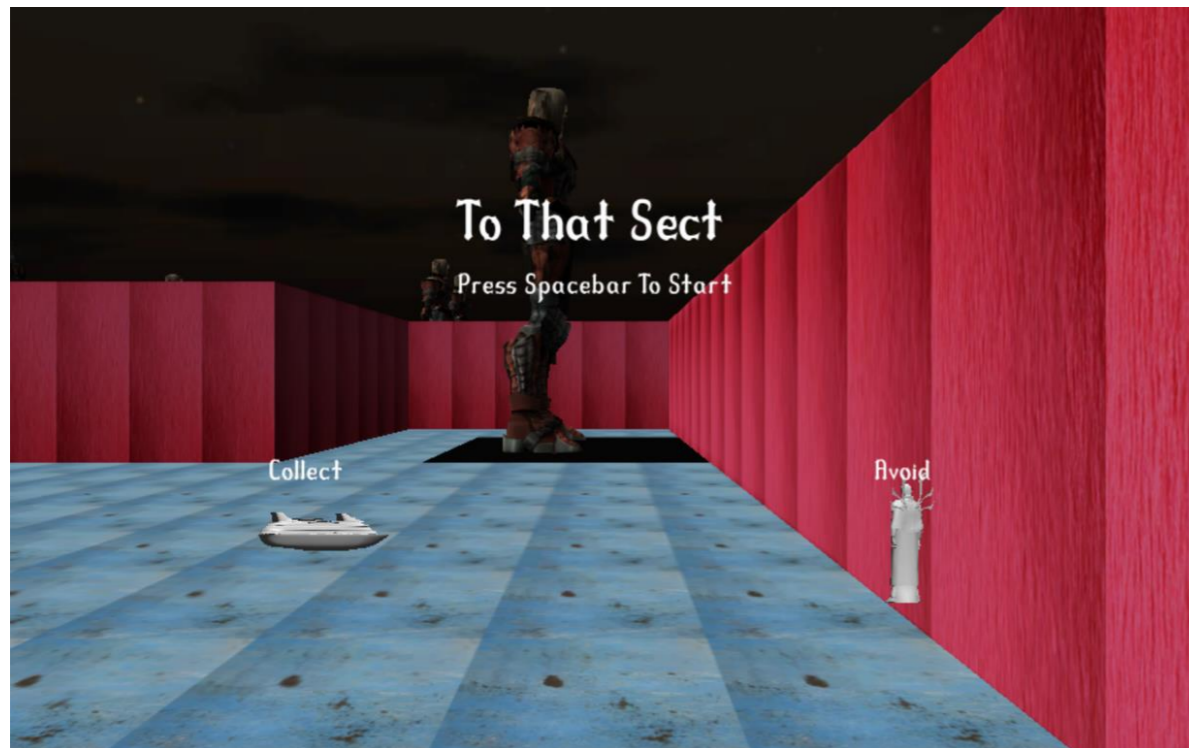OMG! Spoilers

Creative Communities

Communities

- Rob Saunders' on social creativity (see Porvoo Autumn School)

- Simon Colton (and others) - the role of perception in assessing creativity

- My own development as a game designer (mirroring ANGELINA's)

Ludum Dare
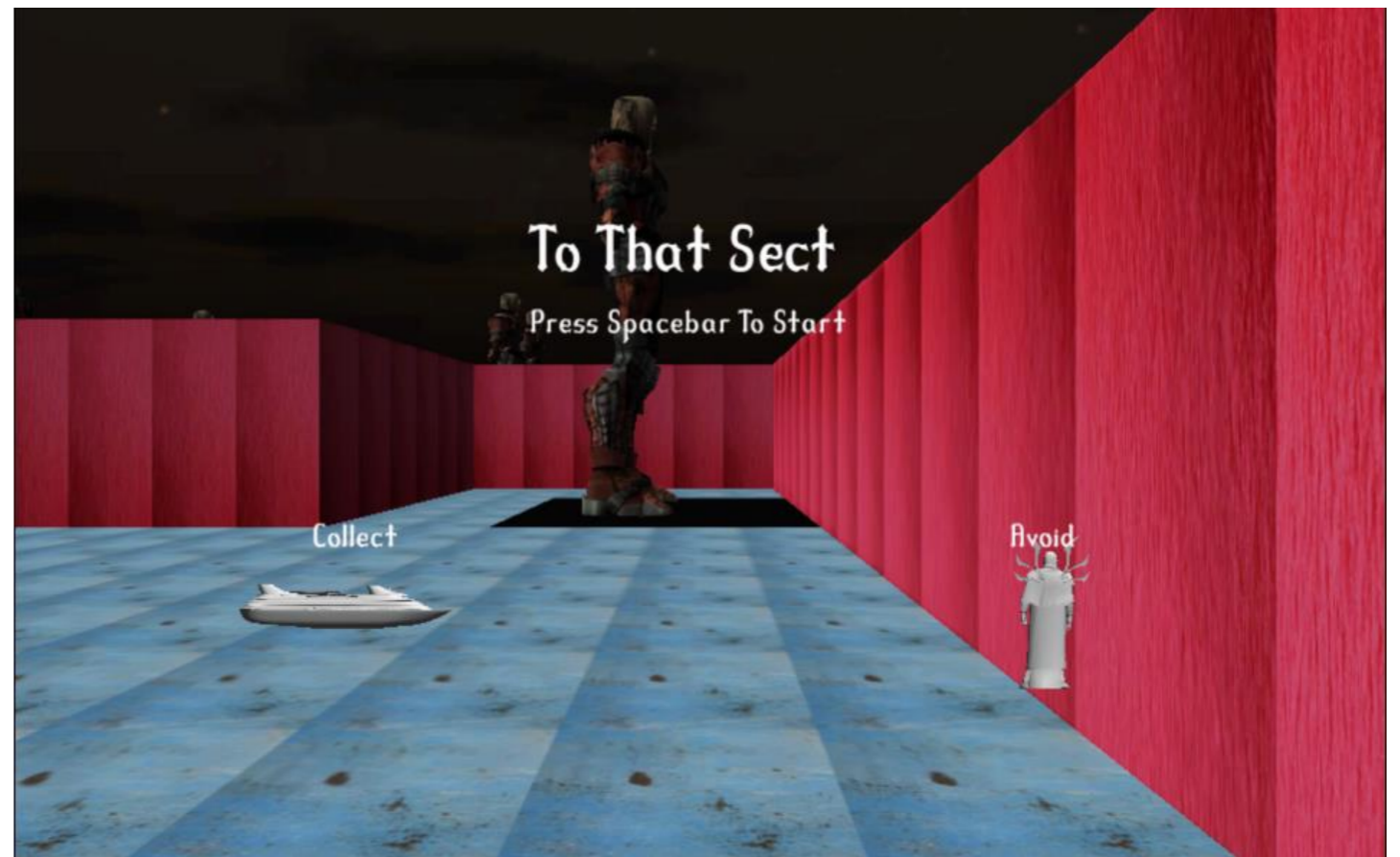
ANGELINA entered two games to Ludum Dare 28.

To That Sect, which included a disclaimer about ANGELINA and a commentary by the software.

Stretch Bouquet Point which didn't mention ANGELINA at all, and included an edited commentary.
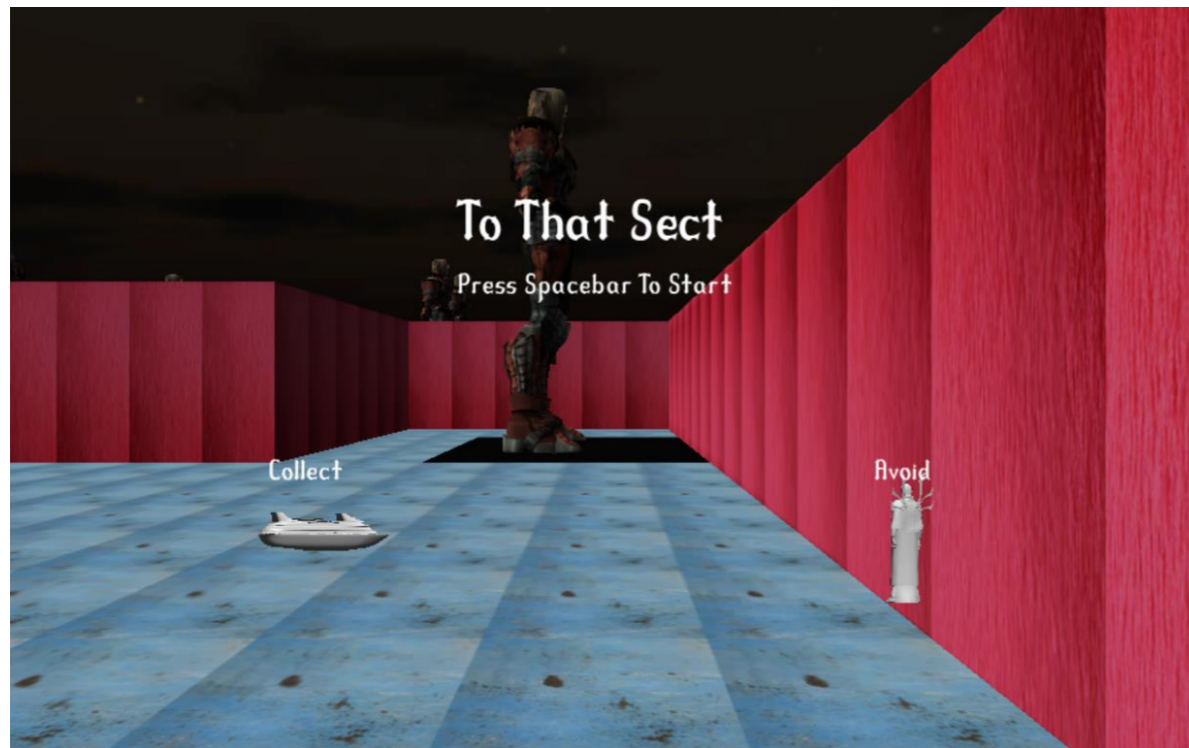
To That Sect

This is a game about a disgruntled child. A Founder... Along the way, you must avoid the Tomb as they kill you, and collect the Ship.

*Using Google and a tool called Metaphor Magnet, I discovered that **people feel charmed by Founder** sometimes. **So I chose a unnerving piece of music** from Kevin Macleod's Incompetech website to complement the game's mood.*

Ludum Dare

Hypothesis: People would prefer the game made by ANGELINA, because of a positive bias towards AI/CC in videogames.

Ludum Dare

#180	Mood(Jam)	3.15
#211	Audio(Jam)	3.06
#282	Innovation(Jam)	2.80
#403	Humor(Jam)	1.81
#441	Graphics(Jam)	2.53
#500	Overall(Jam)	2.37
#515	Fun(Jam)	1.92
#533	Theme(Jam)	1.75

#318	Humor(Jam)	2.15
#444	Audio(Jam)	1.88
#479	Mood(Jam)	2.10
#520	Graphics(Jam)	1.91
#525	Innovation(Jam)	1.97
#543	Fun(Jam)	1.58
#545	Theme(Jam)	1.35
#551	Overall(Jam)	1.73

Stop Press: Ludum Dare 29

#196	Mood(Jam)	3.46
#262	Audio(Jam)	3.31
#415	Innovation(Jam)	2.90
#494	Humor(Jam)	2.26
#638	Graphics(Jam)	2.62
#711	Overall(Jam)	2.40
#740	Theme(Jam)	1.81
#745	Fun(Jam)	1.90

Jet Force Gemini

Ludum Dare 30,31…

- Showing progress seems important - even if it's a small step forward.

- We're still on the downward slide - the shine's coming off the apple.

- The games community are enthusiastic and positive about computational creativity.

Beyond Jams

Future Work For Us

- Community means two-way engagement - ANGELINA should be able to take it, and dish it out.

- Developers are constantly playtesting and searching for feedback. Iterate, iterate, iterate.

- ANGELINA will cease to be a one-pass system.

Future Work For Us

- ANGELINA needs more - more appreciation, more generative power, more funnels and pipes feeding into (and out of) it.

- Metaphor Magnet's help is just the beginning - collaborations with The Painting Fool and DARCI are potentially looming.

- There's a pun about preserving ideas and jams but I'm too tired to work it in here.

Thanks

More on games:
warpdoor.com
forestambassador.com
freeindiegam.es

More on ANGELINA:
www.gamesbyangelina.org

More on everything:
ccg.doc.gold.ac.uk

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