Scripting Versus Emergence

Issues for Game Developers and Players in Game Environment Design

Penelope Sweetser and Janet Wiles, 2005
Design of Game Systems

- The rules of the game world.
- How do interactions work?
- What is the player allowed to do?
- **Scripted vs Emergent/Systemic Game**
Characteristics of a **Scripted Game**?

- Predefined Player Interactions
- Linear Story
- Game Designer has total control
1. Close the right foot to the left (i.e., feet in first position).

2. Step to the left with the left foot.

3. Cross the right foot over the left.

4. Step to the left with the left foot (i.e., feet in second position).
Characteristics of an Emergent/Systemic Game?

- Interactions arise from rules and types
- Freedom of Choice
- Emergent Gameplay
What is Emergent Gameplay?

- Emergent gameplay allows players to solve game problems by using strategies that were not envisaged by the designers.
- Arises from the rules of the game
Emergent Gameplay is not always desirable

2005

- Fixed a bug where animals could rent rooms
- Fixed bug with animals picking out clothes to wear
- Fixed bug with mules shitting luggage
- Cleaned up the bear situation
Scripting and Emergence is a Continuum

- Mechanics can be partly scripted, partly systemic
- Modern games usually have elements of both
Example: Bullet shattering a Window
What do **Game Developers** need to consider?

- Effort in Designing, Implementing and Testing
- Effort in Modifying and Extending
- Level of Creative Control for Game Developers
- Uncertainty and Quality Assurance
- Ease of Feedback and Direction to Player
Effort in Designing, Implementing and Testing

Scripting
- Specific Objects and Interactions
- Careful level design
- Little initial effort

Emergence
- General Objects and Interactions
- “Drag and Drop”
- Considerable initial effort
Effort in Modifying and Extending

Scripting
- Scales poorly
- Mechanics are localized

Emergence
- Scales well
- Mechanics are globalized
Level of Creative Control

Scripting
- Total creative control
- Structured narrative
- Everything is predetermined

Emergence
- Loss of control
- Emergent narrative
- Every playthrough is different
Uncertainty and Quality Assurance

Scripting
- No uncertainty
- Test individual interactions
- Difficulty to maintain at scale

Emergence
- High level of uncertainty
- Test types of interactions
- Difficult to maintain at scale
Ease of Feedback and Direction to Player

Scripting

● Linear
● Player feedback is easy

Emergence

● Nonlinear
● Player feedback is hard
How does this affect the Player?

- Consistency and Immersion
- Intuitiveness and Learning
- Player Expression/Emergent Gameplay
Consistency and Immersion

- Consistency enables Immersion
- Suspension of disbelief
- Systemic games enable consistency
Intuitiveness and Learning

- Game World Physics
- Systemic games are self-consistent
- Self-consistency enables learning
Player Expression/Emergent Gameplay

- Sense of Adventure
- Greater Control and Agency
- High Replayability
Emergence focuses on what the player wants to do, whereas scripting focuses on what the designer wants the player to do.
Techniques for Scripting – Finite State Machines

- Player/Enemy/Object
- Finite set of states
- Very useful for game AI
- State Explosion
- Use Statecharts!

![Statechart diagram showing states and transitions]
Techniques for Scripting – Scripting Languages

- High-Level Language
- Hard-coding
- Easier for designers
- Antiquated use of the term?
Techniques for Emergence – Flocking

- Boids!
- Separation
- Alignment
- Cohesion
- Common example of emergent behavior
Techniques for Emergence – Cellular Automata

- Conway’s Game of Life
- Simple set of rules
- Common in PCG
Techniques for Emergence – Machine Learning

- Neural Networks
- Evolutionary Algorithms
- Game AI
- Other areas?
Conclusion

- Scripting-Emergence Continuum
- Facilitate emergent interactions
- Leave objectives and narrative to scripting
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