

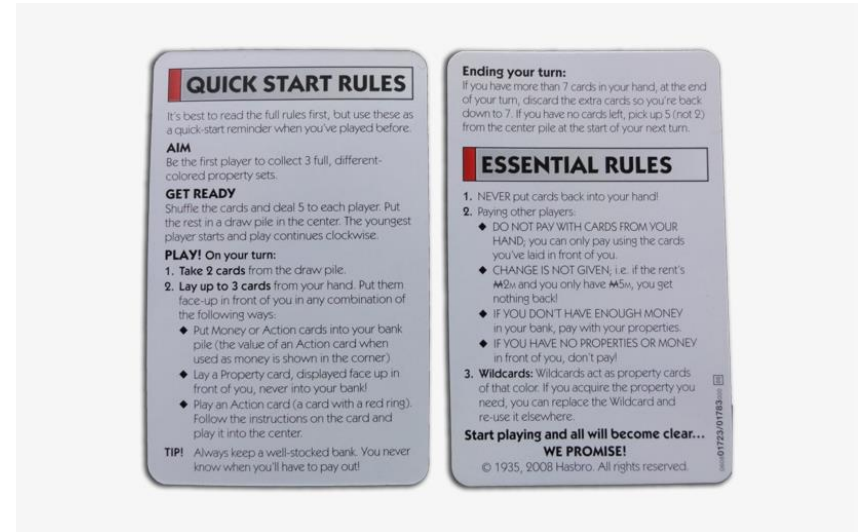
# Scripting Versus Emergence

Issues for Game Developers and Players in Game Environment Design

Penelope Sweetser and Janet Wiles, 2005

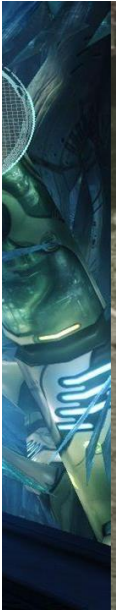
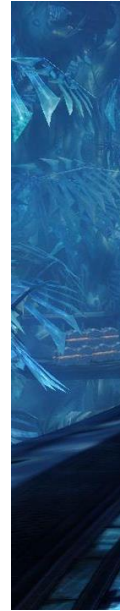
# Design of Game Systems

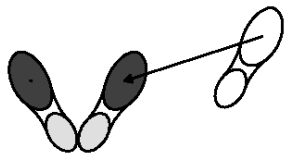
- The rules of the game world.
- How do interactions work?
- What is the player allowed to do?
- **Scripted vs Emergent/Systemic Game**



# Characteristics of a **Scripted** Game?

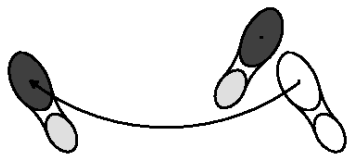
- Predefined Player Interactions
- Linear Story
- Game Designer has total control





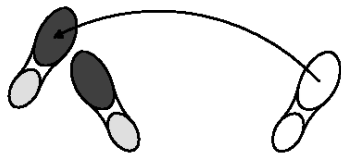
Close the right foot to the left (i.e., feet in first position).

Bar 2  
Beats 3-4



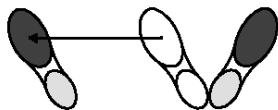
Step to the left with the left foot.

Bar 2  
Beats 1-2



Cross the right foot over the left.

Bar 1  
Beats 3-4



Step to the left with the left foot (i.e., feet in second position).

Bar 1  
Beats 1-2

# 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



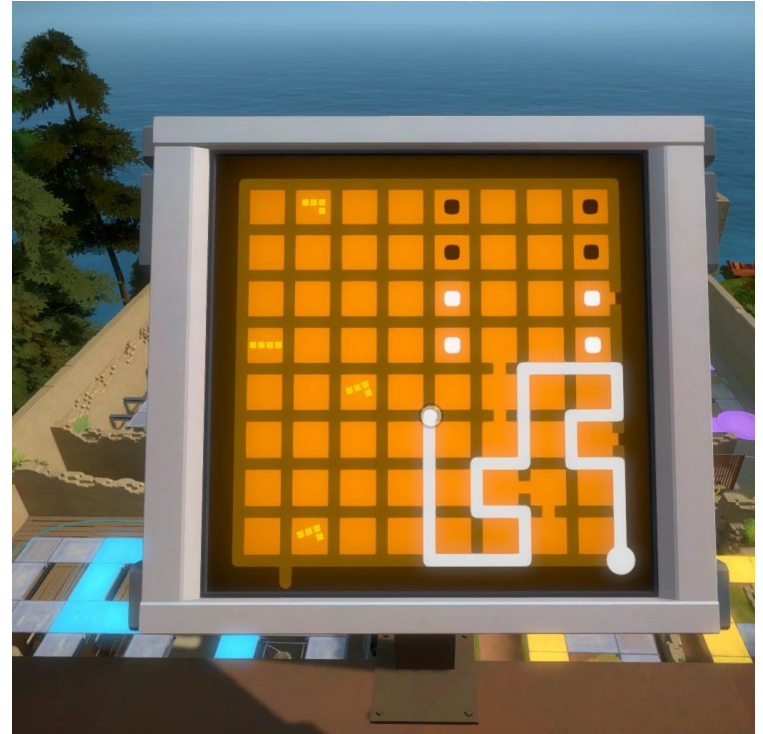
# Consistency and Immersion

- 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

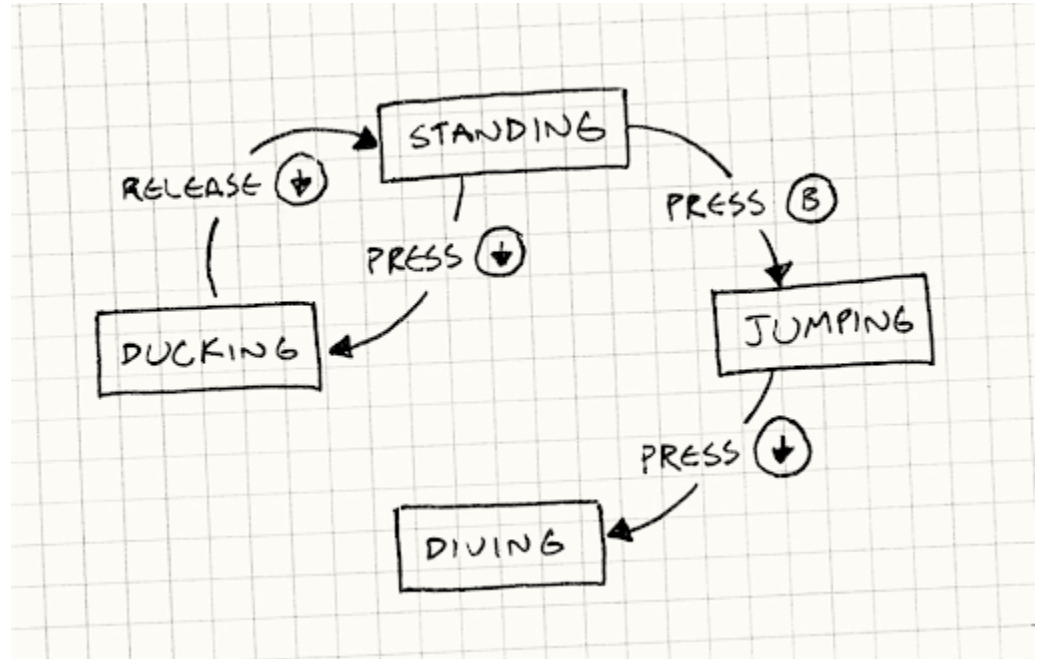
- Sense of Adventure
- Greater Control and Agency
- High Replayability



*Emergence focuses on what the player wants to do, whereas scripting focuses on what the designer wants the player to do.*

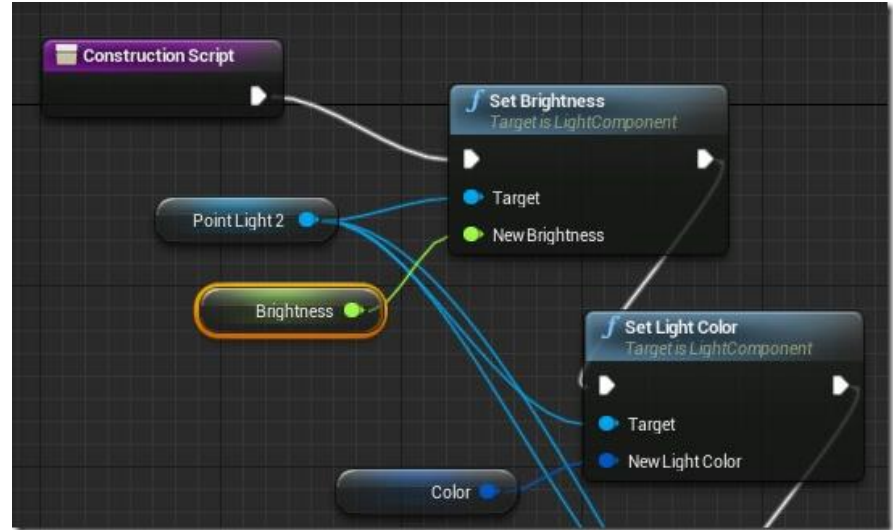
# Techniques for Scripting – Finite State Machines

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



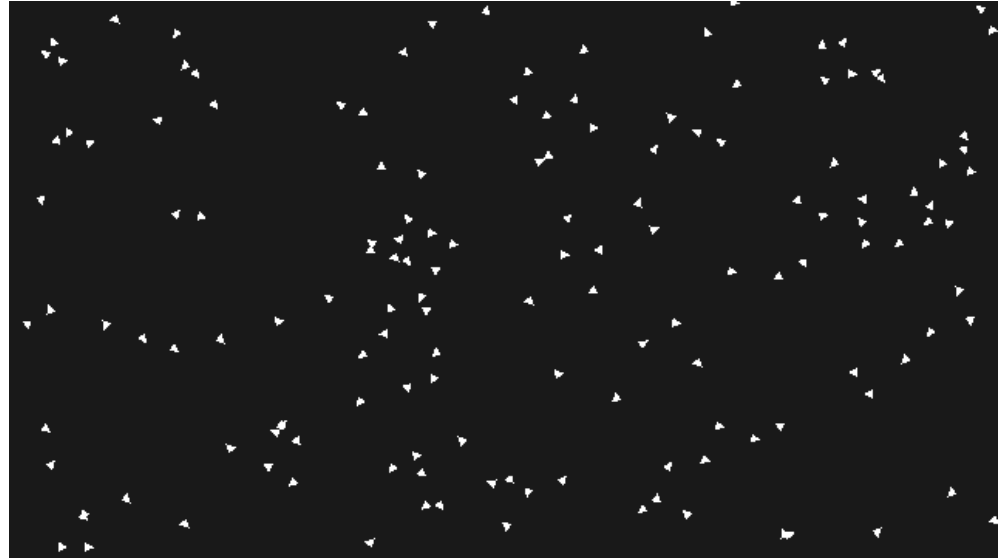
# Techniques for Scripting – Scripting Languages

- High-Level Language
- Hard-coding
- Easier for designers
- Antiquated use of the term?



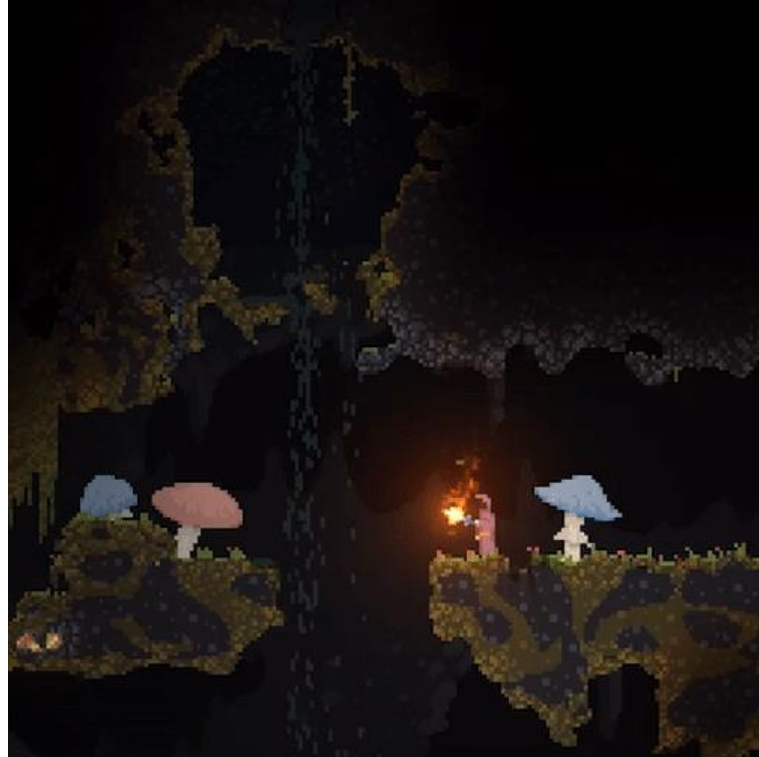
# Techniques for Emergence – Flocking

- Boids!
- **Separation**
- **Alignment**
- **Cohesion**
- Common example of emergent behavior



# Techniques for Emergence – Cellular Automata

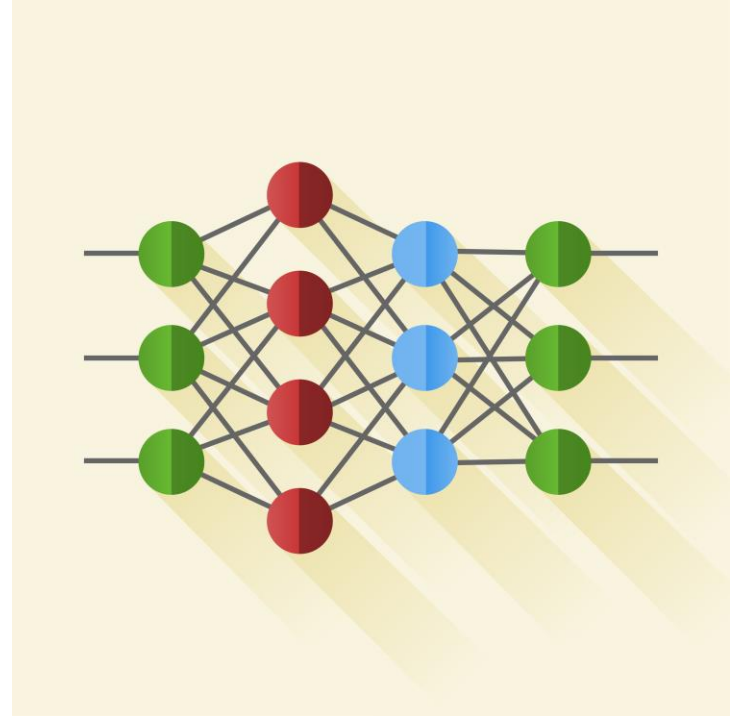
- Conway's Game of Life
- Simple set of rules
- Common in PCG





# 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
- 2005

