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CMS.608 / CMS.864 Game Design  
Spring 2008

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# April 3: Emergence, cybernetic systems

Game Design  
CMS.608/CMS.864

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# Things today

- Positive/negative feedback examples
- Dynamic Difficulty Adjustment
- Emergence exercises

# Positive and negative feedback

- Examples in your game designs?

# Dynamic Difficulty Adjustment

- Good or bad?
- Smooth or irregular?
- In board/card games?

Images removed due to copyright restrictions. Please see p. 74 in Csikszentmihalyi, Mihaly. *Flow: The Psychology of Optimal Experience*. New York, NY: Harper Perennial, 1990.

and

Falstein, Noah. "The Flow Channel." *Game Developer* 11 (May 2004): 52A.

# Two kinds of games: Emergence and progression

- *Emergence*: A small number of rules yield variation. The player uses strategies to play. "More than the sum of its parts".  
=Most traditional games, action games, strategy games.  
(Play using strategy guides.)
- *Progression*: The player performs a predefined set of actions in order to complete the game.  
"No more than the sum of its parts".  
=Adventure games.  
(Play using a walkthrough.)

# The Hobbit walkthrough

You start in your Hobbit Hole, a "comfortable tunnel like hall")

- READ MAP
- EAST
- EAST
- NORTH
- WAIT (until day dawns)
- SOUTH
- GET KEY
- NORTH
- UNLOCK DOOR
- OPEN DOOR
- NORTH
- GET ROPE AND SWORD
- SOUTH
- SOUTH
- GET MAP
- SOUTH EAST
- GIVE MAP TO ELROND
- SAY TO ELROND "HELLO"
- SAY TO ELROND "READ MAP"
- WAIT (until Elrond gives you some lunch)
- EAT LUNCH
- SAY TO ELROND "GIVE ME MAP"
- EAST
- SOUTH
- EAST
- NORTH
- NORTHWEST
- NORTH
- SOUTHEAST
- DOWN
- DOWN
- DOWN
- DOWN
- EAST
- GET GOLDEN KEY
- UP
- NORTH
- WEST
- SOUTH
- EAST
- NORTH
- WAIT (you should be by a crack in a wall, WAIT until it opens and you get captured and thrown in the goblin dungeon!)
- DIG
- SMASH TRAP DOOR (keep doing it until it breaks, there is a CURIOUS KEY underneath. Thorin will take the Key)
- SAY TO THORIN "OPEN WINDOW"
- SAY TO THORIN "PICK ME UP"
- SAY TO THORIN "WEST"
- SOUTHWEST
- WAIT (until a goblin appears)
- NORTH
- SOUTHEAST
- EAST
- GET RING
- NORTH
- SOUTH
- NORTHWEST
- EAST
- OPEN DOOR
- UP
- CLOSE DOOR
- EAST
- EAST
- OPEN CURTAIN
- OPEN CUPBOARD
- GET FOOD
- EAT FOOD
- NORTHEAST
- EAST

- EAST
- LOOK ACROSS RIVER (you should see a boat)
- THROW ROPE ACROSS RIVER (may need to try more than once)
- PULL ROPE
- SAY TO THORIN "CLIMB INTO BOAT"
- CLIMB OUT
- EAST
- SMASH WEB (until it breaks)
- NORTHEAST
- SMASH WEB
- NORTH
- WEAR RING
- EXAMINE DOOR
- WAIT (until the door opens)
- NORTHEAST
- SOUTH
- KILL BUTLER WITH SWORD
- GET RED KEY
- UNLOCK RED DOOR WITH RED KEY
- OPEN DOOR (if Thorin got captured earlier, he'll reappear now)
- OPEN BARREL
- OPEN TRAP DOOR
- GET BARREL
- THROW BARREL THROUGH TRAP DOOR
- SAY TO THORIN "JUMP ONTO BARREL"
- GET BARREL
- THROW BARREL THROUGH TRAP DOOR
- JUMP ONTO BARREL
- EAST
- PICK UP BARD
- WEST
- NORTH
- UP
- NORTH
- NORTHWEST
- NORTH
- WEST
- EAST
- NORTHWEST
- NORTH
- WAIT (keep waiting until sun shines on the rock and opens the SECRET DOOR)
- SAY TO THORIN "UNLOCK DOOR WITH CURIOUS KEY"
- DROP BARD
- EAST
- SAY TO THORIN "WEST"
- WEAR RING
- EAST
- GET TREASURE
- EAST
- WEST
- PICK UP BARD
- UP
- DROP BARD
- SAY TO BARD "GET STRONG ARROW FROM QUIVER"
- WAIT (until Smaug the Dragon shows up)
- SAY TO BARD "SHOOT THE DRAGON"
- SOUTH x 3
- DOWN
- SOUTH x 3
- WEAR RING
- WEST
- WAIT
- WAIT
- WEST
- WAIT
- WAIT
- WEST
- NORTH
- SOUTHWEST
- WEST x 4
- SOUTHWEST
- WEST
- OPEN CHEST
- PUT TREASURE IN CHEST

# Emergence: Indirect game design

Screenshot of *Counter-Strike* removed due to copyright restrictions.

Like Quake III,  
but:

There is only  
one life per  
round.

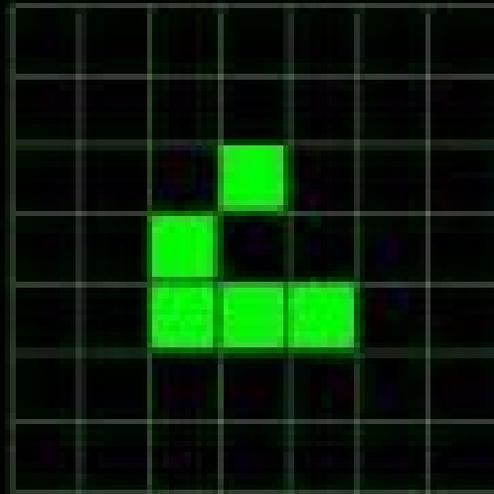
You die easily.

Team-wide  
success criteria.

This completely  
changes the  
game towards  
teampay.

# Game of life

- Does the glider exist?



# Emergence cheap but dangerous

- Proximity mine climbing
- Why is this interesting?
- Proximity mines don't afford climbing!

Screenshot of *Deus Ex* removed due to copyright restrictions.

# Emergence comes from generalizability

- Emergence as: "Flexible game system that allows the player to find his/her own unique solutions to a problem."
- *Emergence comes from the number of possible interactions between objects.*
- Create as many interactions between game objects as possible.
- Not just "gas burns", but "flammable objects", etc..

# Orthogonal unit differentiation

- Harvey Smith: Whatever units / things / options / stuff you put in the game ...
- ... make sure that they can be evaluated on more than one axis.
- Not just differentiate by "cost"
- But differentiate by cost / speed / range / payoff / interaction type

# Emergence / orthogonal exercise

- Starting point: 10\*10 grid, 3 players, players take turn placing a piece on grid. Winner is the player that takes over the entire board. What types of pieces can the players place? Can pieces be moved? What do the pieces do to each other?
- Pieces of paper, game pieces made of paper and marked.
- 20 min: In groups, create a game with only one type of piece - that is "emergent". *Game with simple components where game is unpredictable in an interesting way.*
- 20 min: Create orthogonal units – several types of pieces that the players can place.
- Suggestion: Maximize number of interactions between pieces.
- Overall goal: Use emergence and orthogonality as tools in game design
- Back at 16:20, present.