

# Art 380: History and Theory of Games

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Lecture 11

# Schedule

- Chapter 14
- How's that paper coming along?

# Ch.14:Games as Emergent Sys

- Computer games represent a basic advance in gaming, on par with the invention of counting, because they allow a huge increase in the complexity of games.
- Proof: Before computers, people watched TV.

# Conway's life

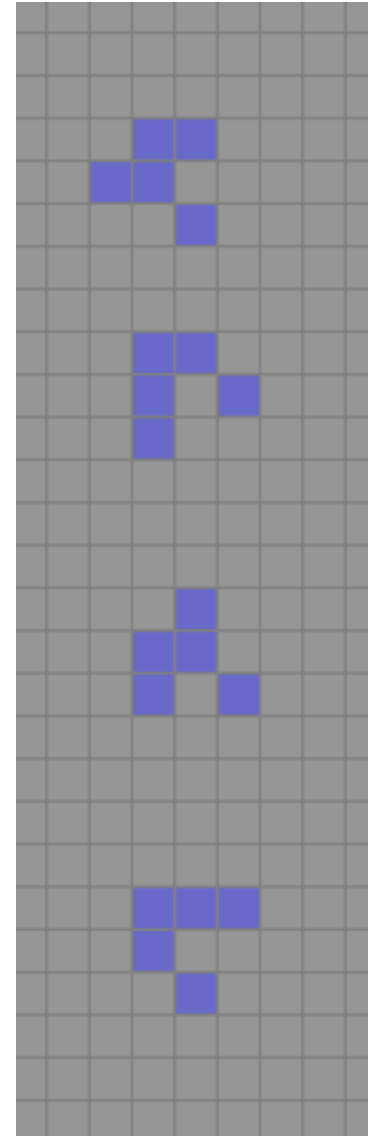
- A **really** boring game
- A cellular automata simulation
  - cellular automata, artificial life-- cool, strange, new, wow.
- ***The*** example of emergent complexity from simple rules
  - <http://www.ibiblio.org/lifepatterns/>

# The Rules of Conway's Life

- use a grid-- a checkerboard.
- squares are either empty or marked
- all squares change at once: this is called a "step"
- if a marked square has 3 marked neighbors, it gets marked next step
- marked squares stay marked if they have 2 or 3 marked neighbors
- otherwise, the square becomes empty

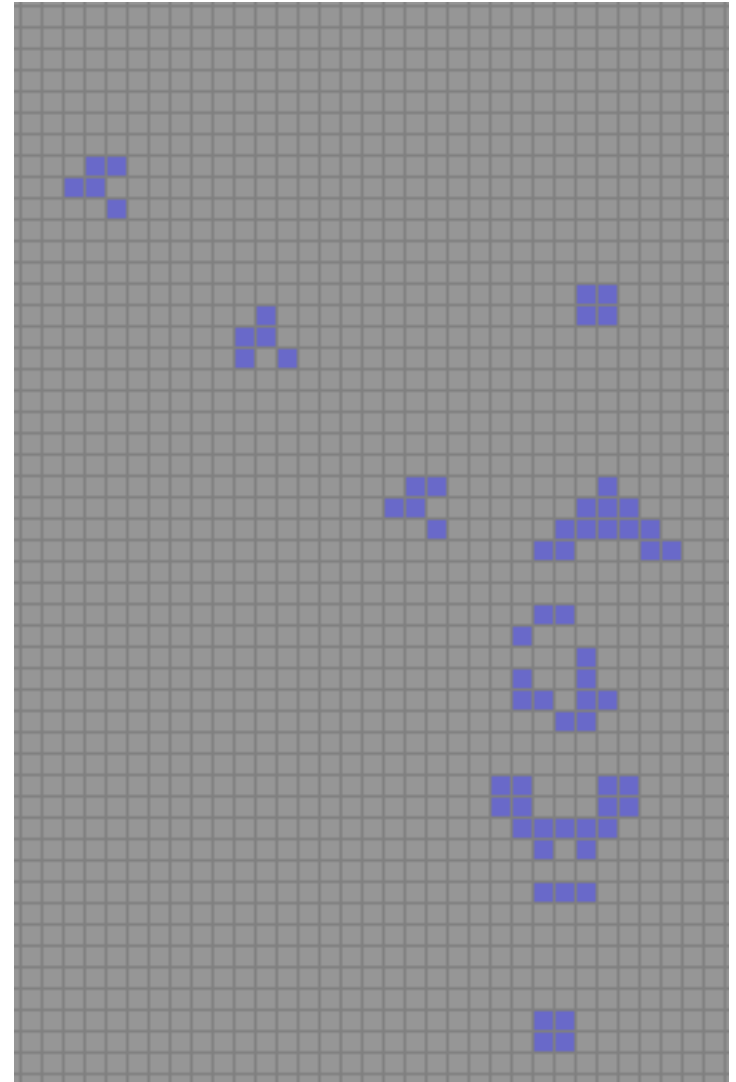
# gliders

- start with the pattern on bottom
- it becomes the pattern above it
- which becomes the above it
- and the one on top becomes the one on bottom
- except translated up and left one space
- it glides away?



# glider guns

- stable patterns
- gliders are emitted



# Seriously. Gliders?

- Where are gliders set up in that rule set?
- Bottom-up behavior
- The rules imply, somehow, the existence of gliders.
- Carbon, Hydrogen and Oxygen imply dogs, somehow.
- Queens, Pawns, and castling imply end games, somehow.

# The role of the grid in C's Life

- Context-dependent system
- The rules do not contain all the complexity-- the grid remembers the patterns!

# Balance in C's Life

- If you tweak the rules, the patterns change
  - if a dead cell has 3 live neighbors, it becomes live next step
  - live cells stay alive if they have 2 or 3 live neighbors
- Maybe no patterns-- all off, all on.

# related topic: cellular automata

- other ways of generating complexity from “cells” and small rule sets
- often limited to 2D cell arrays

# related topic: artificial life

- work of Sims and Holland
- generate organism attributes from short lists of numbers– “genes”
- generate large populations of organisms, let them run/”live” in simulated environments
- kill less-successful organisms
- “breed” (mix genes of) successful organisms

# 4 levels of system complexity

- Fixed
- Periodic
- Complex
  - not entirely repetitive, not entirely unpredictable -- by you!
  - Checkers is solved, but not like TTT
- Chaotic -- the game "Heads or Tails"
  - eternally unpredictable-- no cause, no effect

# 21/Blackjack

- Card game for 2 or more
- Standard deck, face cards all worth 10, Aces worth 11 or 1.
- Blackjack = ace + 10 = 21, instant win
- House = dealer
- Hit = deal another card
- Bust = to go over 21

# The Script of Blackjack

- Players place bets
  - all bets are against the house
- House deals two down to everyone, one down one up to self
  - players with blackjack get 1.5 times their bet
- Players take more cards or stop
  - going over 21 is instant loss
  - 7 cards total and no bust? Instant win?

# House Play

- House must hit if total is  $<17$ 
  - Aces count as 11 unless that would cause a bust
  - House wins all ties (conventionally)
- Splitting pairs-- if you are dealt a pair, you may double your bet and play two hands, directing cards to either in any order
- Let's play

# Baccarat

- Say "Back uh rah"-- unless in Vegas
- Similar to Blackjack, but play to 9
- International deck, aces low-- 3 packs
  - face cards and 10's worth nothing
  - play to modulo 10



# Spades

- Also called "Call Bridge"-- a simplified version of Contract Bridge
- Invented in Cincinnati, Ohio in the 30's, spread virally during WWII
  - that and cigarettes
- Card game for 4 players-- 2 teams
  - Players sit opposite each other
- International deck, aces high

# Spades Definitions

- Trick, Hand -- as in Hearts
- Bid -- a guess regarding the number of tricks a player will take
- Contract -- the total number of tricks a team bids for a hand
- Set -- to be unable to take enough tricks to fulfill your contract
- Bag -- a trick taken in excess of your contract

# Spades Rules

- Spades is mostly hearts-- you try to take tricks, you have to follow suit
- Unlike hearts, tricks are one point each.
- Spades are "trumps"-- any spade is worth more than any non-spade
- Unlike Hearts, players play in couples—two teams of two

# bidding

- after cards are dealt, before any cards are played, each player bids— predicts the number of tricks he or she will take
- the bids are written down
- partners cooperate to try to take the exact number of tricks they bid as a pair
- partners are not allowed to discuss their hands

# spades scoring

- your team gets one point for each trick taken
- if you get the exact number of tricks that you bid, you get 10 more points
- if you do not get as many tricks as you bid, you lose 1 point for each missing trick (bid 5 and take 3 =  $3 - 2 = 1$  point)
- if you get more, nothing
- play until one team has 100 points

# For Next Time

- Chapter 15
- Postmortem: *Weapon of Choice*