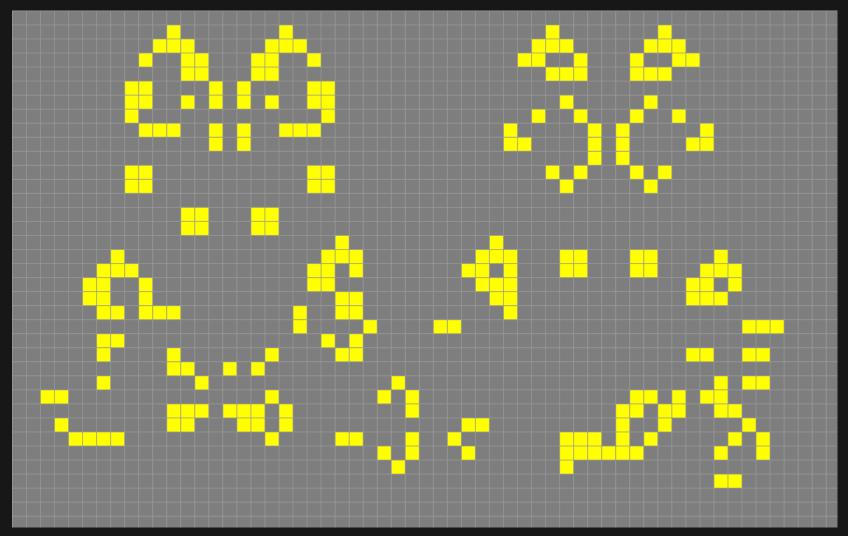
# CREATINE CODING

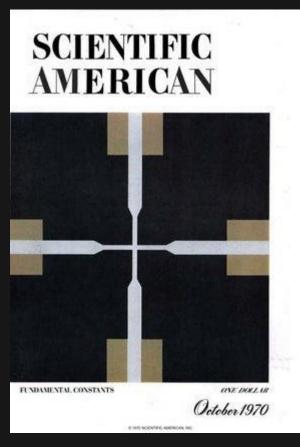
with p5.js

## Game of life



#### Conways game of life

• October, 1970:



#### MATHEMATICAL GAMES

The fantastic combinations of John Conway's new solitaire game "life"

st of the work of John Horton Conway, a mathematician at Gonville and Caius College of way also enjoys recreational mathematgroups. (I ney are cause sporator be for September, 1966. My topic for July, cause they fail to fit any classification scheme.) It is a breakthrough that has had exciting repercussions in both group theory and number theory. It ties in

closely with an earlier discovery by John Leech of an extremely dense packing of unit spheres in a space of 24 dimensions where each sphere touches 196,560 others. As Conway has remarked, "There is a lot of room up there."

the University of Cambridge, has been in ics. Although he is highly productive in pure mathematics. For instance, in 1967 this field, he seldom publishes his discov-"Conway's constellation"—that includes "Mrs. Perkins' Quilt," a dissection proball but two of the then known sporadic groups. (They are called "sporadic" befor September, 1966, My topic for July,

nalogies with the rise fall and alterabelongs to a growing class of what are called "simulation games"-games that resemble real-life processes. To play life you must have a fairly large check-erboard and a plentiful supply of flat counters of two colors. (Small checkers r poker chips do nicely.) An Oriental go" board can be used if you can find flat counters that are small enough to fit because they are not flat.) It is possible it is much easier, particularly for beginners, to use counters and a board.

The basic idea is to start with a simple configuration of counters (organisms) one to a cell, then observe how it chang for hirths deaths and survivals Conway riod of experimentation, to meet three

for which there is a simple proof that the population can grow without limit. 2. There should be initial patter

that apparently do grow without limit.

3. There should be simple initial patterns that grow and change for a consid-erable period of time before coming to an end in three possible ways: fading away completely (from overcrowding or from becoming too sparse), settling into a stable configuration that remains unchanged thereafter, or entering an oscillating phase in which they repeat an

endless cycle of two or more periods.

In brief, the rules should be such as to make the behavior of the population impredictable.

Conway's genetic laws are delightful ly simple. First note that each cell of the checkerboard (assumed to be an infinite plane) has eight neighboring cells, four adjacent orthogonally, four adjacent di-agonally. The rules are:

1 Survivals Every counter with two or three neighboring counters survives for the next generation

2. Deaths. Each counter with four or more neighbors dies (is removed) from overpopulation. Every counter with one neighbor or none dies from isolation.

3. Births. Each empty cell adjacent to

exactly three neighbors-no more, no fewer-is a birth cell. A counter is placed on it at the next move.

It is important to understand that all births and deaths occur simultaneously. Together they constitute a single general



https://de.wikipedia.org/wiki/John\_Horton\_Conway

Two states: Dead / Empty / 0 Alive / Occupied / 1

«A game without player»



#### Conways game of life

- Started as pen & paper, but
- The game unfolds its full richness on a computer
- The game was so hyped in 1970, that the US military estimated the cost of wasted computational power to multiple millions
- The game of life belongs to the family of cellular automata
  - Cellular automata are a type of computational model that consist of a grid of cells that evolve over time based on a set of rules

#### Simple rules



1. Any live cell with fewer than two live neighbours dies, as if by underpopulation.



2. Any live cell with two or three live neighbours lives on to the next generation.

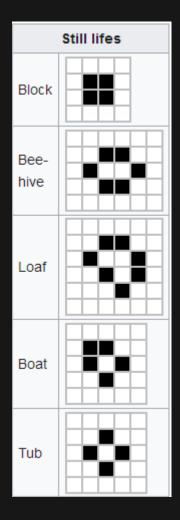


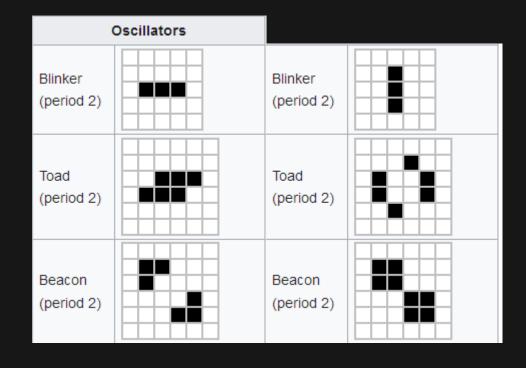
3. Any live cell with more than three live neighbours dies, as if by overpopulation.

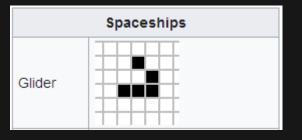


4. Any dead cell with exactly three live neighbours becomes a live cell, as if by reproduction.

#### Groups







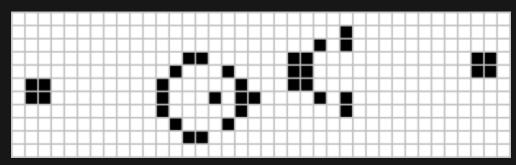
And many more!

Playground & Lexicon:

https://playgameoflife.com/lexicon

#### Conways challenge

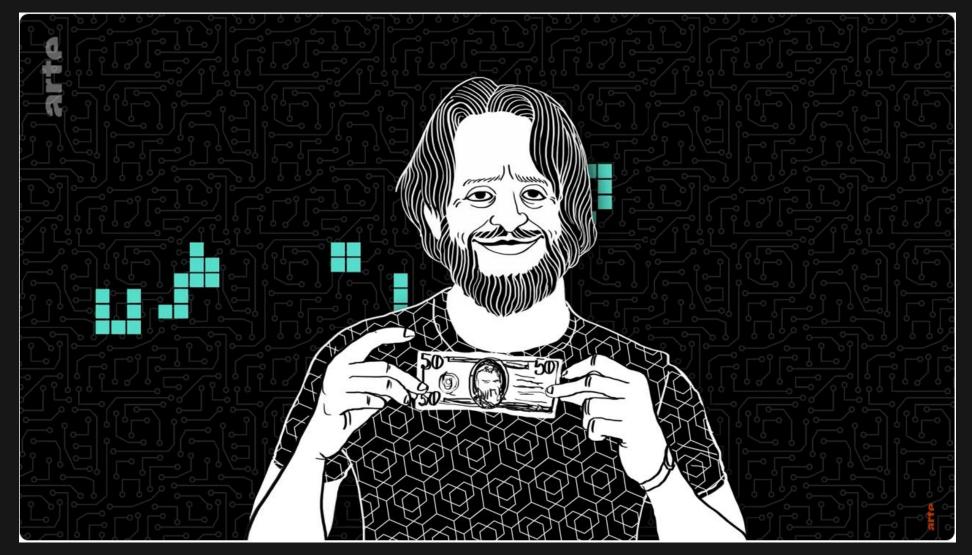
- 50 dollars (~\$350 in 2021)
- Prove or disprove that for any initial configuration with a finite number of living cells, the population cannot grow beyond some finite upper limit
- Bill Gosper from the MIT(Massachusetts Institute of Technology) won with the "Gosper glider gun"



https://en.wikipedia.org/wiki/Conway's\_Game\_of\_Life

#### Game of life

- The basic building blocks of a computer can be created using logic gates such as: AND, NOT, OR.
- You can create such gates in the game of life
  - https://www.alanzucconi.com/2020/10/13/conways-game-of-life/
- You can create the game of life in the game of life
  - https://www.youtube.com/watch?v=xP5-ileKXE8





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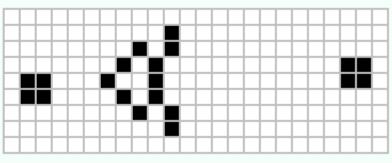
#### Welcome to LifeWiki.

the wiki for Conway's Game of Life. Currently contains 2,577 articles.

Overview · How to contribute · ConwayLife.com

#### This week's featured article

The queen bee shuttle can refer to one of two period-30 oscillators (trans- version shown to the right) in which a queen bee travels back and forth between two blocks. Other stabilisations exist, such as ones that involve the eater 1, called the buckaroo. The queen bee shuttle is the basis of many known true period p30 guns, including the infamous Gosper glider gun. It was found by Bill Gosper in 1970 and was the first period 30 oscillator to be found. It is the smallest known oscillator with period greater than 15 and about the 18th most common naturally-occurring oscillator.





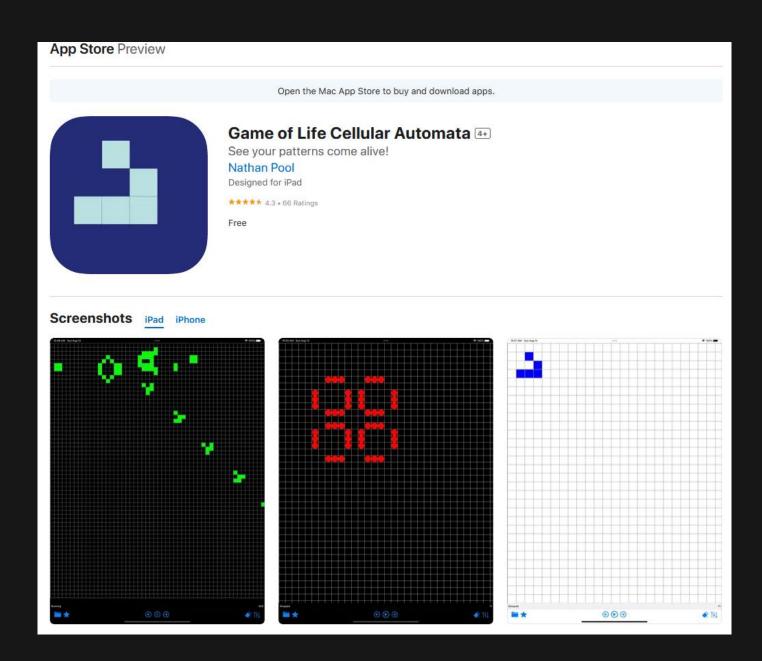
## The Lasting Lessons of John Conway's Game of Life

Fifty years on, the mathematician's best known (and, to him, least favorite) creation confirms that "uncertainty is the only certainty."



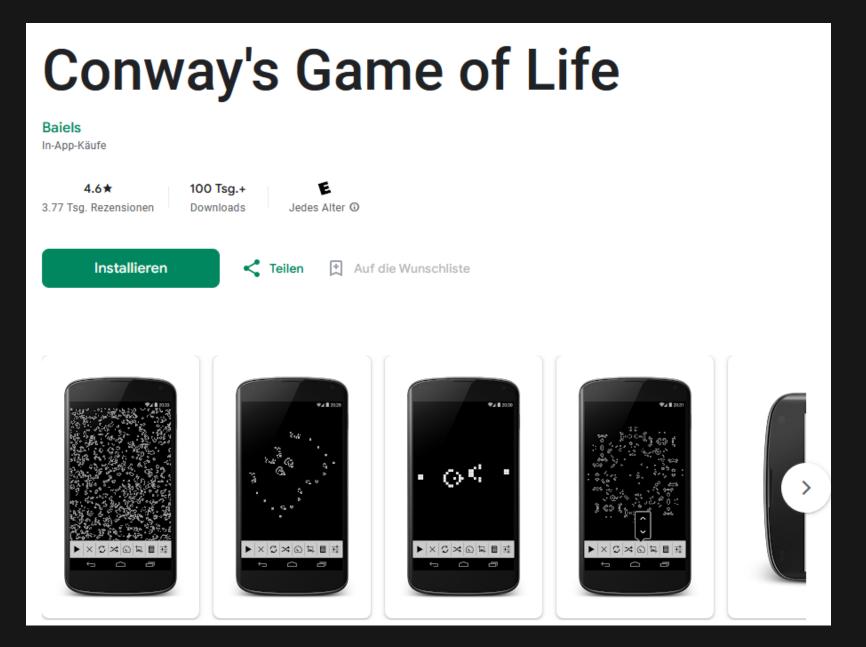
#### Other

There are apps both in the App Store ...



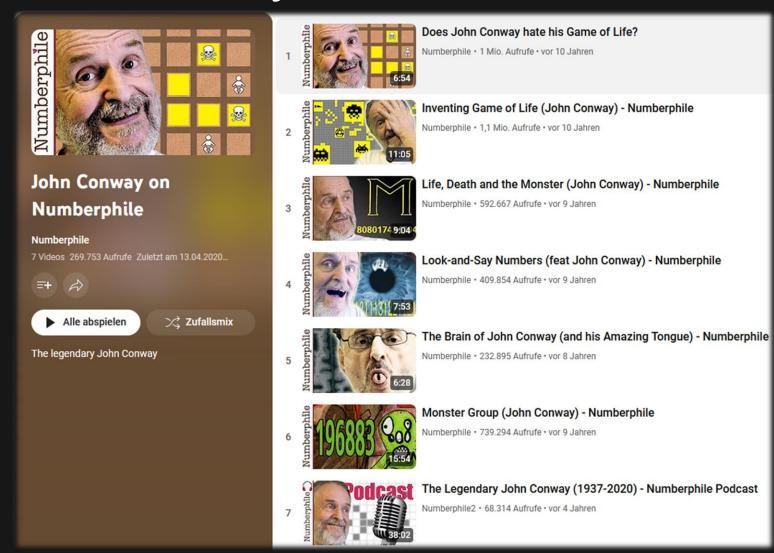
#### Other

... aswell as in the Google Play Store



#### More about John Conway

From Numberphile:



### Tasks

- Implement the game of life
- Try out some structures defined here: <a href="https://playgameoflife.com/lexicon">https://playgameoflife.com/lexicon</a>
- Implement another game of life with your own creative touch!
  - Shape, color, size, alpha, ruleset, interactivity etc..
- Work on your website & individual project