

Women in Mathematics

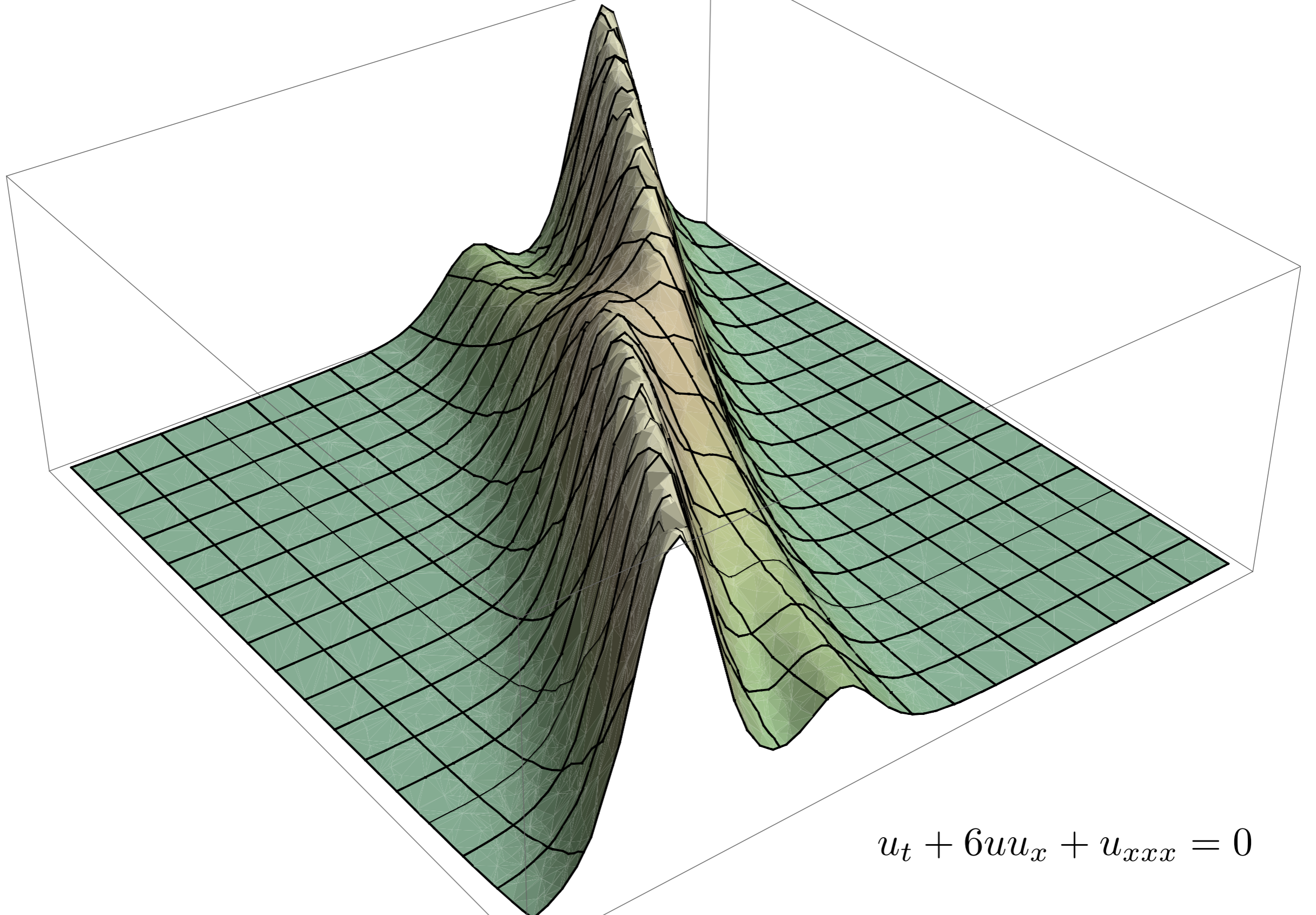
and maths in the world

Nalini Joshi

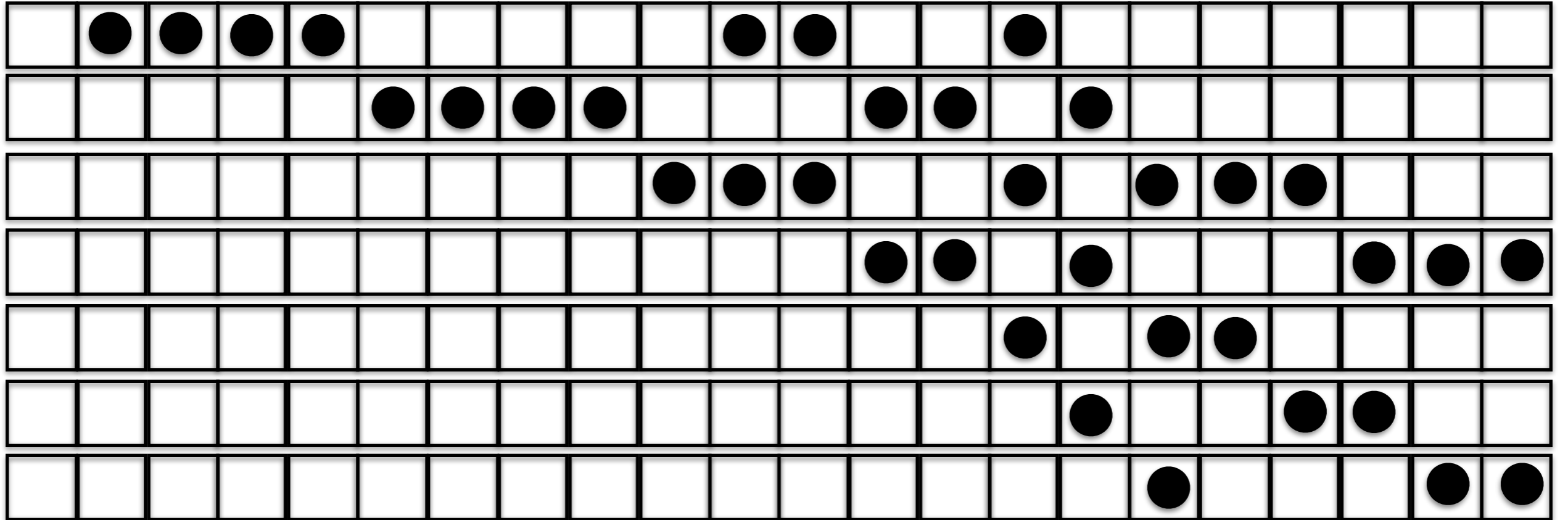


<https://vimeo.com/21661807>

Solitons



$$u_t + 6uu_x + u_{xxx} = 0$$



$$u_i(t+1) = \begin{cases} 1 & \text{if } u_i(t) = 0 \text{ and } \sum_{j=-\infty}^{i-1} u_j(t) > \sum_{j=-\infty}^{i-1} u_j(t+1) \\ 0 & \text{otherwise} \end{cases}$$



When people tell me women can't do maths

1D Cellular Automata

- Each cell has 2 neighbours

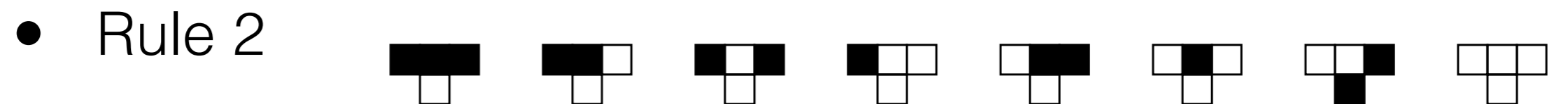
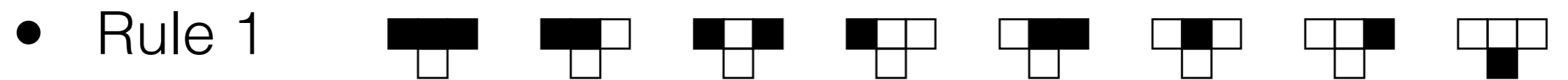


- There are 8 configurations



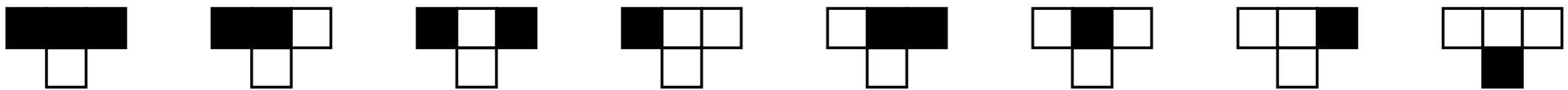
Wolfram's Classification

- Wolfram showed that there are 256 CA

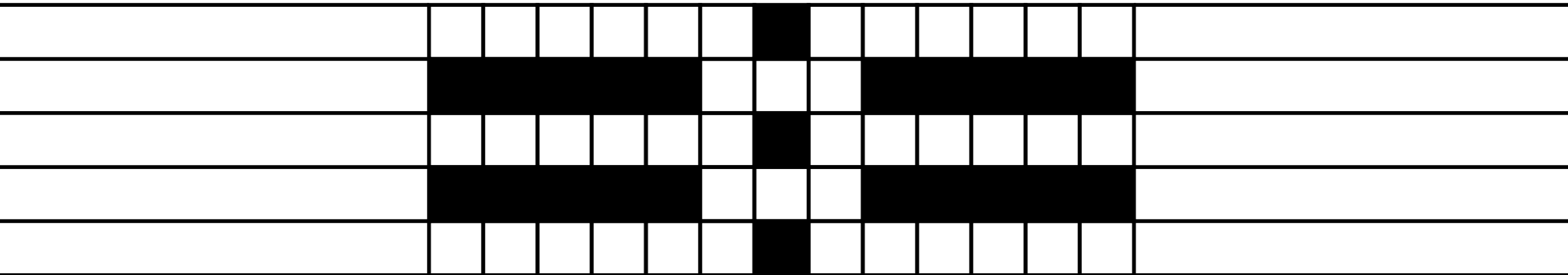


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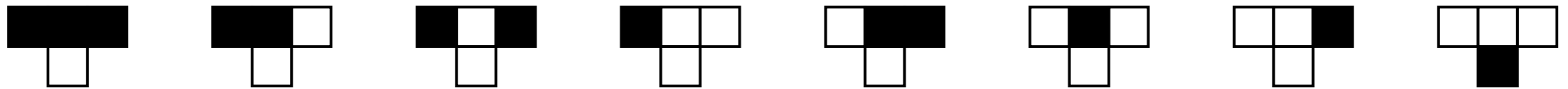
Rule 1



One initial black cell evolves like



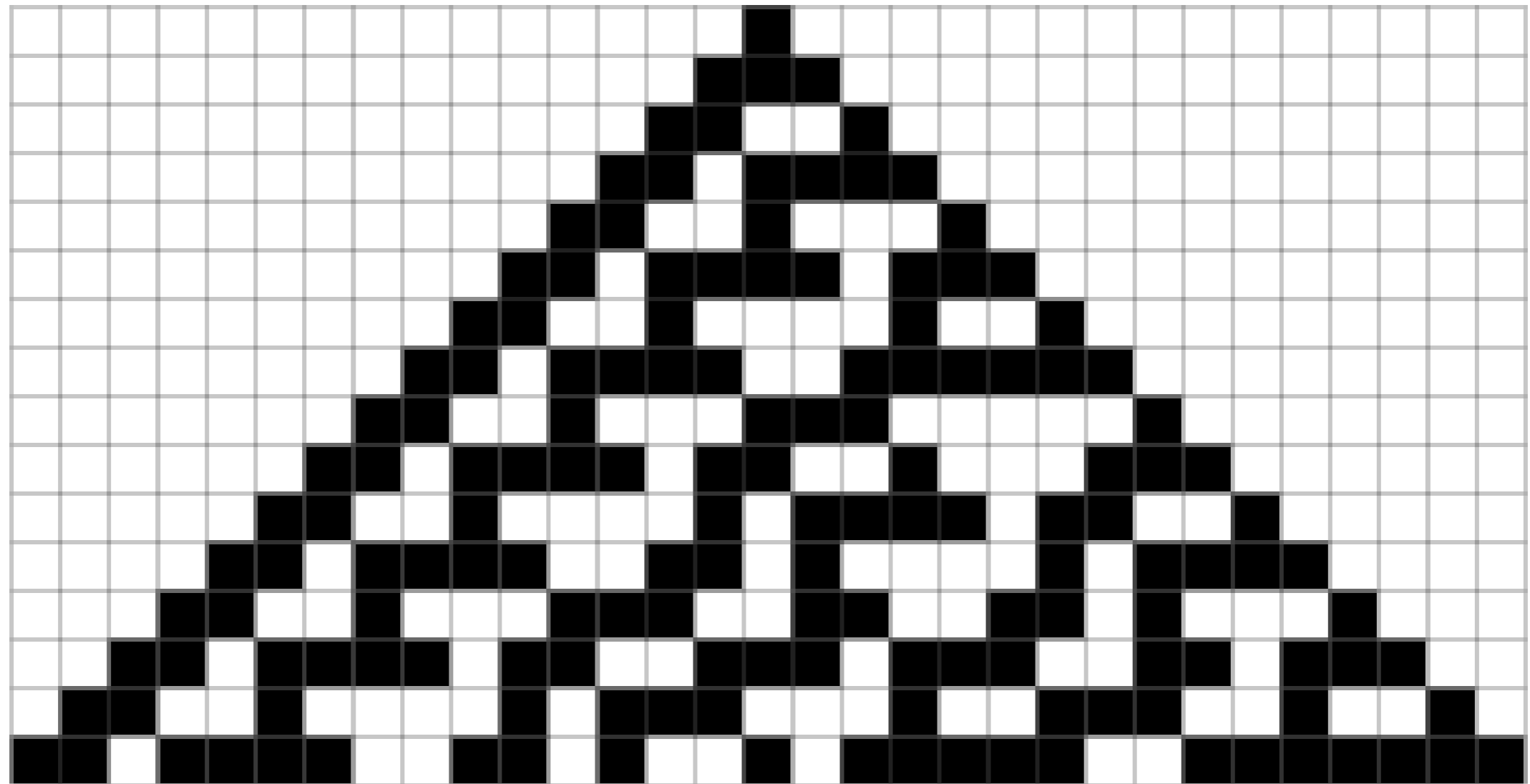
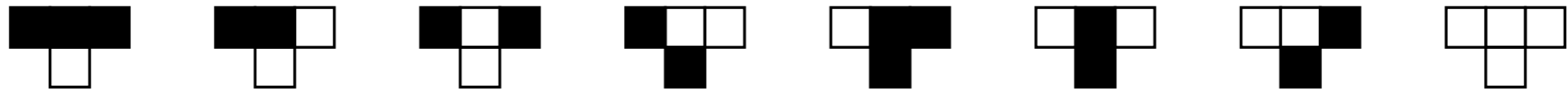
Rule 1 Again



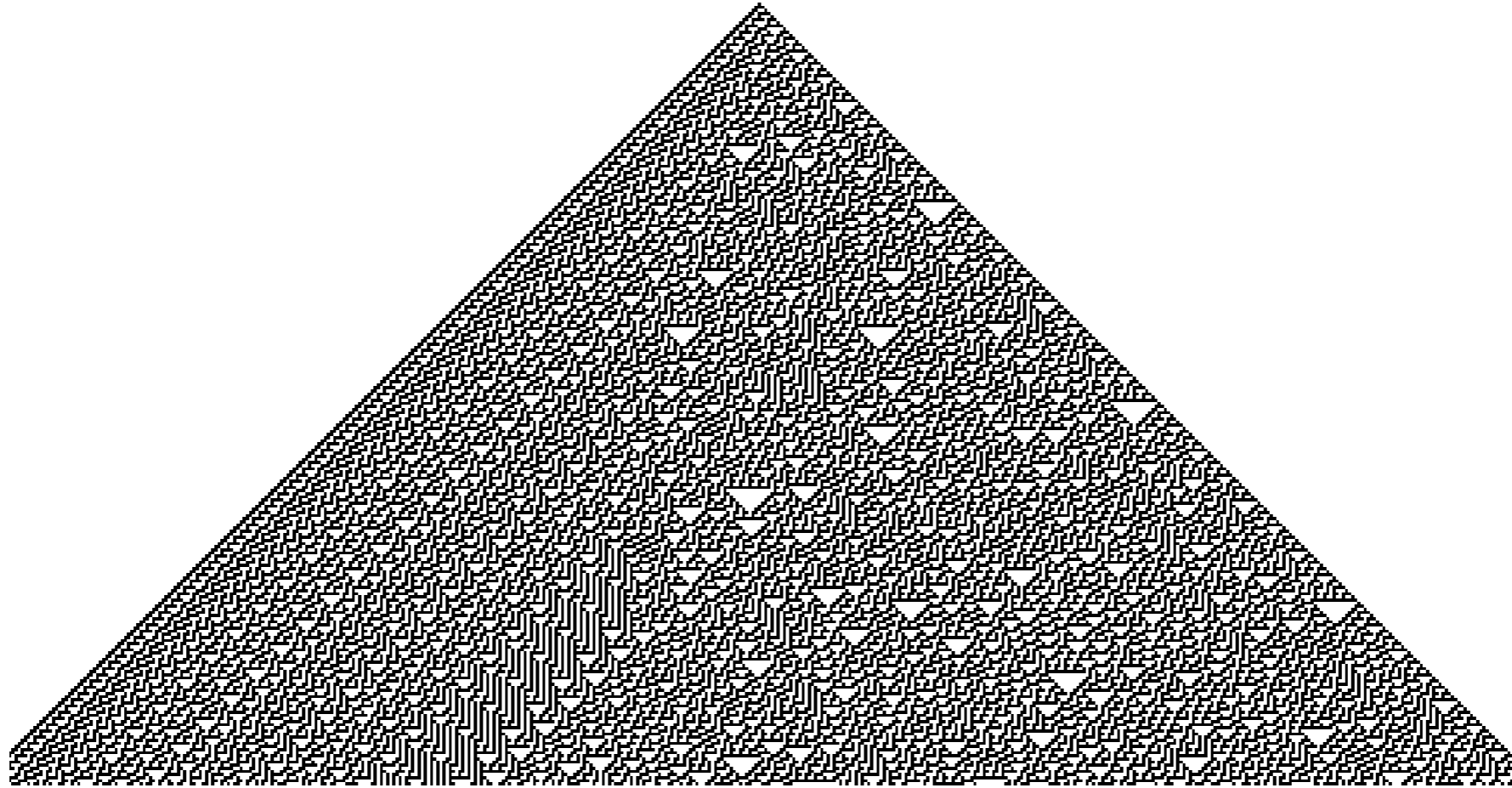
- CA can also be written as equations on a state $u_i(t)$ where $u_i = 0$ means white and $u_i = 1$ means black.
- Rule 1 is then

$$u_j(t + 1) = 1 - \max(u_{j-1}(t), u_j(t), u_{j+1}(t), 0)$$

Rule 30



After 250 iterations



Used as a random number generator in `Mathematica`

Methods to analyse CA models

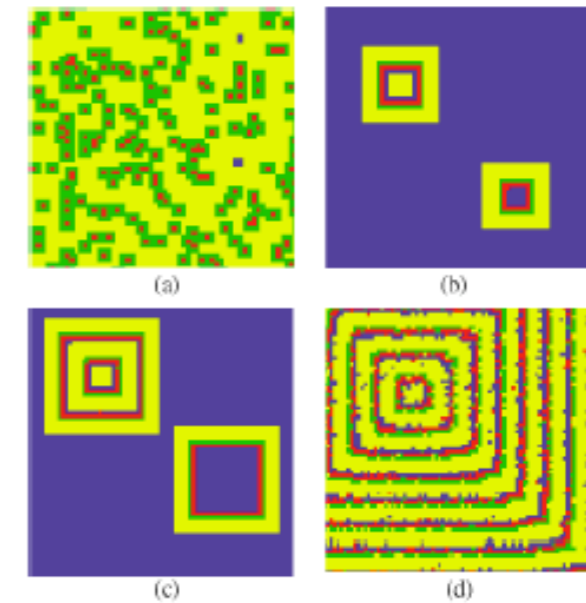
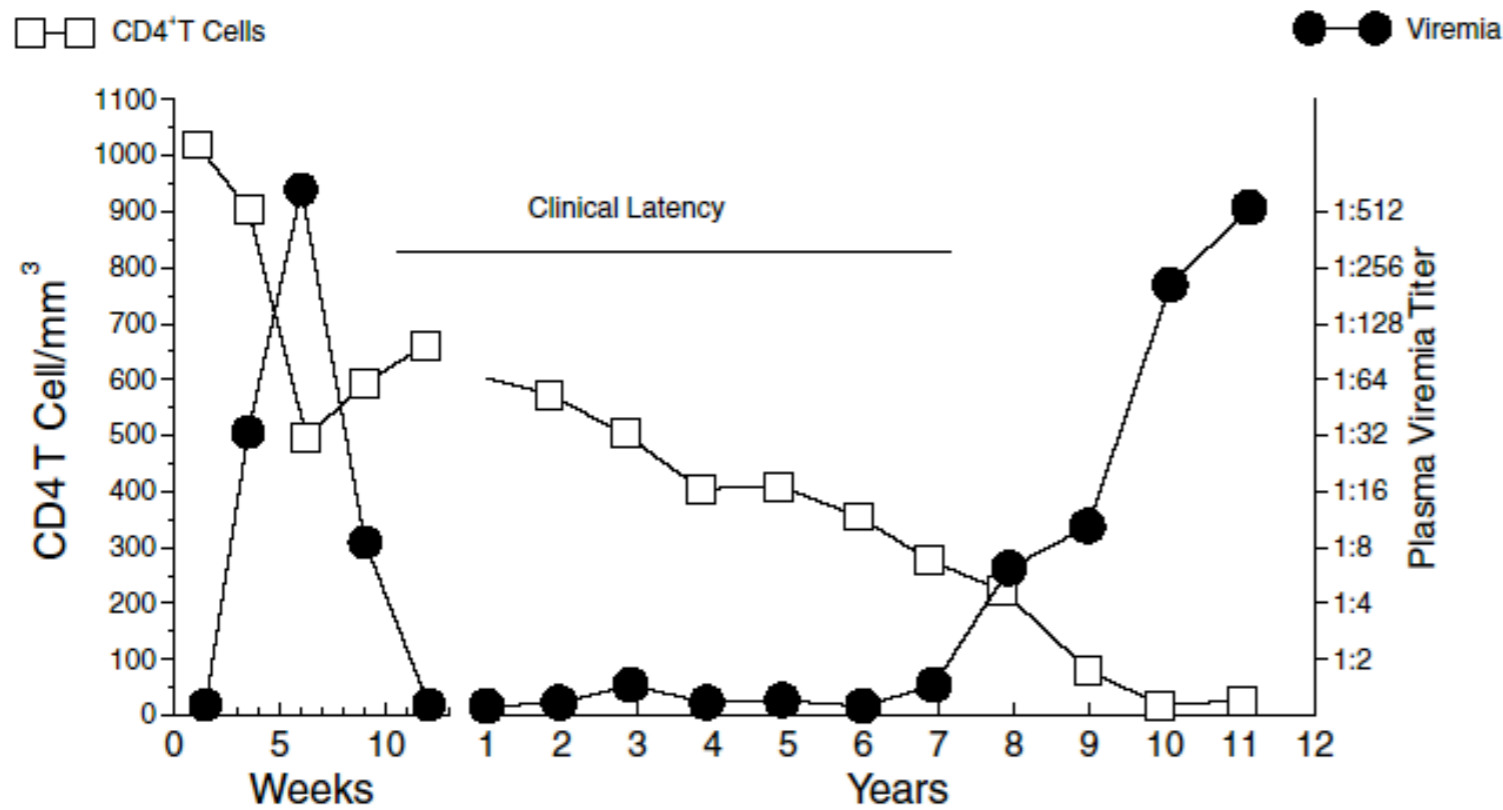


FIG. 3 (color). Four snapshots of parts of the lattice configuration for different time steps: (a)–(d) correspond to 5, 18, 25, and 200 weeks, respectively. We have adopted the same parameters used in Fig. 2. The color codes for the different states of the cell are the following: healthy=blue, infected-A1=yellow, infected-A2=green, and dead=red.

from Zorzenon dos Santos et al *PRL* (2001) 168102