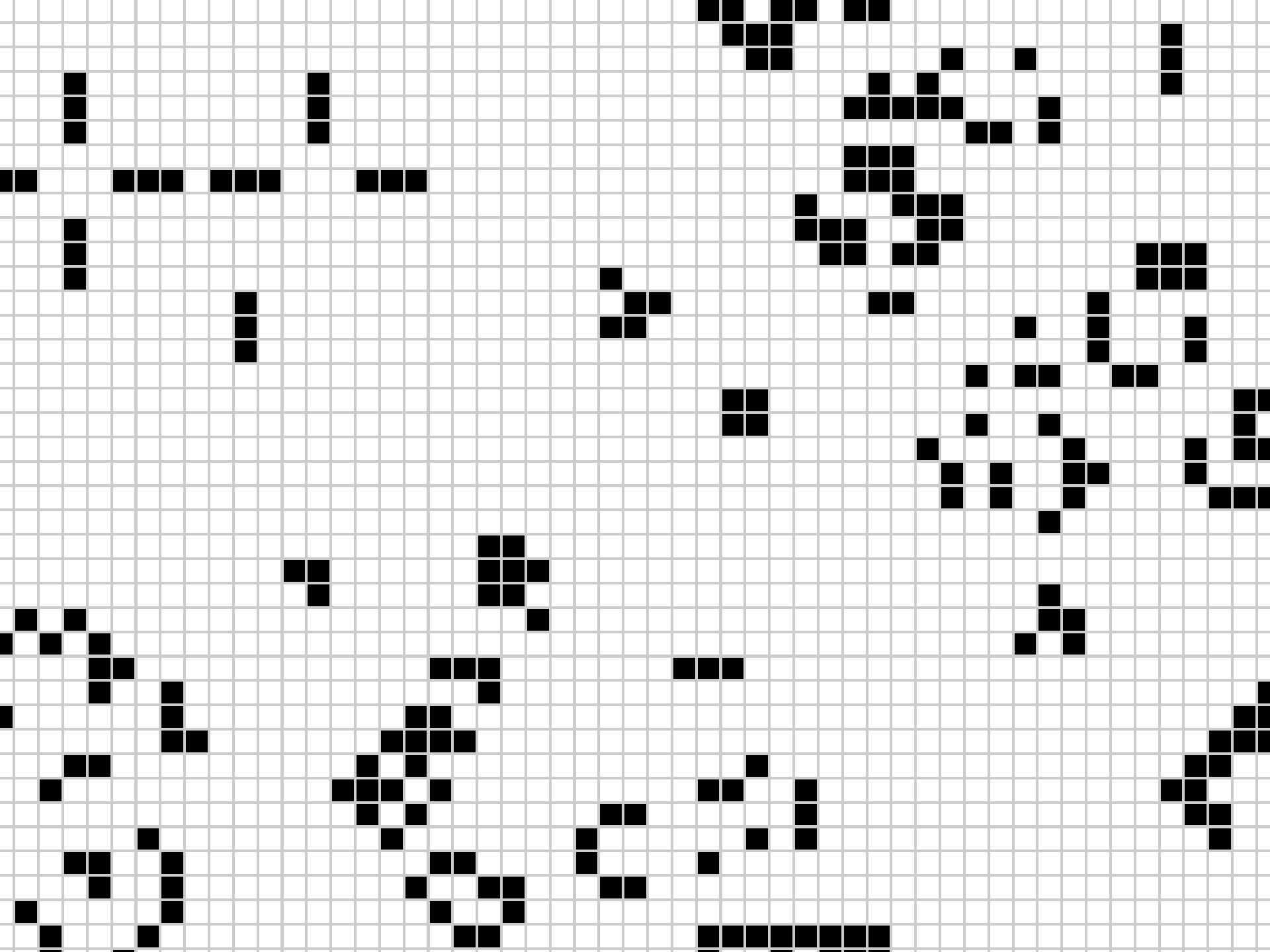


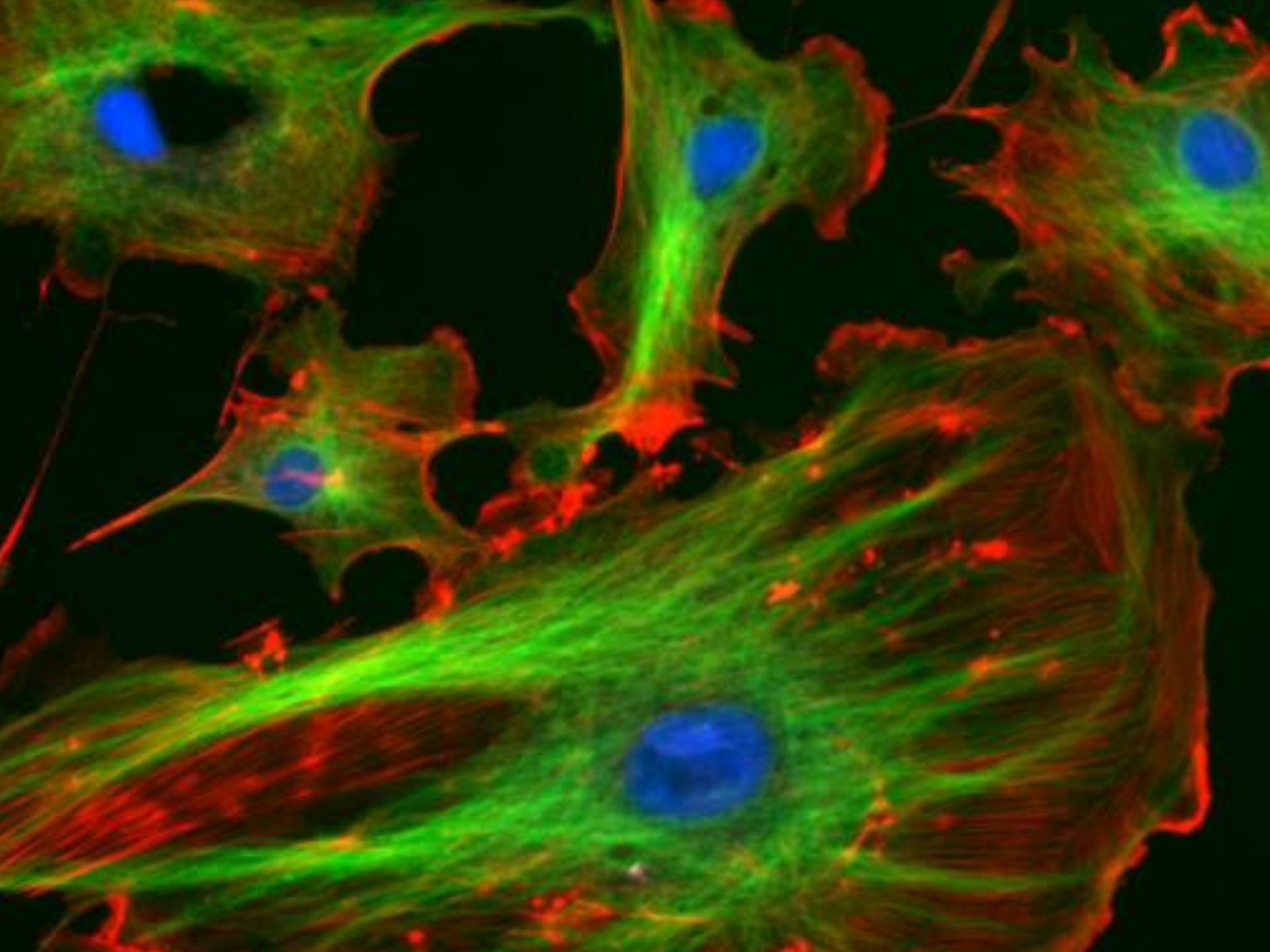
Majority Voting: San Rocco or Ulisse?



Barbara Keller, Panda Metaiel









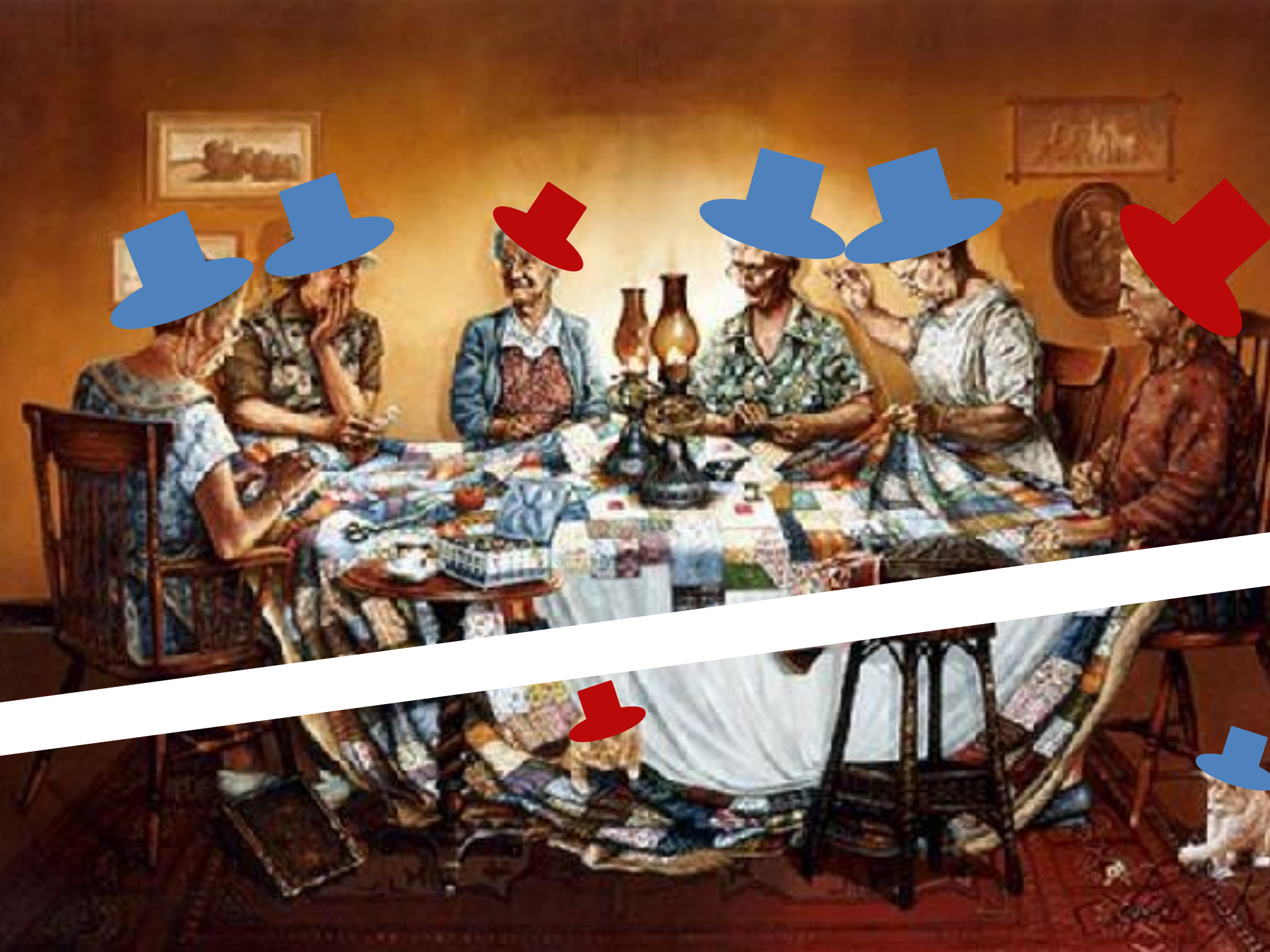
$$\begin{aligned}
& \max_{\mathbf{y}} \sum_t v^t_{\text{chemical}} \beta^t_{\text{chemical}} \\
& \text{s.t.} \quad \sum_{j:j \neq \text{chemical}} \sum_t (v^t_j - v^t_{\text{glc}}) \cdot \beta^t_j = \sum_j a_j + v_{\text{glc_uptake}} \mu_{\text{glc}} + v^t_{\text{biom}} \mu_{\text{biom}} - e_j v_j^{\min} + \sum_j f_j v_j^{\max}; \\
& \quad \sum_t \beta^t_j = 1 \quad \forall j; \quad \sum_t S_{ij} v^t_j \beta^t_j = 0 \quad \forall j; \quad \sum_t v^t_{\text{glc}} \beta^t_{\text{glc}} = v_{\text{glc}}; \quad \sum_t v^t_{\text{biom}} \beta^t_{\text{biom}} = v_{\text{target,biom}}; \\
& \quad \sum_t -v^t_j \beta^t_j \geq -y_j \quad \forall j; \quad \sum_t v^t_j \beta^t_j \geq v_j^{\min} \cdot y_j \quad \forall j; \\
& \quad a_j + \sum_i S_{ij} v^t_i c_j + v^t_j d_j \leq v_j^{t2} - 2W_j v^t_j \quad \forall j, t; \quad \text{biom, chemical}; \\
& \quad v^t_{\text{glc}} \mu_{\text{glc}} + \sum_i S_{i,\text{glc}} v^t_i b_i - v^t_{\text{glc}} c_{\text{glc}} \leq v_{\text{glc}}^{t2} - 2W_{\text{glc}} v^t_{\text{glc}} \quad \forall t; \\
& \quad v^t_{\text{biom}} \mu_{\text{biom}} + \sum_i S_{i,\text{biom}} v^t_i b_{\text{biom}} + v^t_{\text{biom}} c_{\text{biom}} + v^t_{\text{biom}} d_{\text{biom}} \leq v_{\text{biom}}^{t2} - 2W_{\text{biom}} v^t_{\text{biom}} \quad \forall t; \\
& \quad a_{\text{chemical}} + \sum_i S_{i,\text{chemical}} v^t_i c_{\text{chemical}} + v^t_{\text{chemical}} f_{\text{chemical}} + v^t_{\text{chemical}} d_{\text{chemical}} \leq v_{\text{chemical}}^{t2} - 2W_{\text{chemical}} v^t_{\text{chemical}} \quad \forall t; \\
& \quad -My_j \leq e_j \leq My_j, \quad -My_j \leq c_j \leq c_j + M(1 - y_j) \quad \forall j; \\
& \quad -My_j \leq f_j \leq My_j, \quad -My_j \leq d_j \leq d_j + M(1 - y_j) \quad \forall j; \\
& \quad \mu_{\text{biomass}} \geq 0; \quad c_j \geq 0, \quad a_j \geq 0 \quad \forall j, t.
\end{aligned}$$

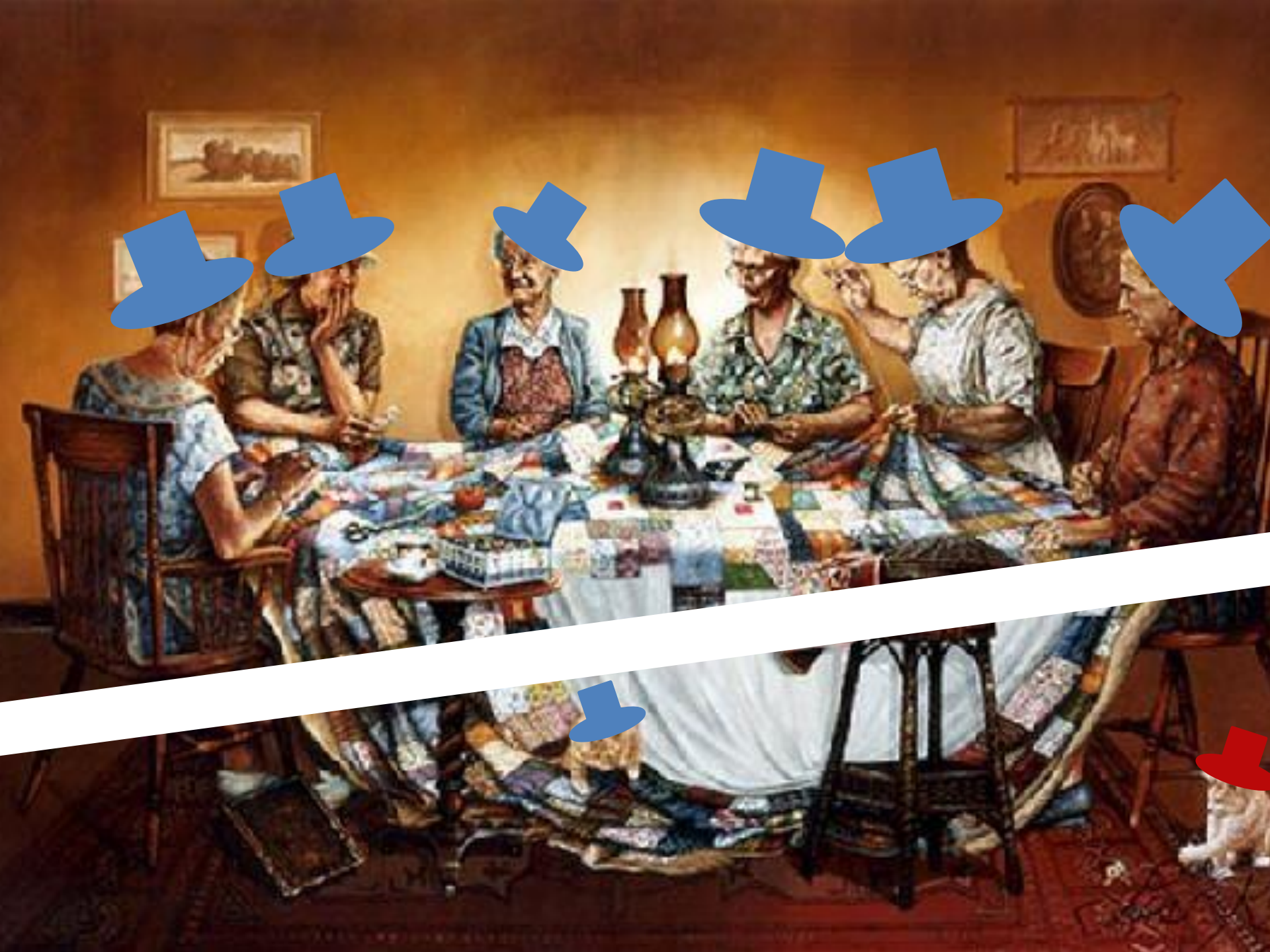
Simple World

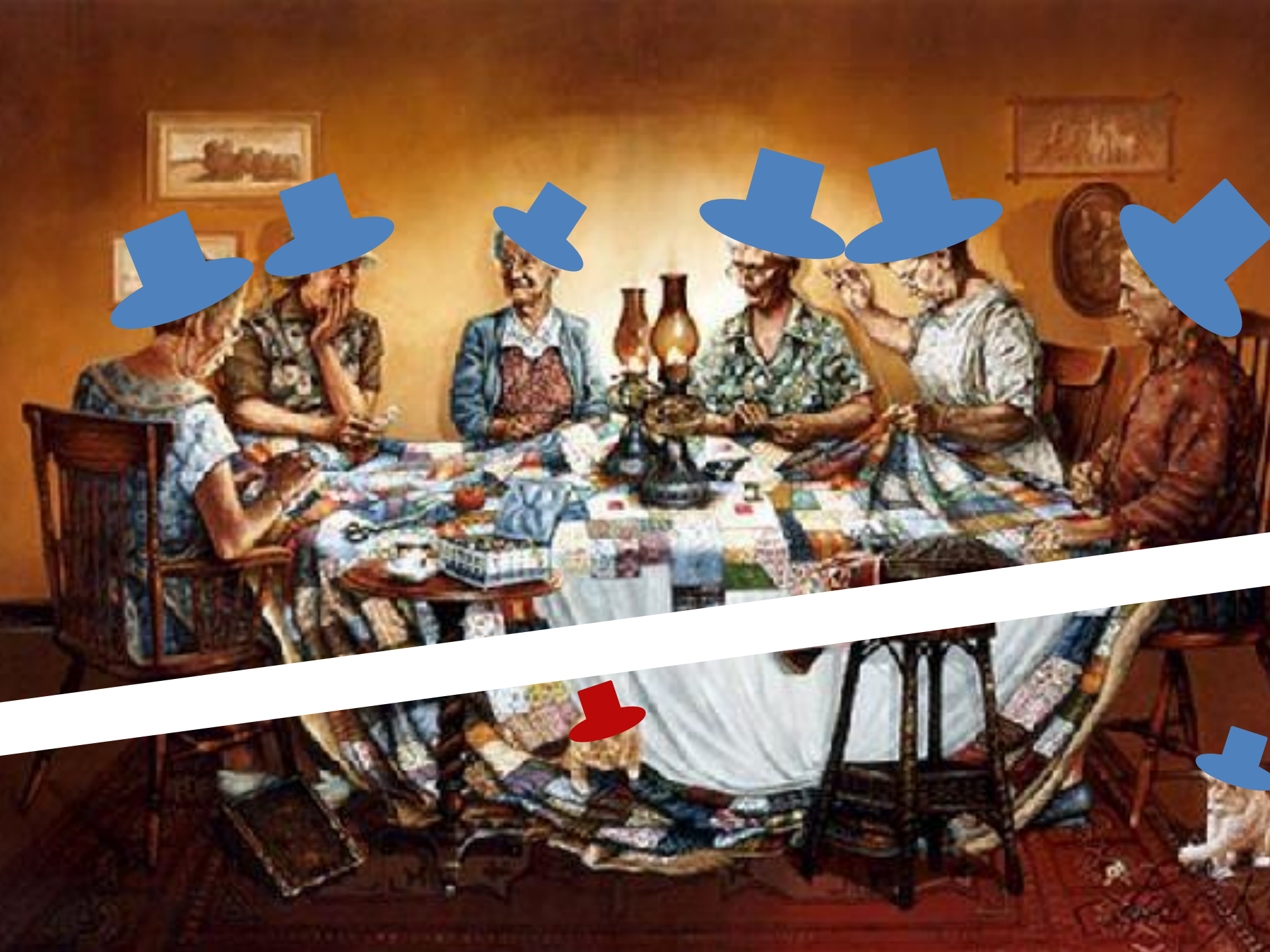


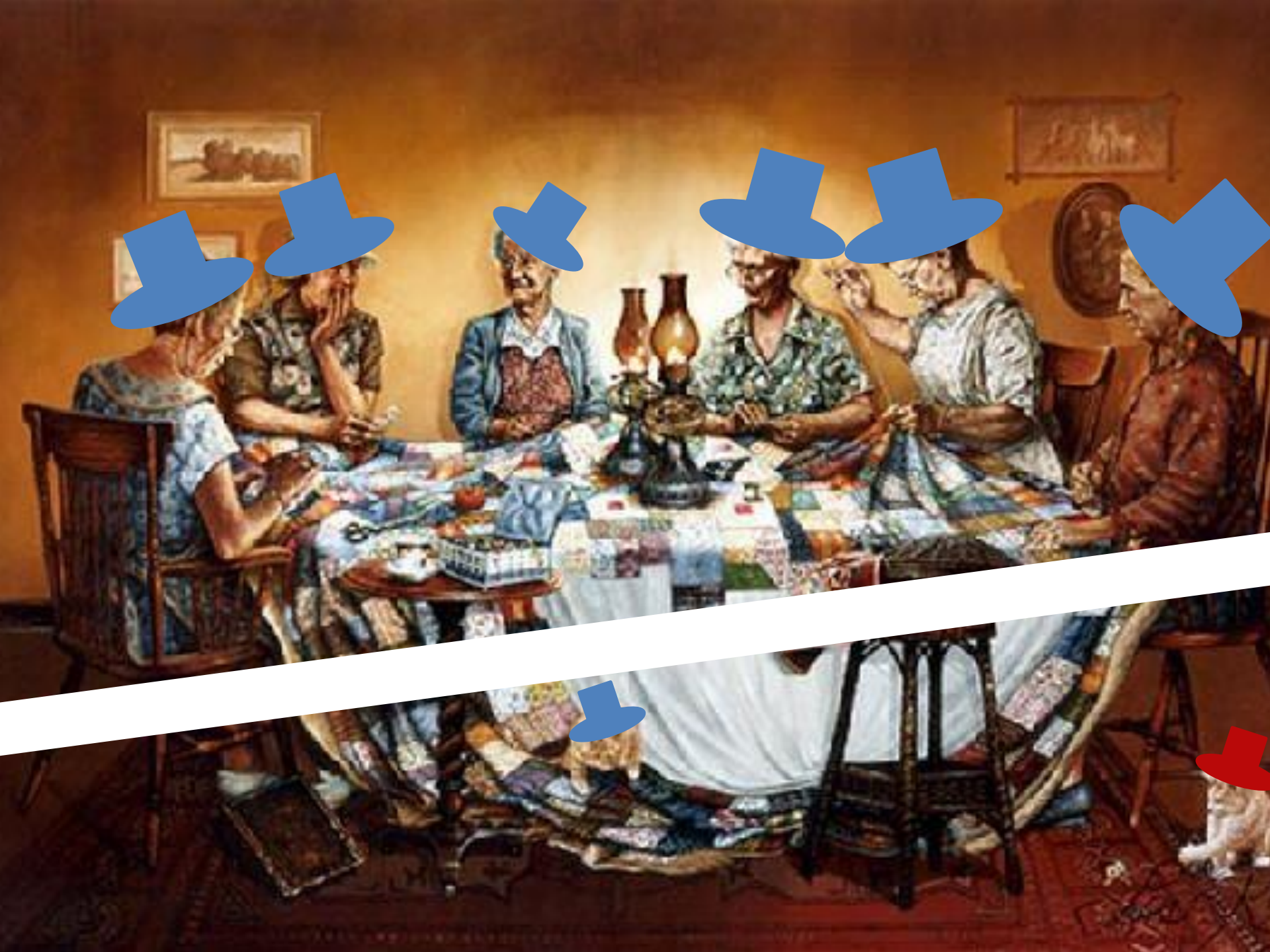
Opinion changes: Whatever the majority of my friends think











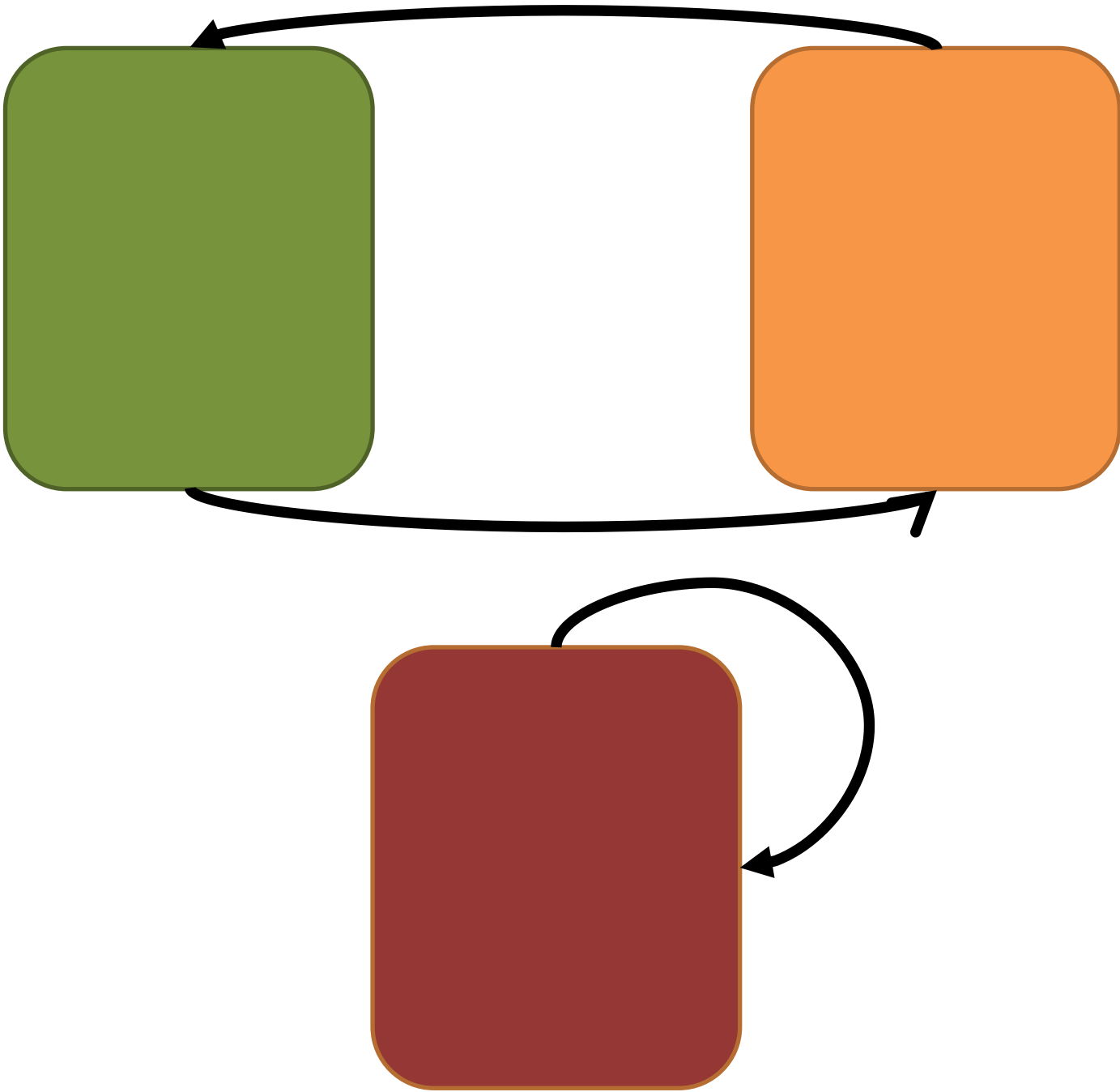
What Can Happen?



and/or



Goles and Olivios 1980





MONDAINE

 SBB CFF FFS

OFFICIAL RAILWAYS CLOCK DESIGN

Easy Lower Bound: $\Omega(n)$



Easy Lower Bound: $\Omega(n)$



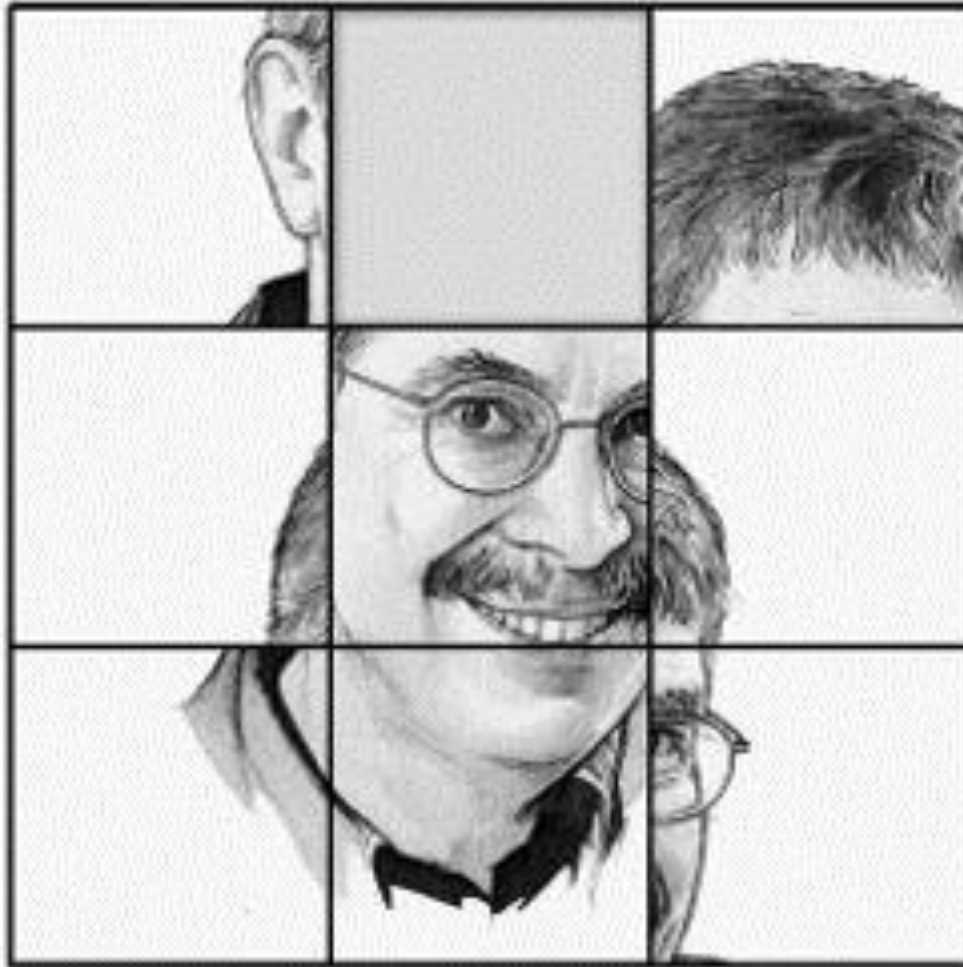
Easy Lower Bound: $\Omega(n)$



Easy Lower Bound: $\Omega(n)$

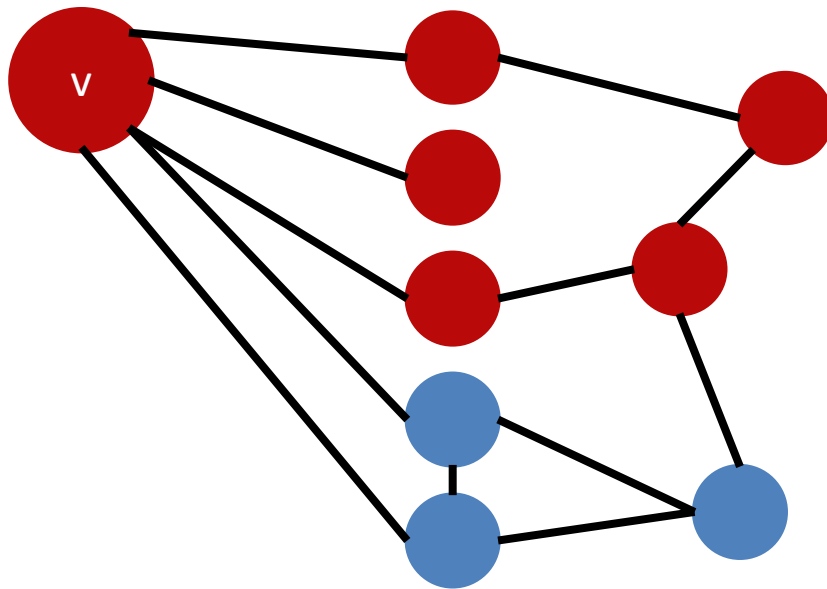


Upper Bound?

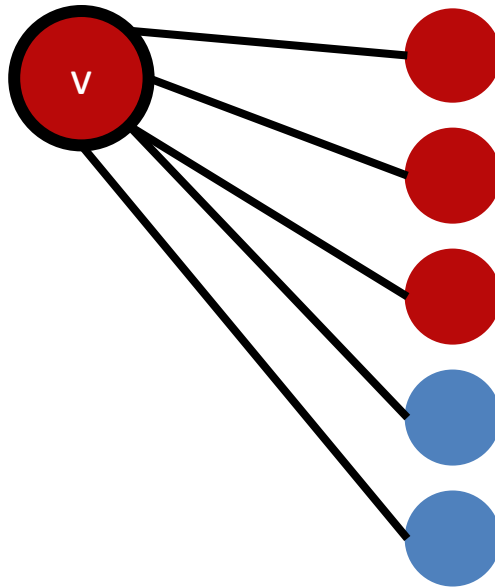


Winkler 2008

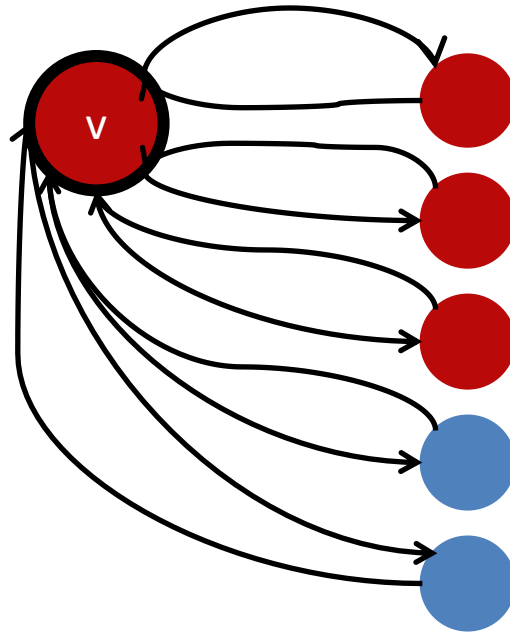
Upper Bound: $O(n^2)$



Upper Bound: $O(n^2)$



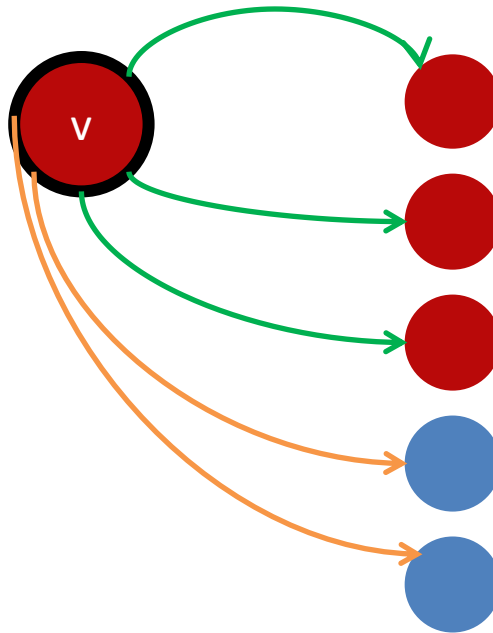
Upper Bound: $O(n^2)$



Upper Bound: $O(n^2)$

Good edge: Friend takes advised opinion on next day

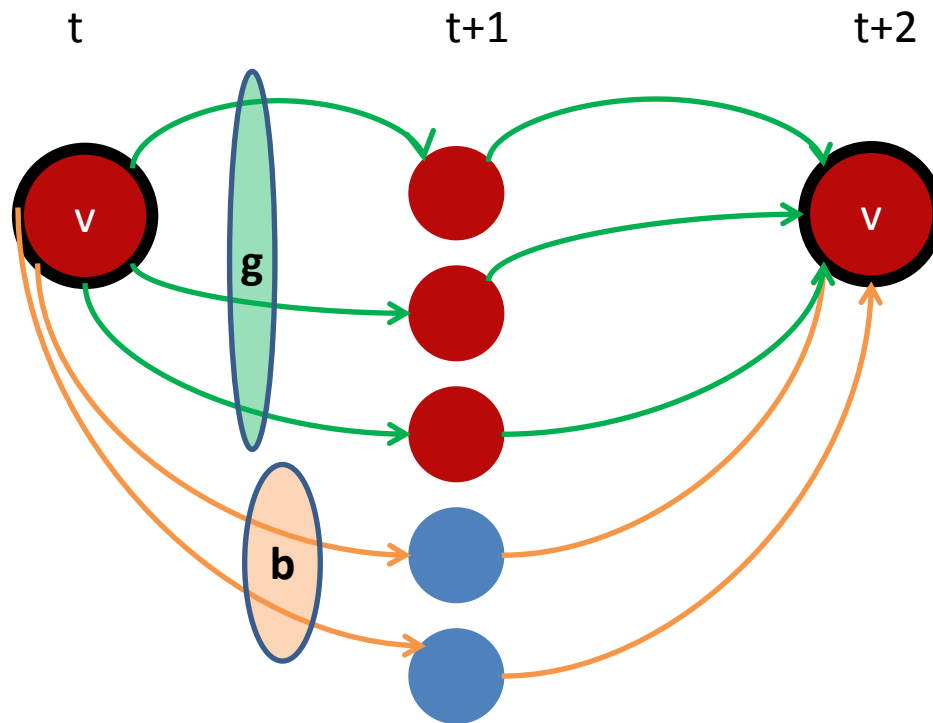
Bad edge: Friend does not take the proposed opinion



Upper Bound: $O(n^2)$

Good edge: Friend takes advised opinion on next day

Bad edge: Friend does not take the proposed opinion



g : Nr. of good edges

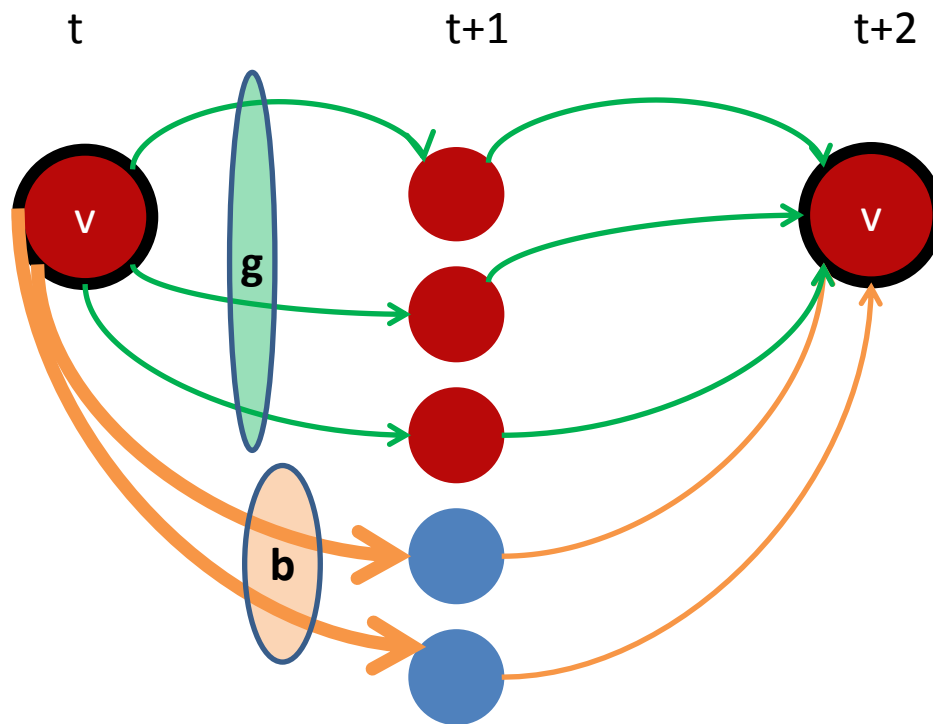
b : Nr. of bad edges

case $g > b$

Upper Bound: $O(n^2)$

Good edge: Friend takes advised opinion on next day

Bad edge: Friend does not take the proposed opinion



g : Nr. of good edges

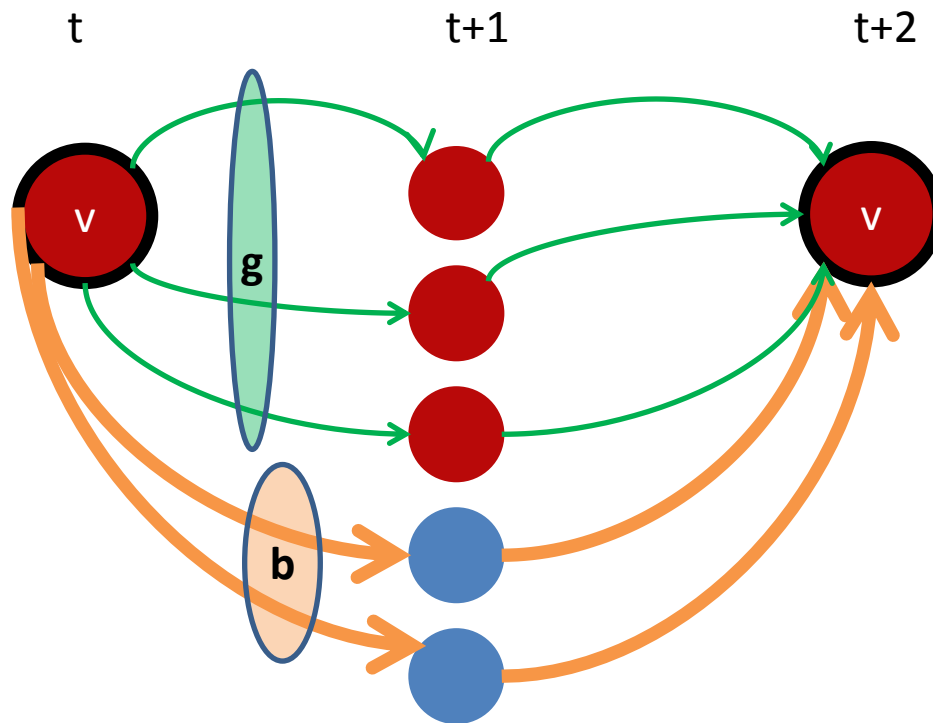
b : Nr. of bad edges

case $g > b$

Upper Bound: $O(n^2)$

Good edge: Friend takes advised opinion on next day

Bad edge: Friend does not take the proposed opinion

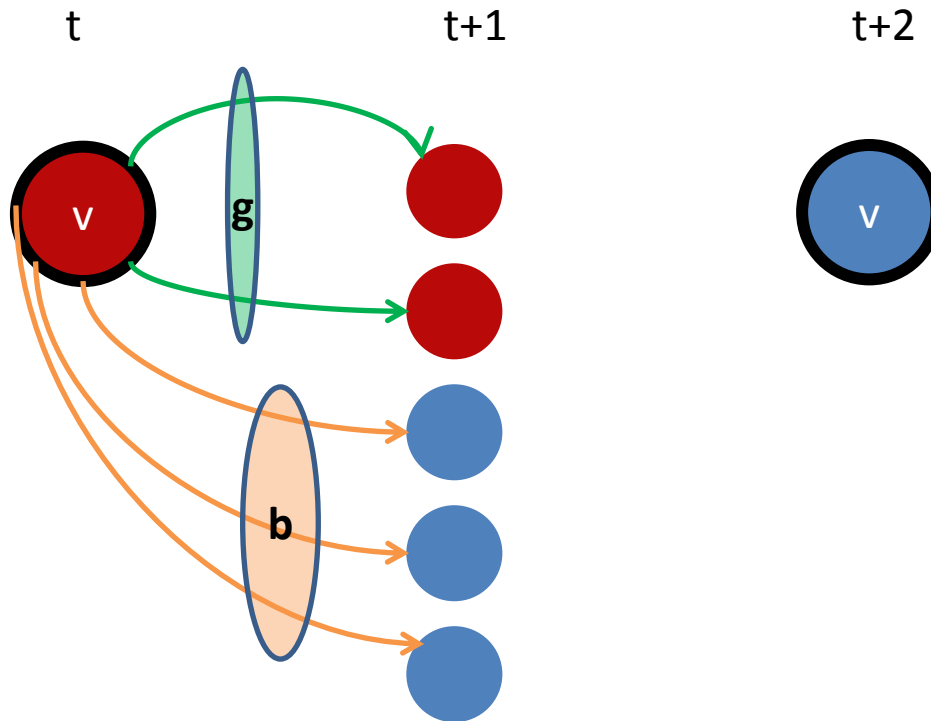


g : Nr. of good edges

b : Nr. of bad edges

case $g > b$

Upper Bound: $O(n^2)$

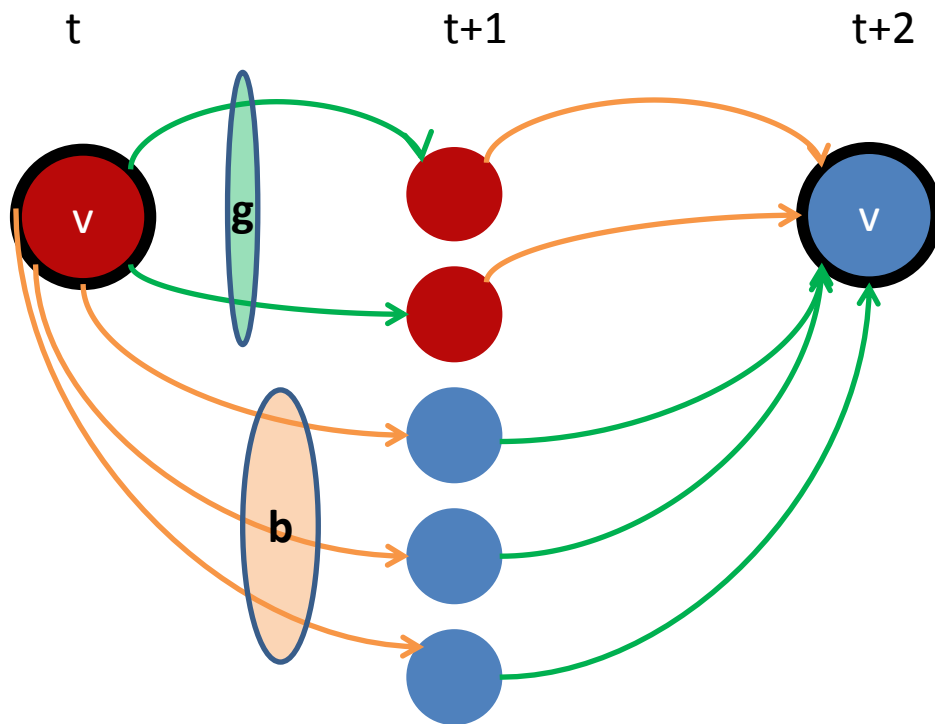


g : Nr. of good edges

b : Nr. of bad edges

case $b > g$

Upper Bound: $O(n^2)$

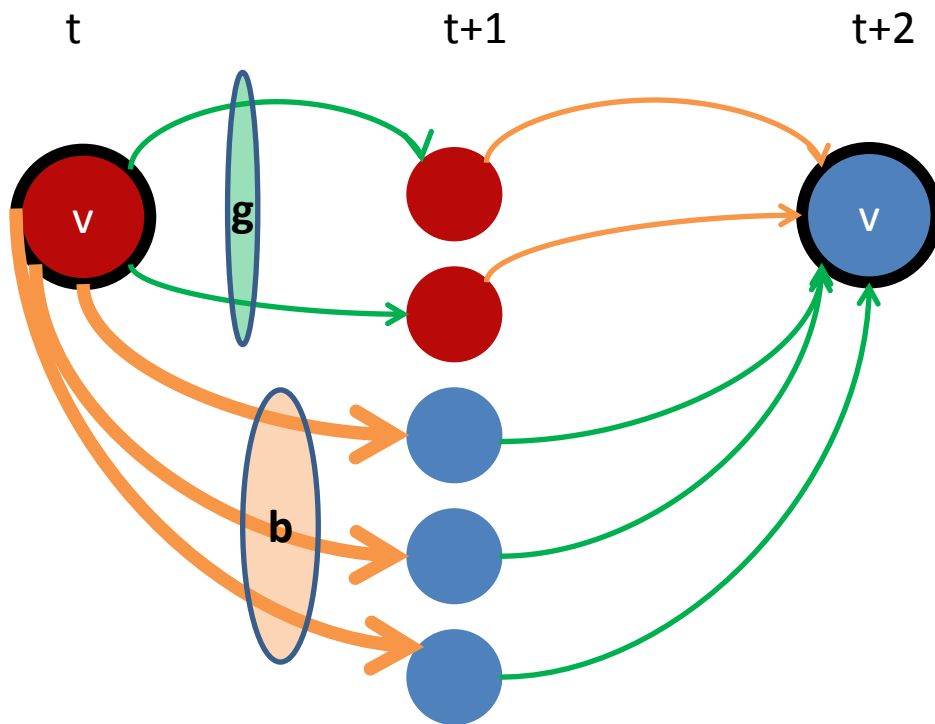


g : Nr. of good edges

b : Nr. of bad edges

case $b > g$

Upper Bound: $O(n^2)$

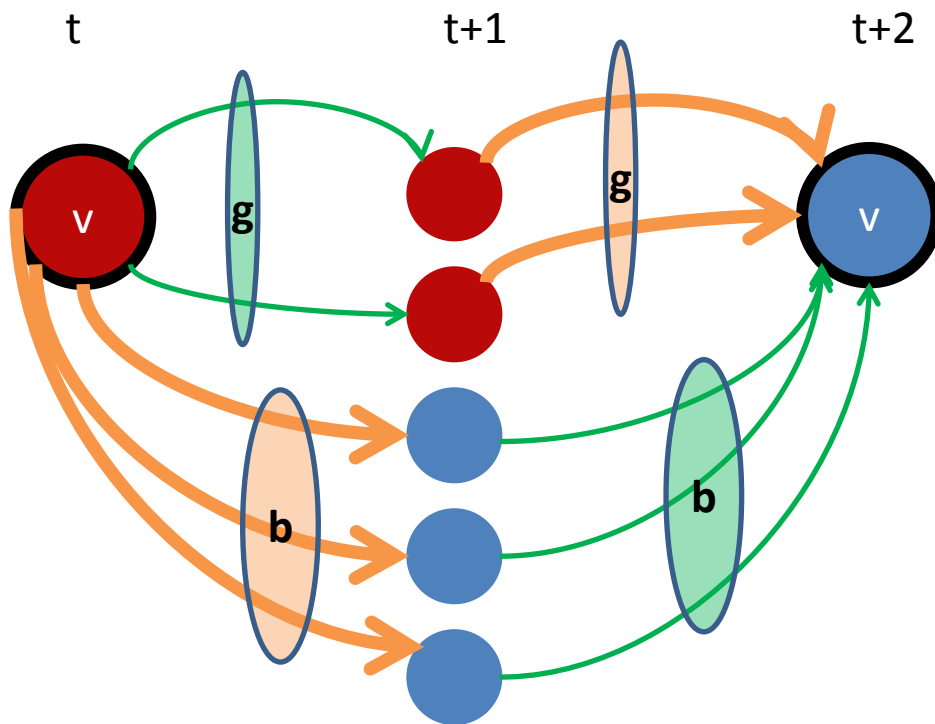


g : Nr. of good edges

b : Nr. of bad edges

case $b > g$

Upper Bound: $O(n^2)$

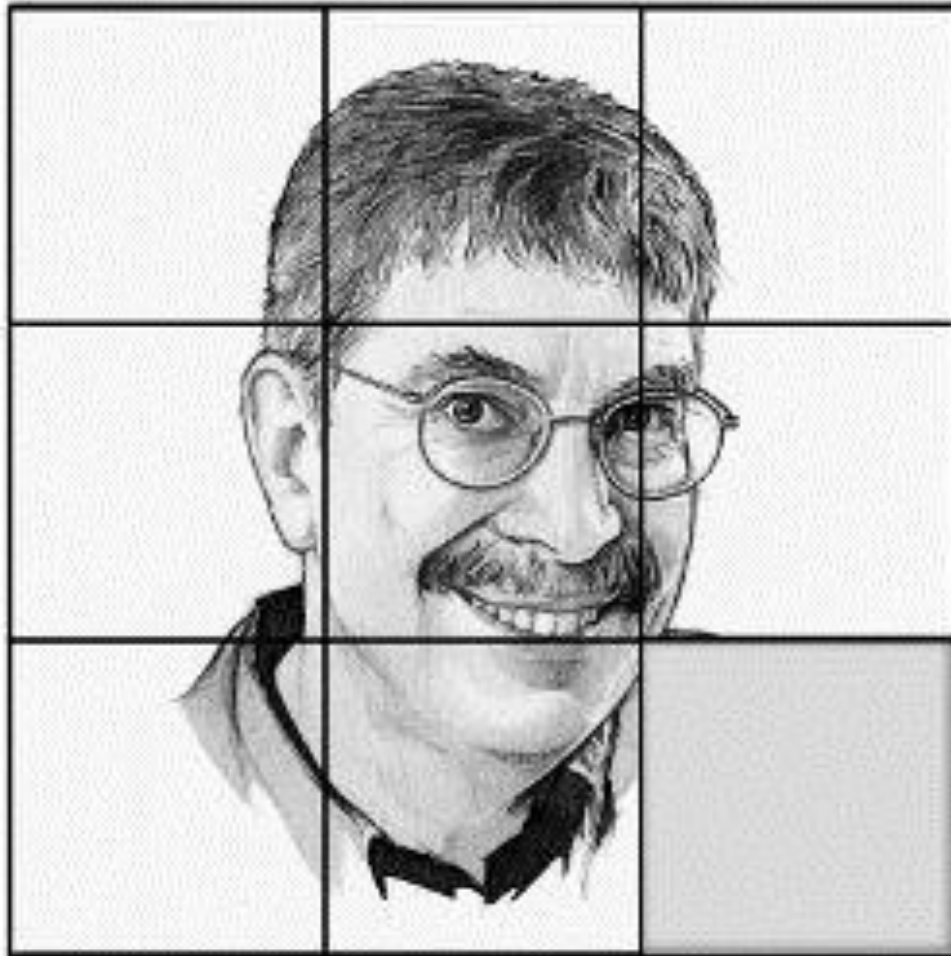


g : Nr. of good edges

b : Nr. of bad edges

case $b > g$

Upper Bound: $O(n^2)$



Winkler 2008

Tight Bound?

Lower bound

n

vs.

Upper bound

n^2



Let`s Vote

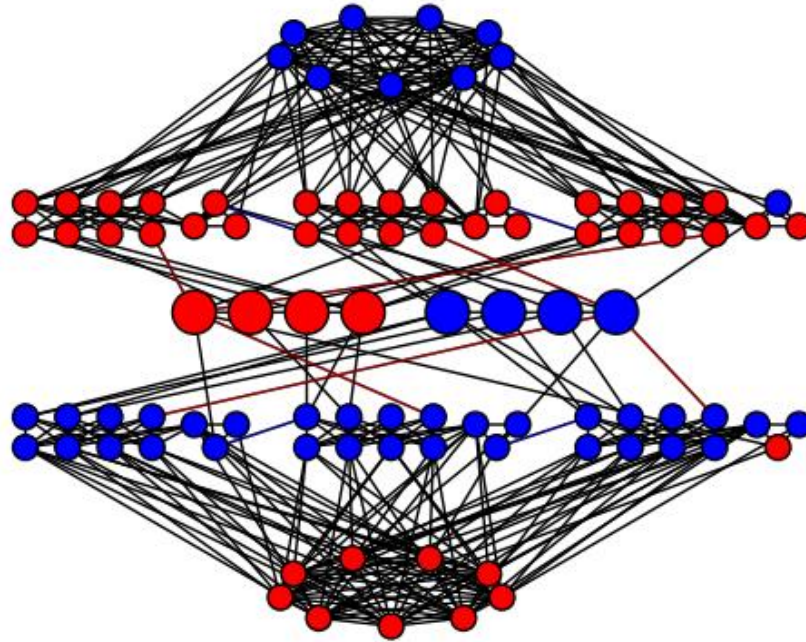
n

vs.

*n*²

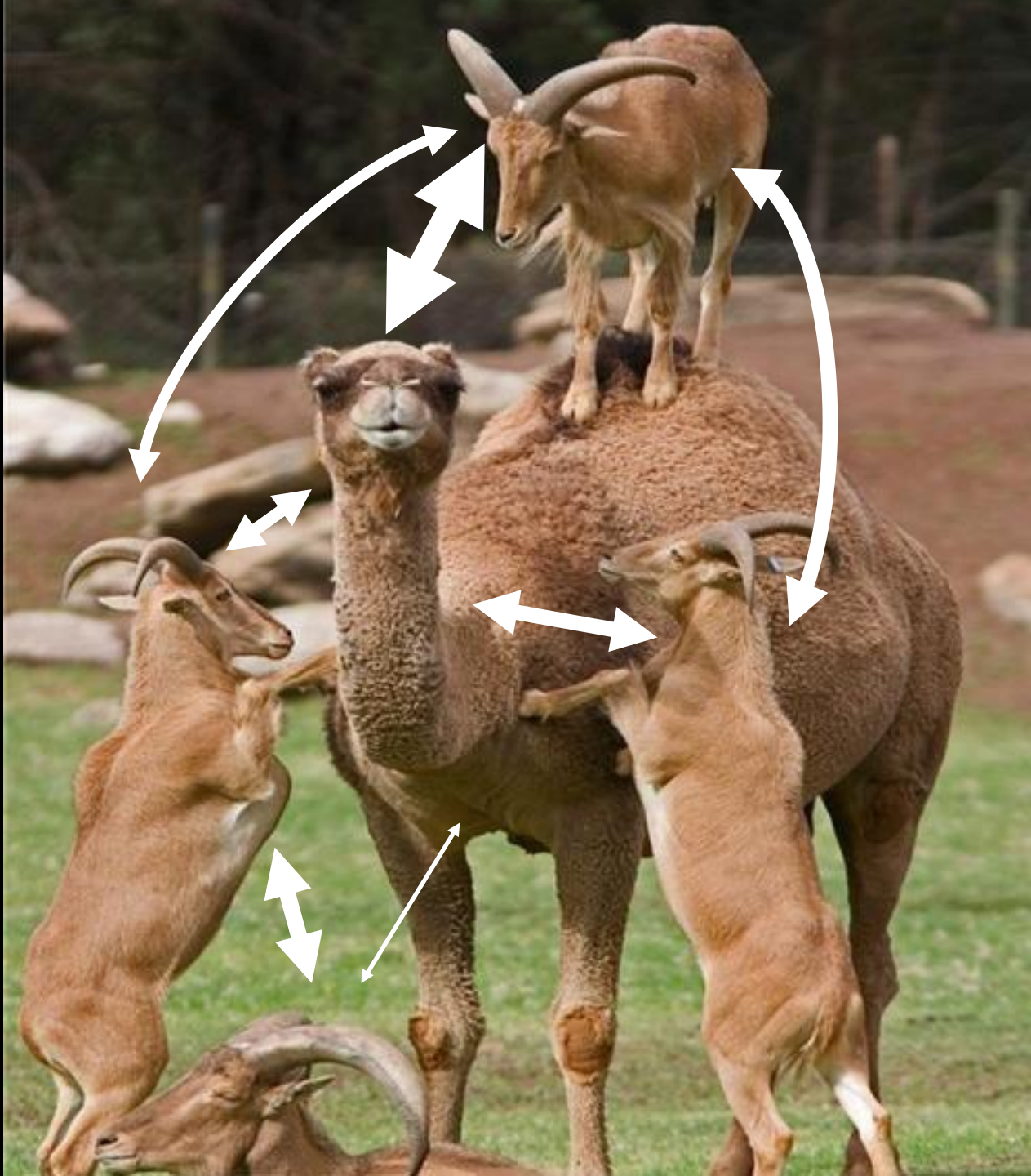
$$\frac{n^2}{\log^2 n}$$

Simpler Example: $n\sqrt{n}$



Different Models







changes
ahead?



Let`s Vote Again!

No!



$$O(n^2)$$

Only a Little Bit!



$$n^{2+o(1)}$$

Yes!



$$2^{\Theta(n)}$$



Let`s Vote Again!

No!



$$O(n^2)$$

Only a Little Bit!



$$n^{2+o(1)}$$

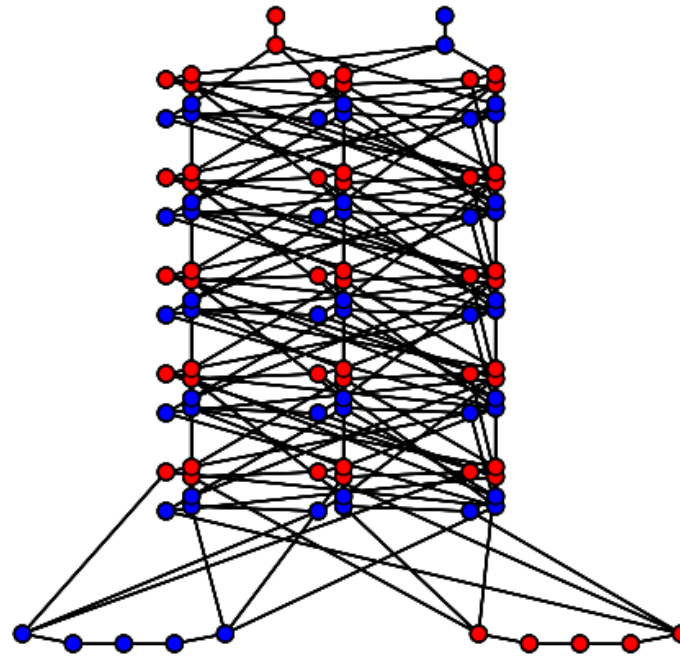
Yes!



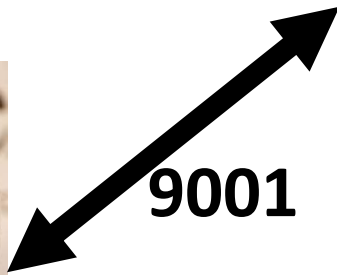
$$2^{\Theta(n)}$$

Animations

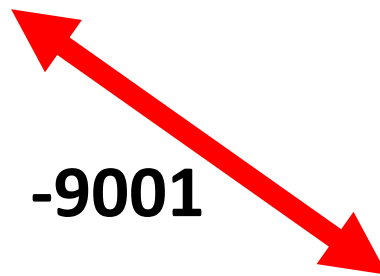
000



<http://www.disco.ethz.ch/members/barkelle/FUN.zip>



9001



-9001

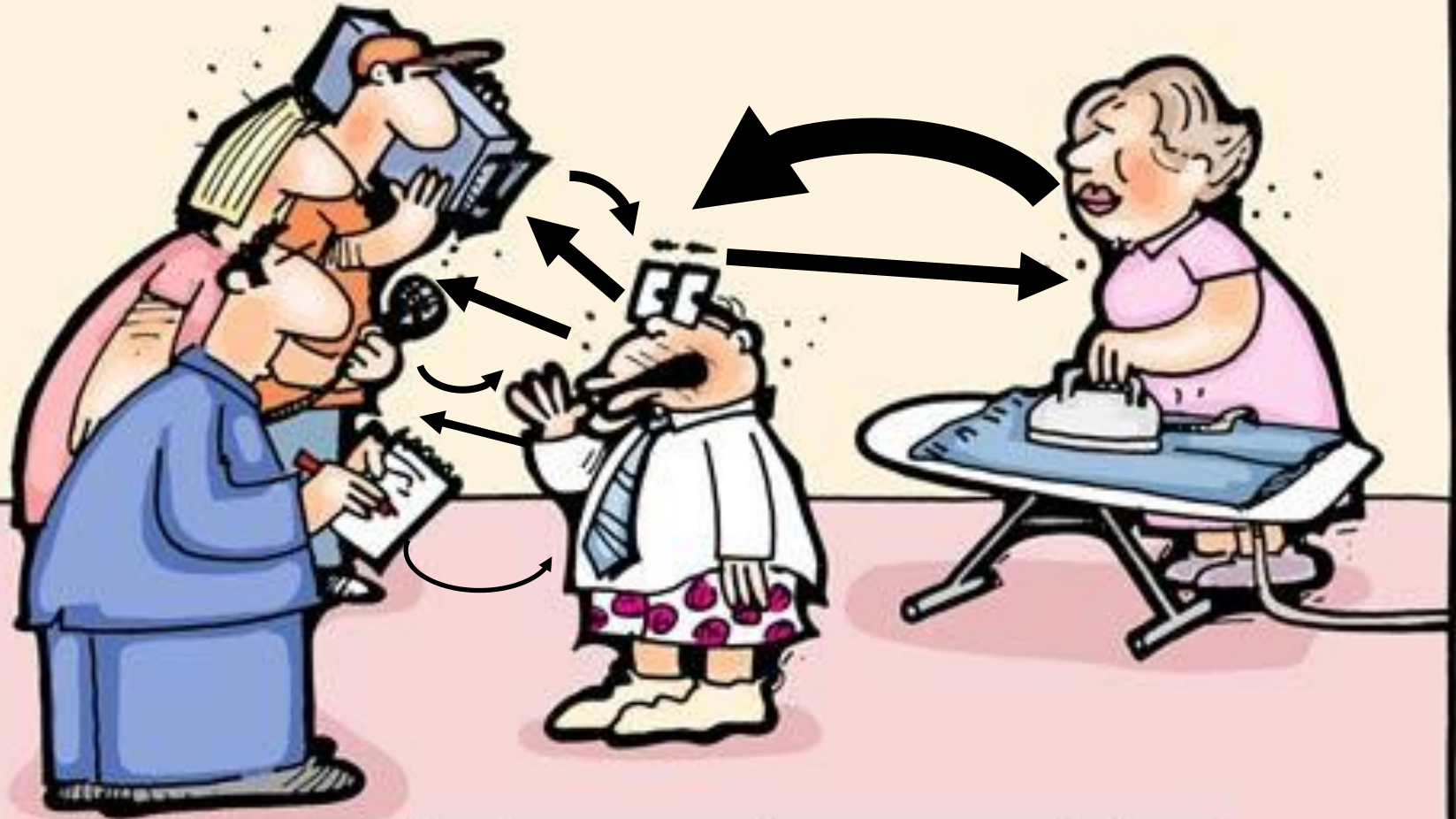


Sorry

NO

CHANGE!

JOHN HOWARD ON JANETTE'S INFLUENCE

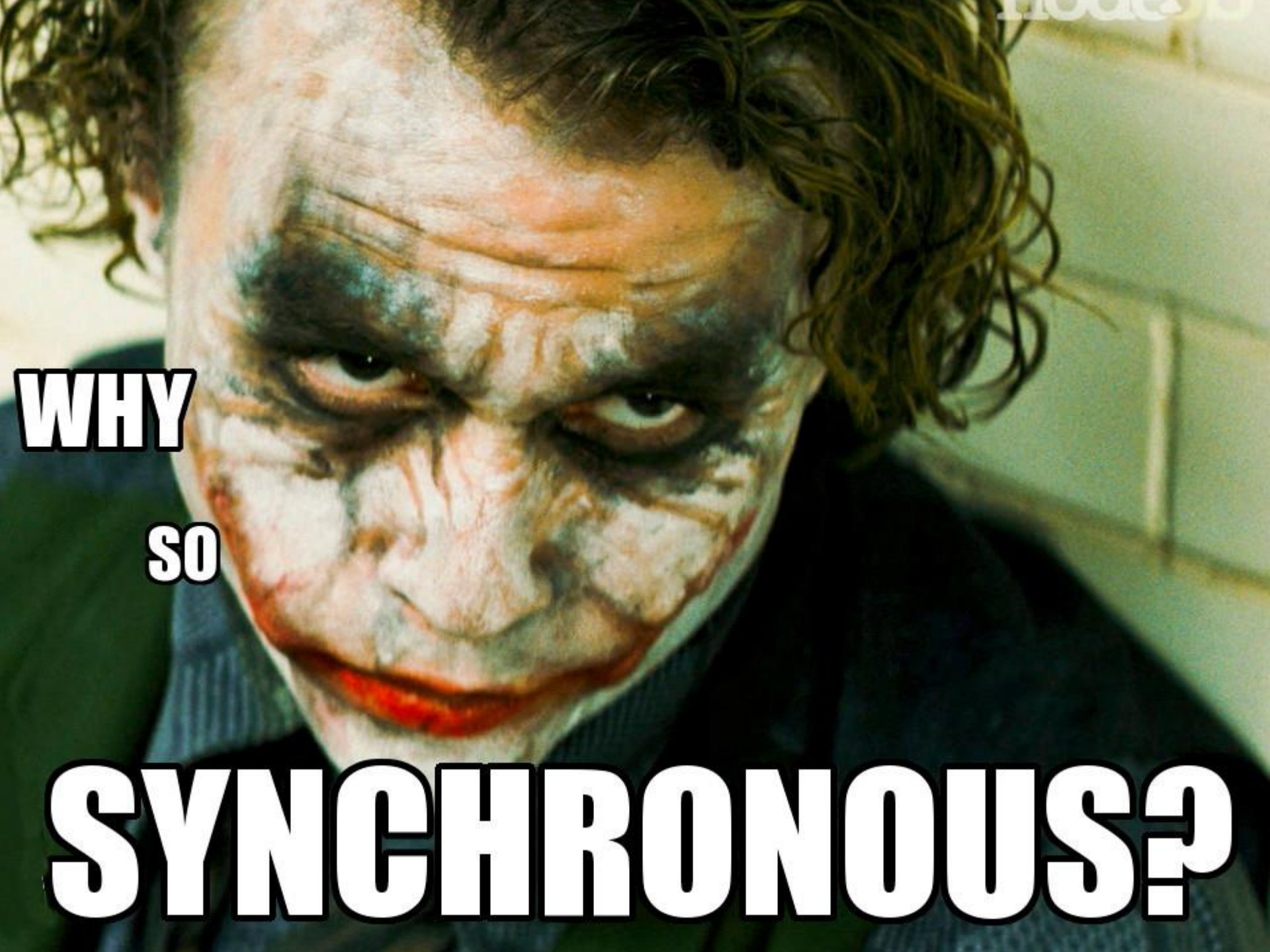


I wear the trousers in this marriage but my wife decides when they are to be ironed!



A large group of white rabbits, possibly a breed like the Dutch rabbit, are shown in a field. The rabbits are densely packed, with many in the foreground and background. The text "Exponentially long circles!" is overlaid in the center of the image.

Exponentially long circles!



liberty

WHY

SO

SYNCHRONOUS?

San Rocco or Ulisse?





Grazie!

