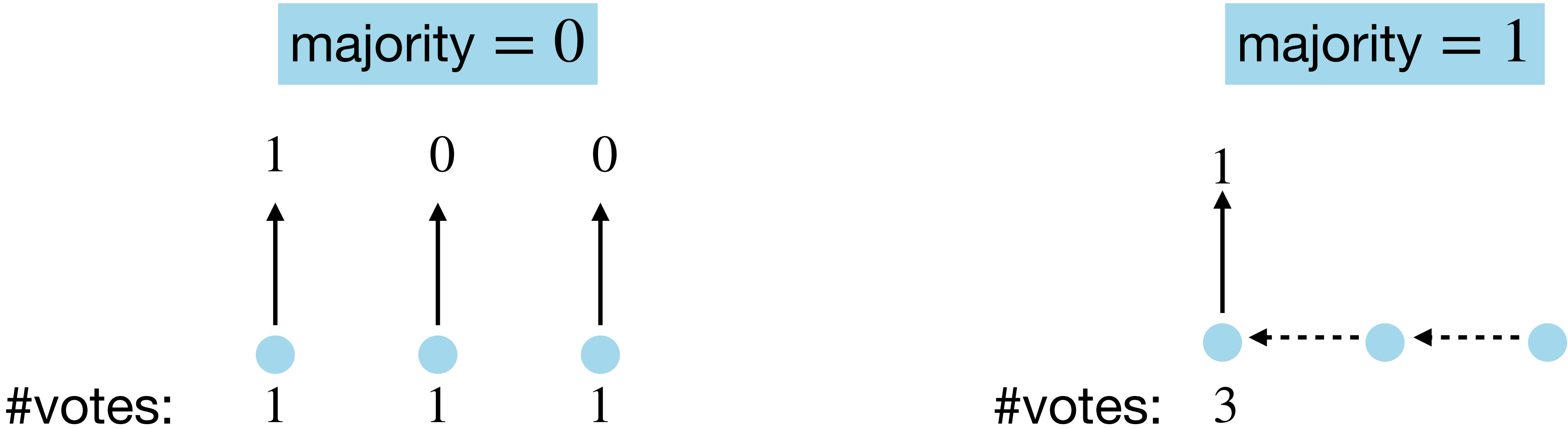


Correlated liquid democracy

Michelle X. Yeo

under submission $\epsilon >$

Direct vs liquid democracy

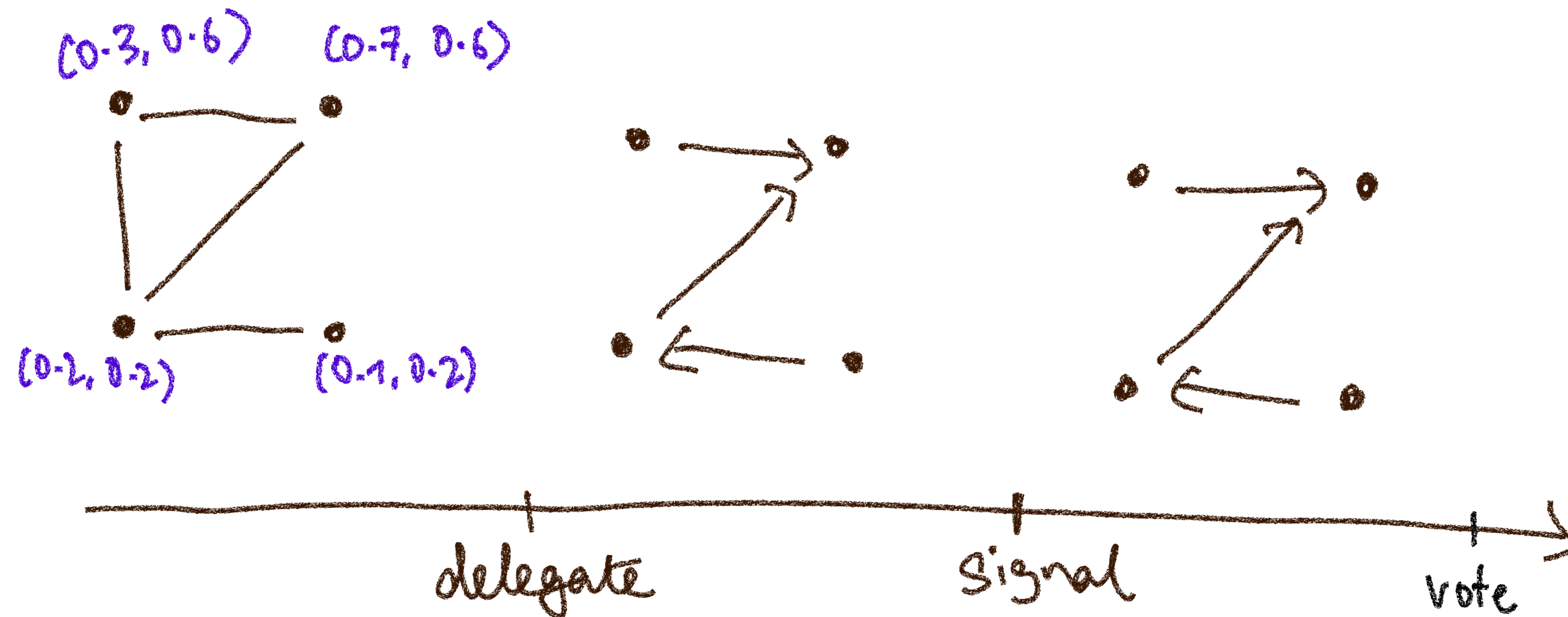


What we know so far

- Knowledge graph model
- Need sufficient variance in voting outcome [CGSSY25]
- We can handle settings where there is no ground truth [CGSSY26]

New model: correlated votes

- Votes correlated by external signal



Negative result

- Average delegation: delegate to someone more competent on average over both dimensions
- Not a safe reduction!

$$\pi_0 = \pi_1 = 0.5$$

K_n with distinguished voter v^* (1, 0.4)

All others (0.6, 0.6)

As $n \rightarrow \infty$ $P_D(G_n) \rightarrow 1$, but $P_M(G_n) = 0.7$.

Negative result

- Average delegation: delegate to someone more competent on average over both dimensions

- Not a safe reduction! $\pi_0 = \pi_1 = 0.5$

$$K_{2m} = \begin{array}{c|c} \begin{array}{c} \underline{A} \\ \text{size } m \\ (0.6, 0.6) \\ \text{average} = 0.6 \end{array} & \begin{array}{c} \underline{B} \\ \text{size } m \\ (0.3, 1) \\ \text{average} = 0.65 \end{array} \end{array}$$

as $m \rightarrow \infty$,

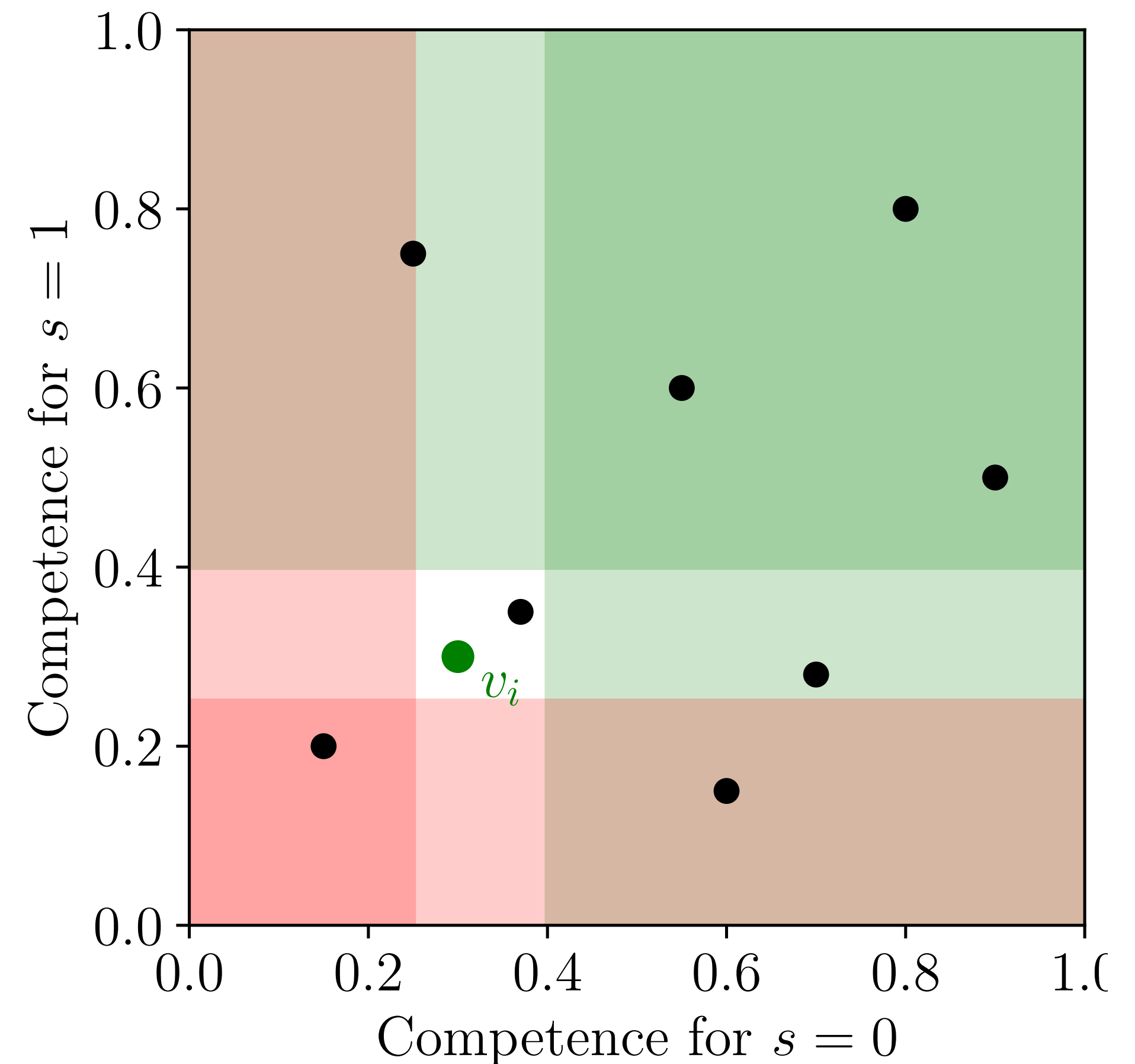
$$P_0(G_m) \rightarrow 1/2$$

$$P_m(G_m) \rightarrow 1.$$

Mechanism: pair each voter in B to a voter in A and delegate from $B \rightarrow A$.

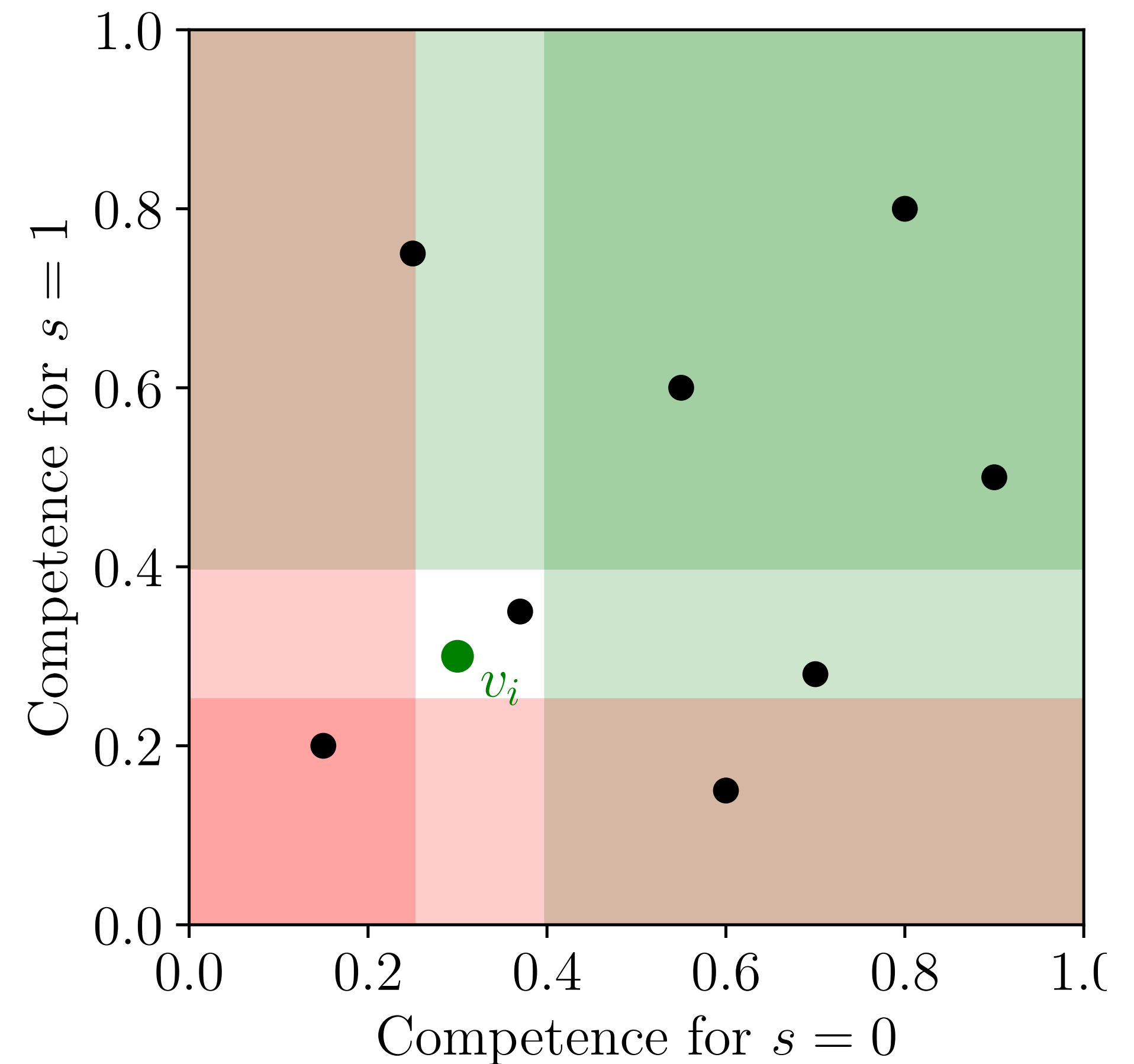
Positive results: 3 mechanisms

- Conservative intersection mechanism: delegate to people strictly favoured in each dimension
- Too conservative, performs badly when votes are negatively correlated



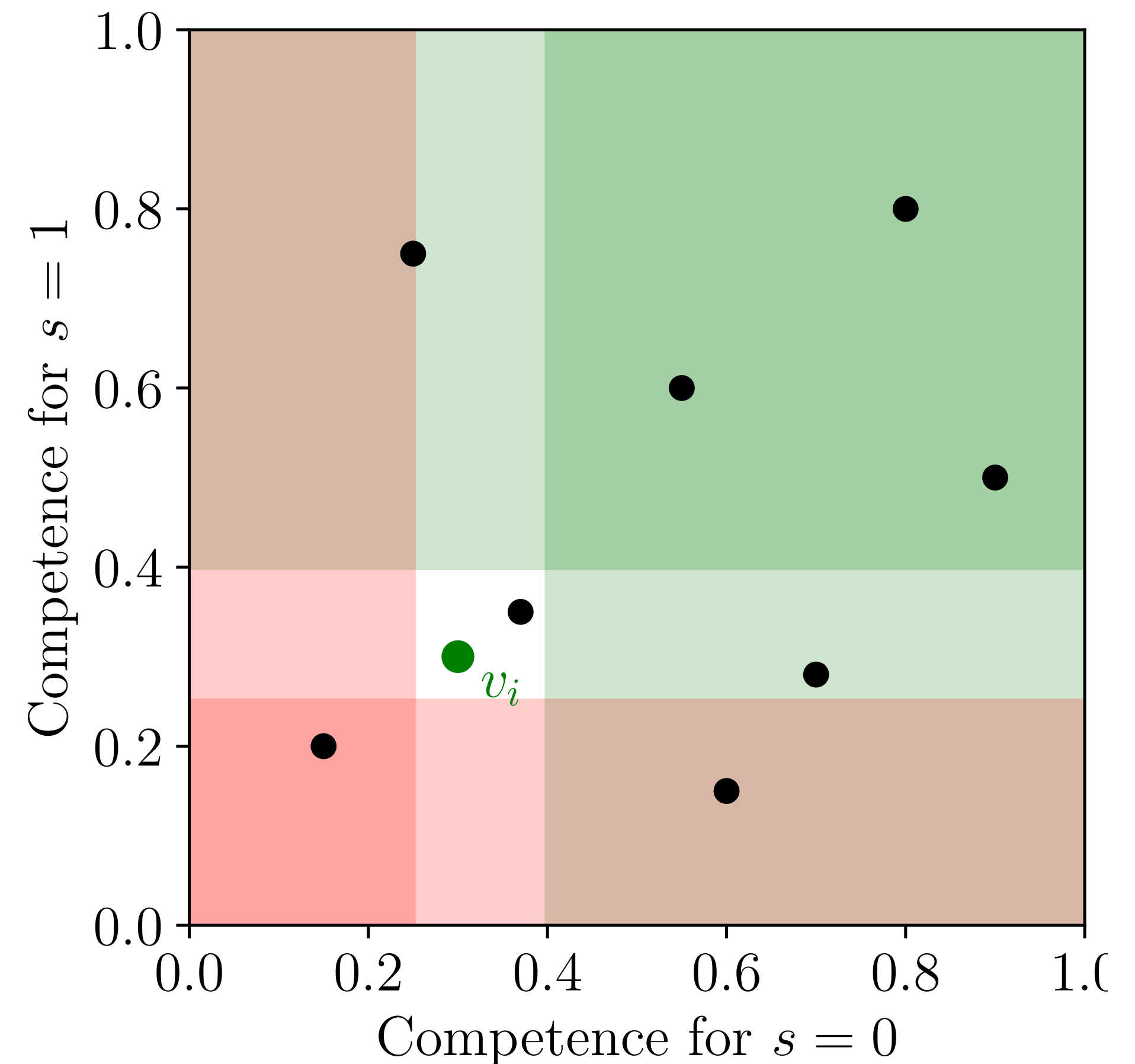
Positive results: 3 mechanisms

- Excluded middle mechanism: split voters into favoured, neutral, and confounded sets. Delegate to favoured and neutral in both dimensions
 - Increases amount of delegation



Positive results: 3 mechanisms

- Distributed mechanism on bounded degree graphs: allow voters to talk to their neighbours and neighbours of their neighbours (and so on) to find good routes through neutral intermediary
- More delegation, but at higher communication cost and no more locality



Implications

- Each mechanism works best under different correlation structures
- Conservative intersection: best under positive correlation, e.g., cultish behaviour, influence following, information cascades
- Other 2 mechanisms: best under negative correlations, e.g., public release of misinformation, black swan events, scandals
- Mechanism 3 works best when there are very few “experts” (e.g., amendment to animal diseases act in CH in 2012)

Voting reading group!

- We have a voting reading group!
- Tentatively Fridays biweekly 15-16h (but flexible)
- Sometimes there is cake..