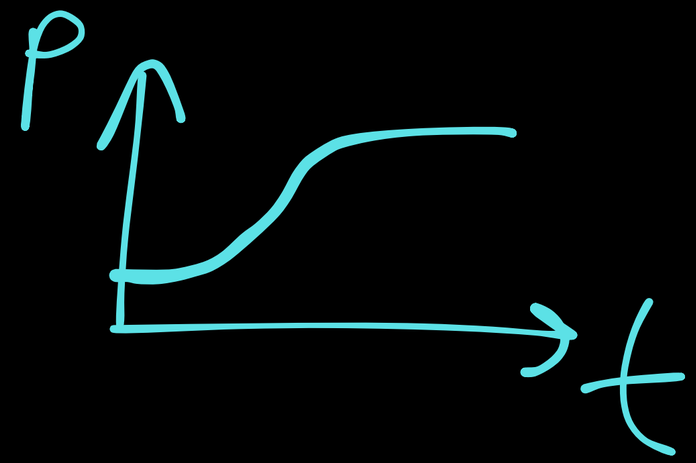
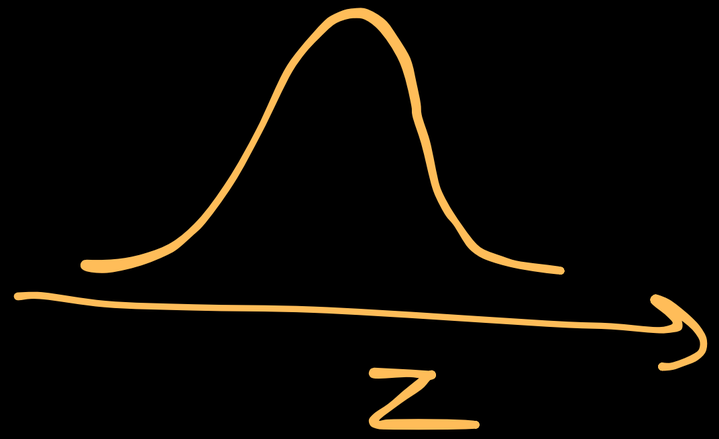
Adaptive Dynamics

Raphaël Scherrer





population genetics

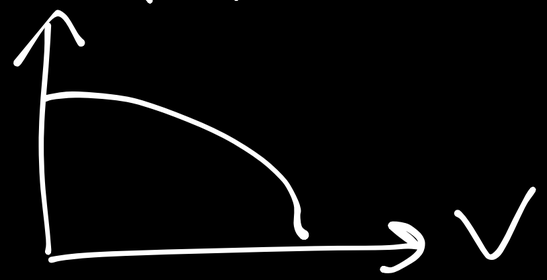
quantitative genetics

adaptive dynamics

vigilance

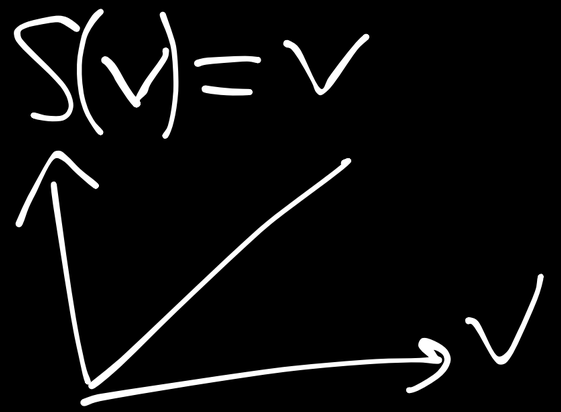
foraging

$F(v) = 1 - v^2$



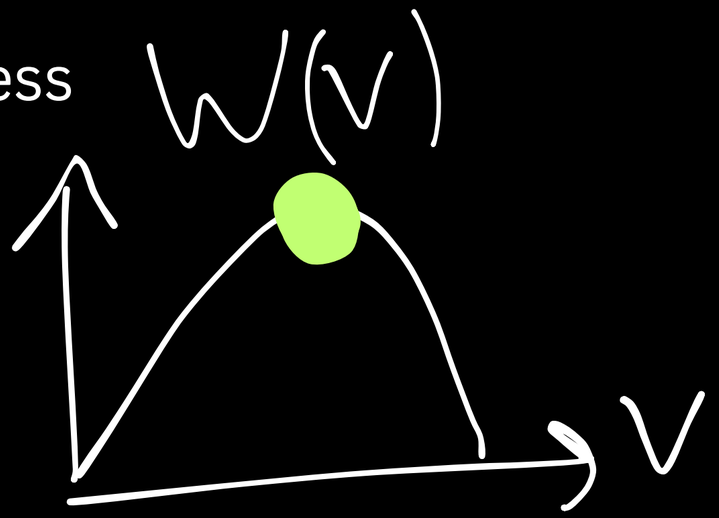
survival

$S(v) = v$



$v^* = 0.51$

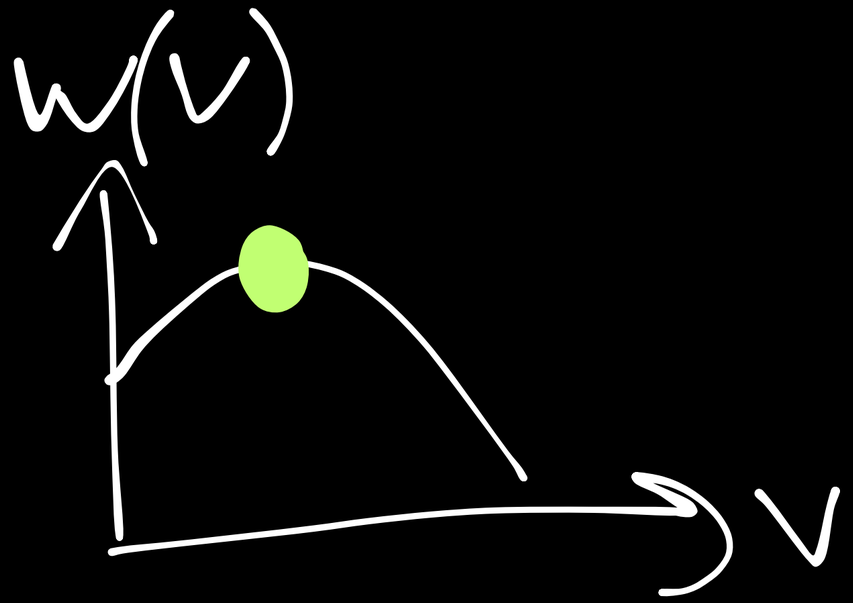
fitness



$$S(v) = 1 - \hat{\kappa}(1-v)^n$$

probability of being the one caught

probability that no-one is watching



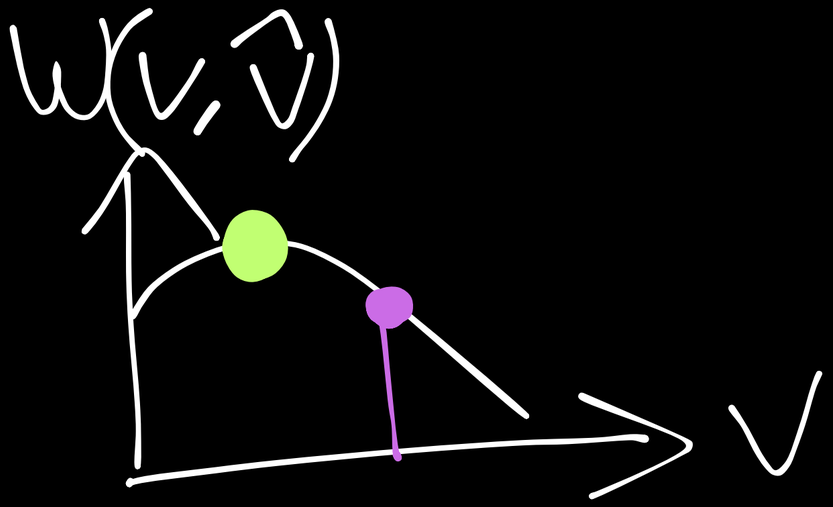
$$v^* = 0.33$$

frequency-dependent selection

$$S(v,\hat{v}) = 1 - \frac{1}{n}(1-v)(1-\hat{v})^{n-1}$$

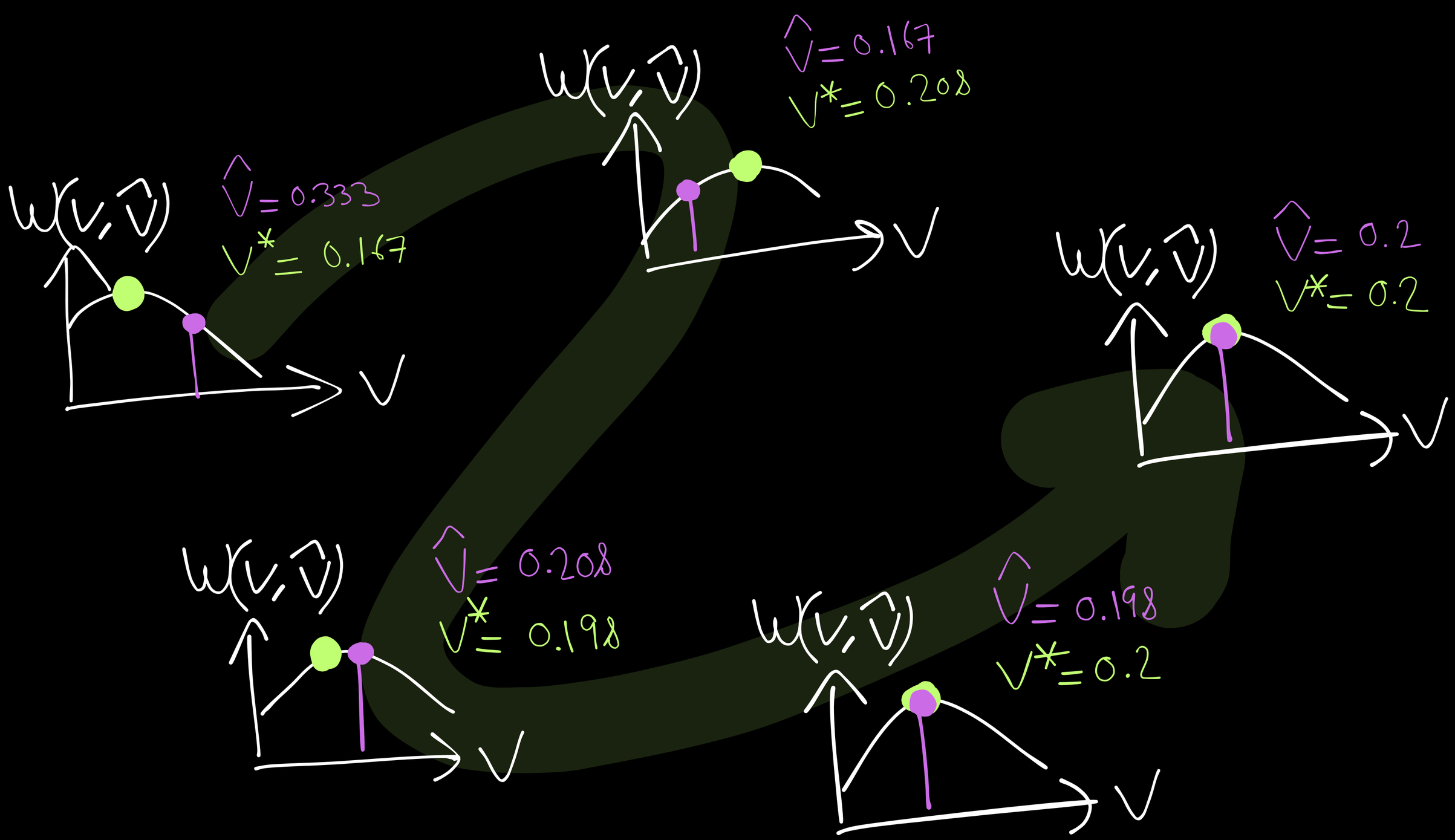
probability that the focal individual is not watching

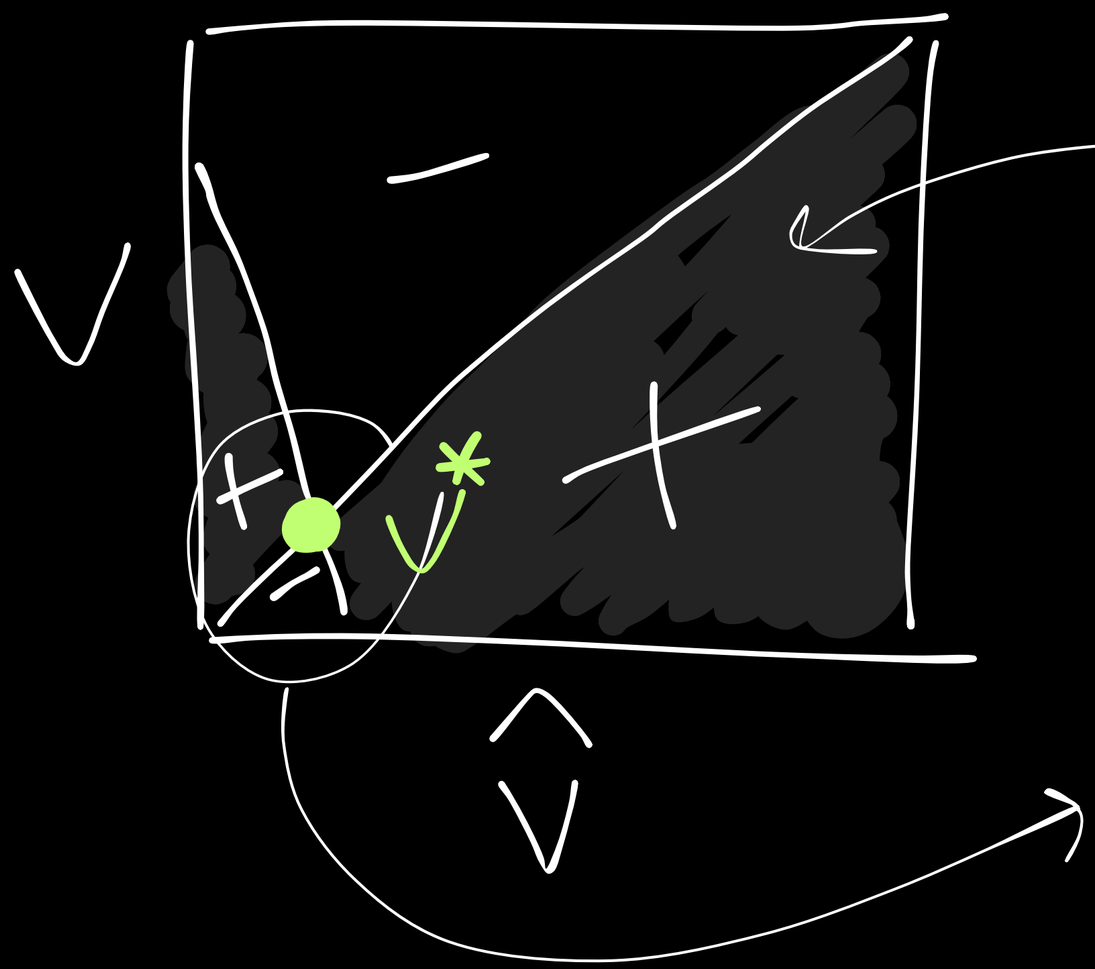
probability that none of the others is watching



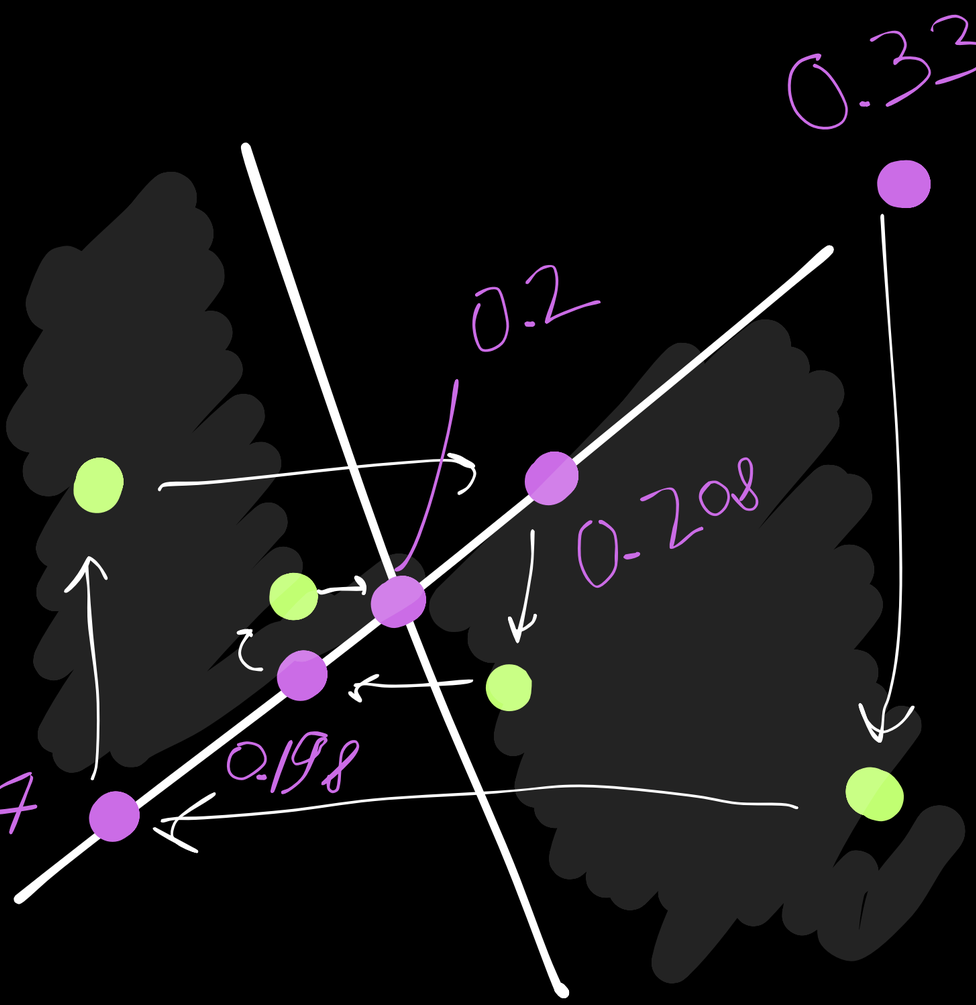
$\hat{v} = 0.333$

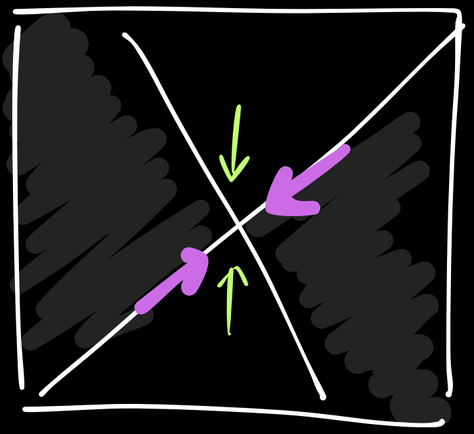
$v^* = 0.167$


w(v, v)
$\hat{V} = 0.333$
$V^* = 0.167$
w(v, v)
$\hat{V} = 0.167$
$V^* = 0.208$
v
w(v, v)
$\hat{V} = 0.2$
$V^* = 0.2$
v
w(v, v)
$\hat{V} = 0.208$
$V^* = 0.198$
v
w(v, v)
$\hat{V} = 0.198$
$V^* = 0.2$
v

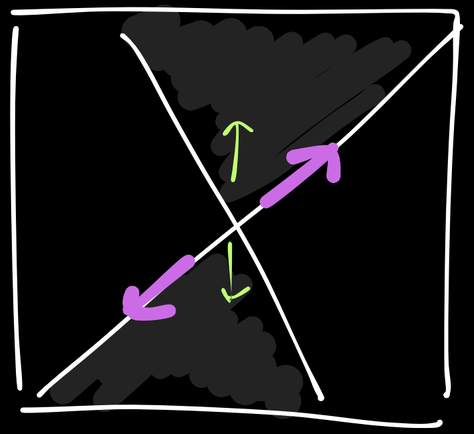


$$w(v,\hat{v}) - w(\hat{v},\hat{v})$$

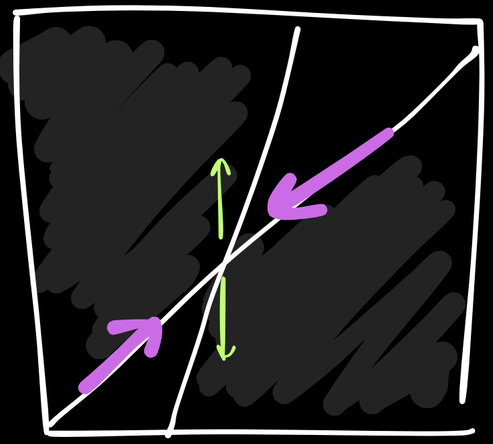




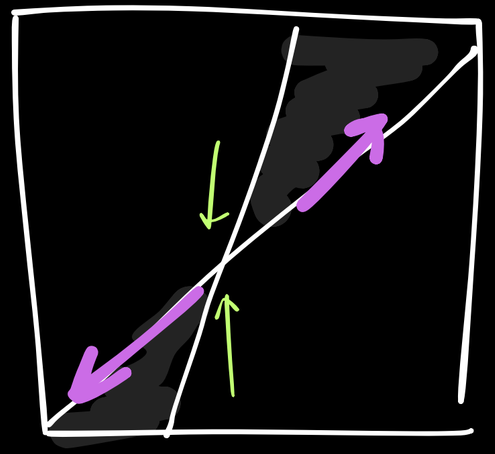
Evolutionarily
Stable Strategy



Repeller



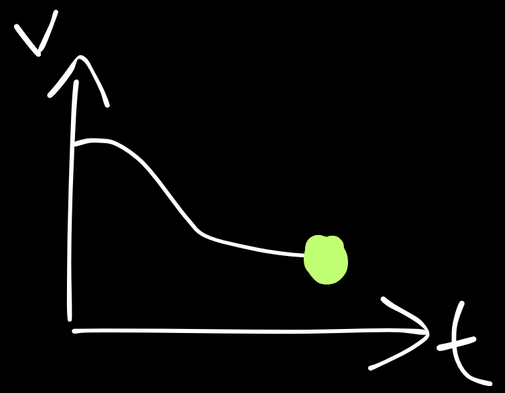
Branching point



Garden of Eden

convergence stability

evolutionary stability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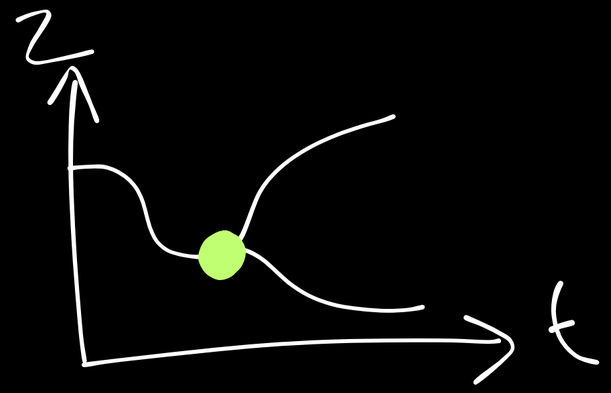
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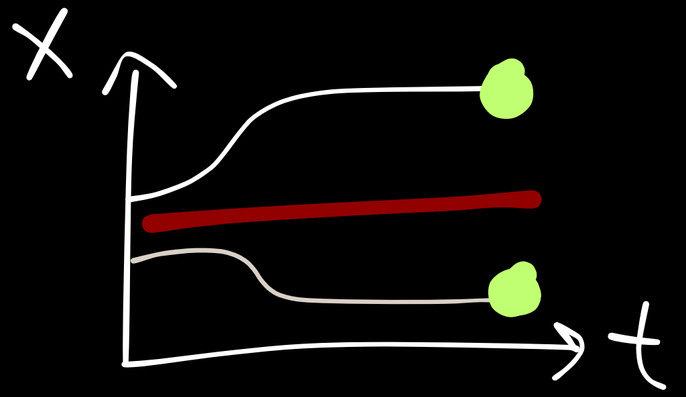
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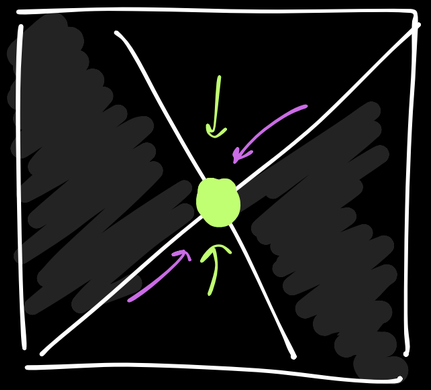
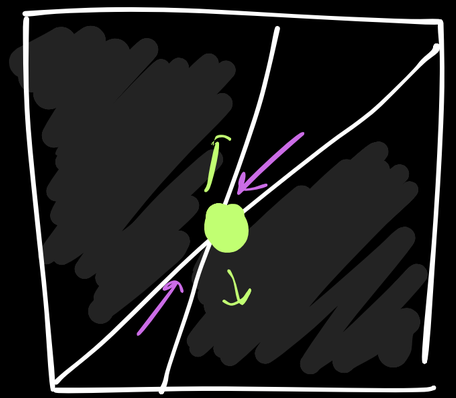
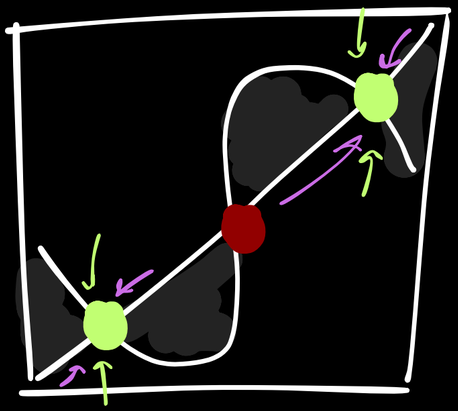
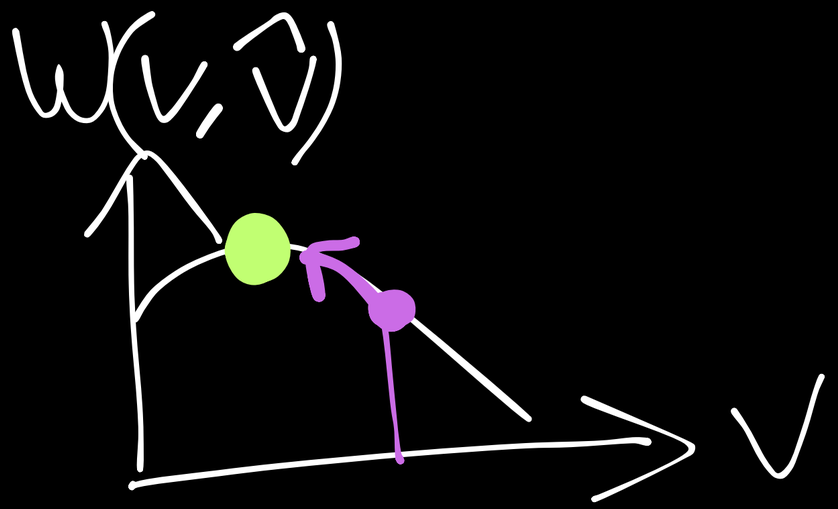






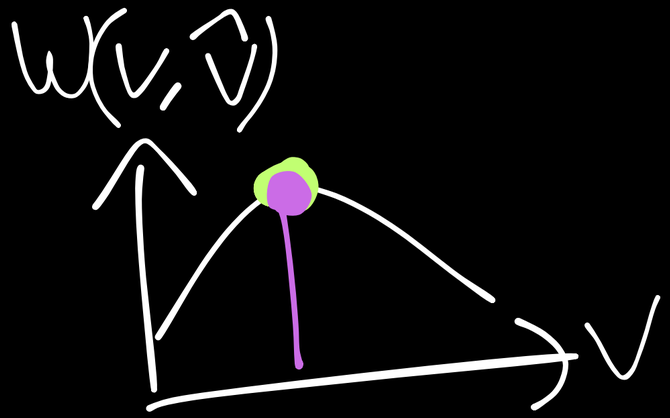
game theory

Prisoners' dilemma



$$\left.\frac{\partial w}{\partial v}\right|_{v=\hat{v}} = G(\hat{v})$$

selection gradient



$$G(v^*) = 0$$

$$\left.\frac{\partial G}{\partial \hat{v}}\right|_{\hat{v}=v^*} < 0$$

convergence stability

$$\left.\frac{\partial^2 w}{\partial v^2}\right|_{v=\hat{v}=v^*} < 0$$

evolutionary stability