444 Lecture 8.4 - Many Player Stag Hunt

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Generalising

- The world doesn't have many 2 player 2 option games.
- If we're thinking of modelling real world situations, either as PD or Stag Hunt, we need something more general.

- n > 2 players each choose a number x in [0, 1].
- The mean of the choices is m.
- Payoff to each player is $m - \frac{x}{r}$, for r between 2 and n.

- If everyone picks the same number, better for everyone that that number is higher.

General Pattern

- If everyone picks the same number, better for everyone that that number is higher.
- Holding fixed other players moves, it is always better to pick a lower number.

- It's really hard to do Axelrod-type stuff in these kinds of games.
- Just having the chance to interact again is not enough to push people to cooperate.
- There isn't enough freedom of movement; do you defect if 1 player out of 100 defects?

Punishment

- Changing the payouts is a more effective move.
- So what we see in these kinds of situations is what is called 'altruistic punishment'.
- One person makes themselves temporarily worse off, and the perpetrator much worse off, to send a signal that defection will not be tolerated.
- Of course there is a free riding issue with who carries out the punishment, so ...

Generalised Stag Hunt

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Generalised Stag Hunt

- n > 2 players each choose a number x in [0, 1].
- The mean of the choices is m.
- If a player chooses x ≤ m, their payout is x.
- If they choosee x > m, they receive m − r(x − m), where r > 1 is some measure of how much one is penalised for leaving the equilibrium.

- For any x, everyone choosing x is a (strict) equilibrium.
- The higher x is, the better this equilibrium is for everyone.
- Choosing 0 minimises regret, and maximises expected return given some natural distributions of probability to the other player's moves.

- For something to be a real world stag hunt, those are the features you (approximately) need.
- The best thing to do is to do what everyone else does.
- If everyone does the same thing, better that everyone does the more cooperative thing.
- Given radical uncertainty about what others will do, best to do the uncooperative thing.

- We'll talk through some examples of possible real life Stag Hunts.