PHIL 408Q/PHPE 308D
Fairness

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Tags

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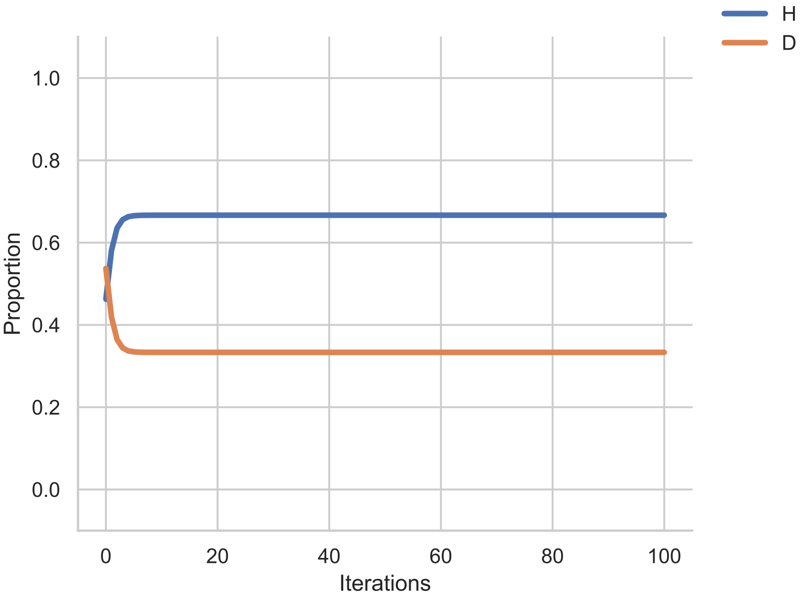
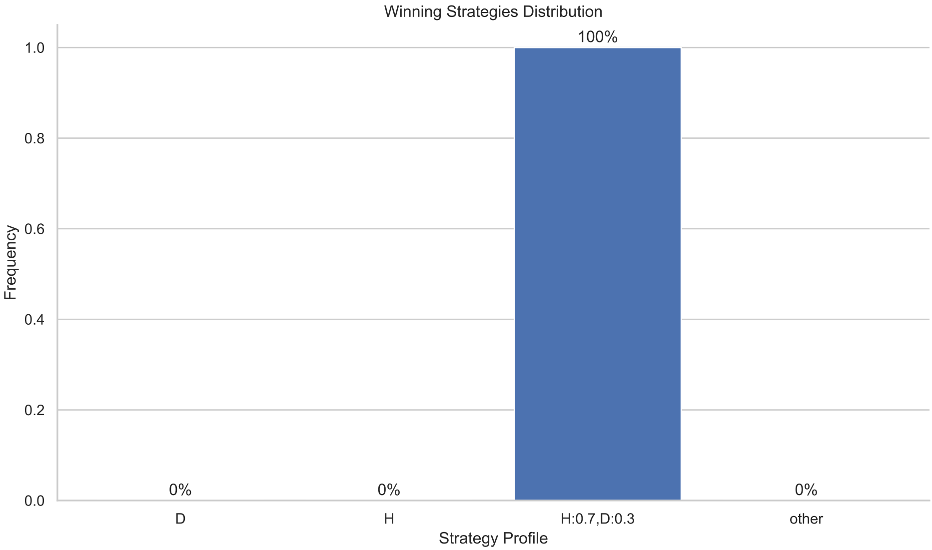
Agents in this model play the bargaining game...but in doing so may condition their strategy on the tag of their partner.

For example, an agent in the green group might play Medium against other greens, and Low against yellows. We can label this two part strategy, listing the in-group strategy first, as follows: $\langle Medium, Low \rangle$. For now, we can also assume that agents learn from in-group members only. I.e., a yellow will only copy the strategies of other yellows.

	Dove	*Hawk*
Dove	$1, 1$	$1, 3$
Hawk	$3, 1$	$0, 0$


H
D
1.0
0.8
0.6
0.4
0.2
0.0
Proportion
0
20
40
60
80
100
Iterations


Winning Strategies Distribution
100%
0%
0%
0%
1.0
0.8
0.6
0.4
0.2
0.0
Frequency
D
H
H:0.7,D:0.3
other
Strategy Profile

Problem: When 70% of the population is playing Hawk and 30% is playing Dove, there is a stable equilibrium, but this is inefficient, since sometimes Hawk players will play against other Hawk players and the payout will be 0.

Maynard-Smith noted that in such games it might be of interest to the players to find something outside of the game to use as a method for breaking symmetry. That is, if the players could use some feature observable to both players to which they can correlate their strategy, evolution might select for strategies which use this cue.

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- $\langle H, H \rangle$: Play Hawk if playing against the same tag, else play Hawk
- $\langle H, D \rangle$: Play Hawk if playing against the same tag, else play Dove
- $\langle D, H \rangle$: Play Dove if playing against the same tag, else play Hawk
- $\langle D, D \rangle$: Play Dove if playing against the same tag, else play Dove

There are lots of new equilibria created by the introduction of roles, but many are also unstable. The bottom line is that now almost every population state is carried by evolution to either all playing $\langle H, D \rangle$ or all playing $\langle D, H \rangle$.

Nature sends a signal to individuals, the signals are (anti)correlated, and individuals have strategies that are conditional on the signal....For situations where the [tag] is unclear — an ambiguous signal or no signal at all — we should expect a polymorphism of Hawks and Doves. For situations with a clear signal, we should expect a *correlated equilibrium*.

Brian Skyrms and Kevin Zollman (2010). *Evolutionary Considerations in the Framing of Social Norms*. Politics, Philosophy, and Economics 9(3), pp. 265-273.

	Low	*Medium*	*High*
Low	4, 4	4, 5	4, 6
Medium	5, 4	5, 5	0, 0
High	6, 4	0, 0	0, 0

	Low	*Medium*	*High*
Low	4, 4	4, 5	4, 6
Medium	5, 4	5, 5	0, 0
High	6, 4	0, 0	0, 0

The polymorphic trap in which 50% play Low and 50% play High is *inefficient* since sometimes Low players face Low players and leave 2 on the table and sometimes High players face High players and get 0.

Minority Disadvantage

Justin Bruner (2019). *Minority (dis)advantage in population games*. Synthese, 196(1), pp. 413-427.

If agents are tasked to just interact with out-group members (i.e., Blues never interact with fellow Blues), then inefficient arrangements can be completely avoided. In this case, play evolves to either the equal split, in which both those from the Blue and Green group demand five, or an asymmetric split, where Blues (Greens) always demand the high amount of six and Greens (Blues) acquiesce and demand four.

Consider the case in which both Blue and Green populations consist of a mixture of those who demand four and demand six.

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This gives rise to a positive feedback loop, whereby the proportion of those who demand six in one group rises, in turn increasing the average payoff these agents receive, which leads to them further proliferating.

Things are more complicated, however, if we allow for interactions between both in-group and out-group members. In this case we assume individuals can accurately determine the group membership of their counterpart (i.e., whether they are Green or Blue) and group membership is fixed (that is, one cannot switch from Green to Blue).

Things are more complicated, however, if we allow for interactions between both in-group and out-group members. In this case we assume individuals can accurately determine the group membership of their counterpart (i.e., whether they are Green or Blue) and group membership is fixed (that is, one cannot switch from Green to Blue). Additionally, individuals can condition their behavior on the group membership of their strategic partner. In other words, agents can select to offer an equal split to Blue agents, and demand the bulk of the resource when interacting with Green agents.

In what follows, we consider the situation in which Green and Blue groups are not of the same size. We find that this has rather dramatic effects that can, in many circumstances, result in the minority systematically demanding the low amount when interacting with members of the majority.

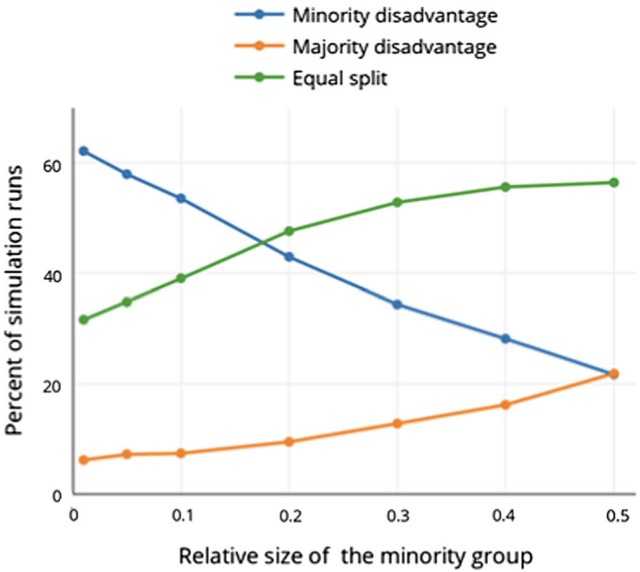

Fig. 2 Simulation results of the modified two-population replicator dynamic

Power

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[O]ne thing missing from the models discussed to this point is the coercive nature of the way inequitable contracts are often formed in reality. There is no coercion in these models, and there is no sense of power inequity between groups. Part of what makes them such effective epistemic tools, in fact, is the way that otherwise entirely identical groups starting from neutral states ("of nature") can evolve to stable, discriminatory norms. But we still might wish to know: what happens if we add power to these models?

Power is most often included in bargaining models via disagreement points.

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Alternatively, agents might have different disagreement points because of material or political differences in their lives that make bargains more or less important to them.

		Player 2		
		Low	*Medium*	*High*
Player 1	*Low*	3, 3	3, 5	3, 7
	Medium	5, 3	5, 5	0, 0
	High	7, 3	0, 0	0, 0

		Player 2		
		Low	*Medium*	*High*
	Low	3, 3	3, 5	3, 7
Player 1	*Medium*	5, 3	5, 5	D, d
	High	7, 3	D, d	D, d

When $D > d$, Player 1 has power over Player 2 in the bargaining game.

The power imbalance systematically advantages the more powerful group, who tend to end up at the outcome where they demand High more often. The greater the power, the greater the discrepancy. This happens because powerful individuals have relatively little incentive to adopt low demands—their disagreement point is not much worse. As a result they move towards such demands more slowly, and tend to end up adopting higher demands instead.

Justin Bruner and Cailin O'Connor (2018). *Power, Bargaining, and Collaboration*. in *Scientific Collaboration and Collective Knowledge* Ed. Conor Mayo-Wilson Thomas Boyer and Michael Weisberg. Oxford University Press.

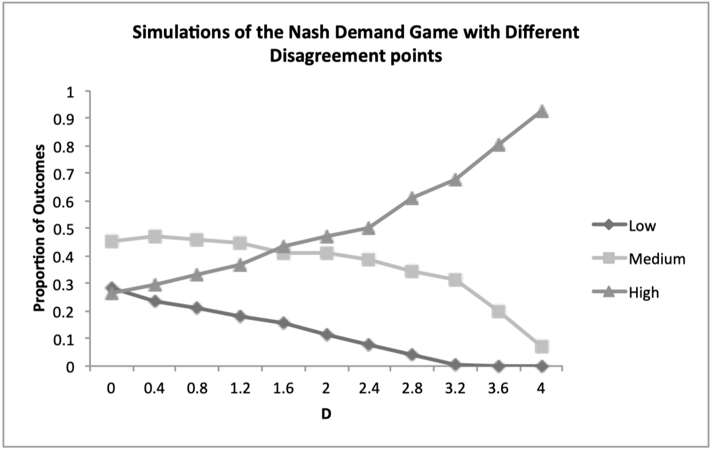

Figure 5: Simulation results for the game presented in figure 4. The y-axis shows the proportion of simulations that result in senior academics demanding Low, Medium, and High as D increases (x-axis) and $d = 0$.

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Since all these features are likely to be present in most social groups, we should expect that underlying social dynamics will tend to persistently push towards inequity. Thus, attempts to eradicate inequity are unlikely to be permanently successful. We should thus adopt a model where unfairness is something to be continually watching for, and continually combating, rather than something that will someday be "fixed". Inequity is a hydra whose heads grow back.