EVOLVING A GENDERED DIVISION OF LABOR

Cailin O'Connor, Logic and Philosophy of Science, UC Irvine

GENDERED DIVISION OF LABOR

GENDERED DIVISION OF LABOR AND INEQUITY

Many have argued that gendered division of labor is the starting place for another (nearly) ubiquitous feature of human groups – gender inequity.

THE HOE AND THE PLOUGH

Alesina et al. (2013) show how in societies with traditionally plough-based agriculture, men tend to have more economic advantage and power than in cultures with hoe-based agriculture.

Control over food production provides direct economic/power advantages, and usually only men are strong enough to plough.

WHERE WE'RE GOING

There are a number of extant game theoretic models explaining gendered DoL using assumptions of human rationality.

In this talk, I will present alternative cultural evolutionary models of gendered DoL.

As I will argue, these models 1) make more reasonable assumptions about human behavior and 2) account for phenomena that classic game theoretic models cannot.

ROADMAP

1) Coordination Games
2) Game Theory and Division of Labor
3) Evolutionary Game Theory and Division of Labor

COORDINATION GAMES

At the heart of all the models I will discuss here are simple *coordination games*.

These are models of strategic interactions where individuals gain an advantage from coordinating their behavior.

Classic coordination problems – greetings, driving, semantic meaning

ANTI-COORDINATION GAMES

The particular variant we'll use here are "anti-coordination" games. (Though I prefer to call these complementary coordination games.)

In these cases, actors coordinate by taking different, complementary actions, rather than matching actions.

There are variations – i.e., full or partial common interest, better and worse outcomes etc

THE TANGO

Imagine you and a partner are about to dance the tango.

You would both like one of you to lead, and the other to follow. Otherwise, you miscoordinate.

Likewise, a household with two individuals ploughing and none cooking will be unsuccessful.

THE MODEL

Let A represent ‘lead’ and B ‘follow’, or A represent ‘plough’ and B ‘cook’.

		Player 2	
		A	**B**
Player 1	**A**	0,0	1,2
	B	2,1	0,0

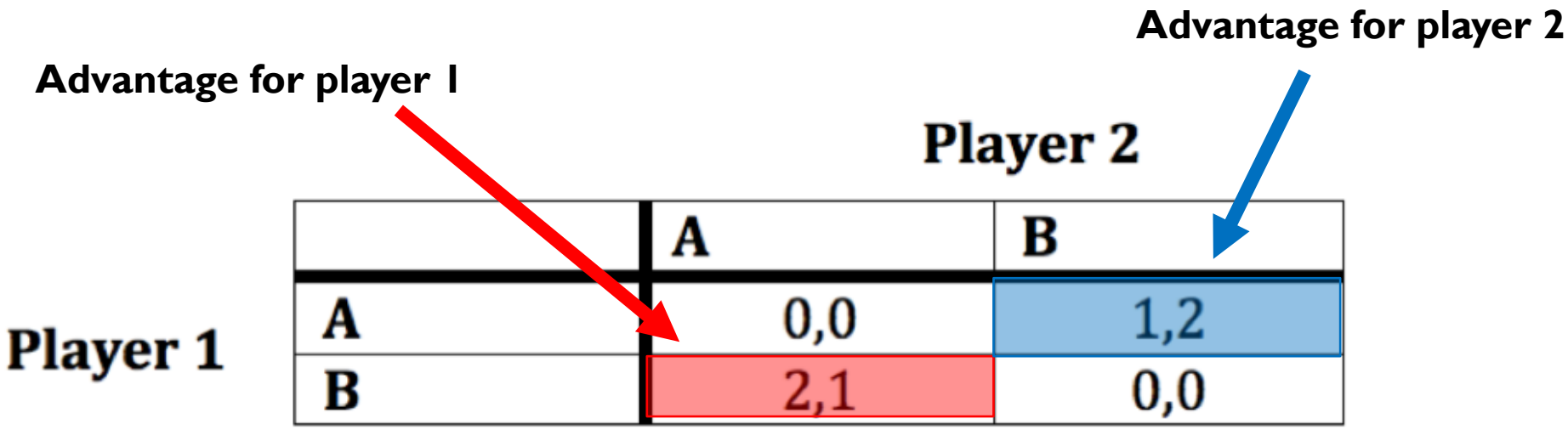
THE MODEL

Let A represent ‘lead’ and B ‘follow’, or A represent ‘plough’ and B ‘cook’.

		Player 2	
		A	**B**
Player 1	**A**	0,0	1,2
	B	2,1	0,0

THE MODEL

Let A represent ‘lead’ and B ‘follow’, or A represent ‘plough’ and B ‘cook’.



ROADMAP

1) Coordination Games
2) Game Theory and Division of Labor
3) Evolutionary Game Theory and Division of Labor

GAME THEORY AND DOL

Game theoretic treatments of gendered DoL typically involve:

1) A group divided into men and women
2) A variant on the coordination game where each household's success depends on combining two complementary skills
3) A marriage market where choices are based on creating successful households
4) Skills are chosen to maximize marriage returns
5) Time required to develop skills

GAME THEORY AND DOL

The typical result is that there exist two equilibria in such models where labor is perfectly divided by gender.

This result is driven by:

1) Benefits of coordination
2) A need to anticipate this coordination

SOME ISSUES

These models don't typically 'fill in the gaps' as to how a society would reach these equilibria, and when we do so using model assumptions things look a bit funny.

- Actors must make complicated, rational decisions about specialization from early on
- Actors must choose partners based on coordinating skills
- These calculations must be performed anew each generation
- There is no explicit reason for a pattern of DoL to continue across generations in these models
- There is no explanation for why some tasks are almost always performed by one gender (i.e., infant care)

ROADMAP

1) Coordination Games
2) Game Theory and Division of Labor
3) Evolutionary Game Theory and Division of Labor

EVOLUTIONARY GAME THEORY

Evolutionary game theory attempts to explain strategic behavior via appeal to *learning* or *cultural evolution*.

This is done by taking games and applying *dynamics* – rules that determine how actors learn or change their strategies over time.

GAME THEORY VS. EVOLUTIONARY GAME THEORY

I now present an evolutionary game theoretic model of gendered division of labor.

The claim is not the the game theoretic models are hopeless or uninformative. Rather by replacing a few key assumptions we can generate simpler, more perspicuous models that can also better explain patterns of gendered DoL.

EVOLUTION OF ANTI-COORDINATION

Imagine a population with two types of actors (men and women, say) where interactions happen between types.

Suppose these individuals play a coordination game and over time update their strategies by copying those in their type who are successful.

B

B

A

A

A

B

B

A

B

B

B

B

A

A

A

B

B

B

A

B

B

B

A

A

A

B

B

A

B

B

B

A

A

A

B

B

B

A

B

B

B

B

A

A

A

B

B

A

B

B

B

B

A

A

A

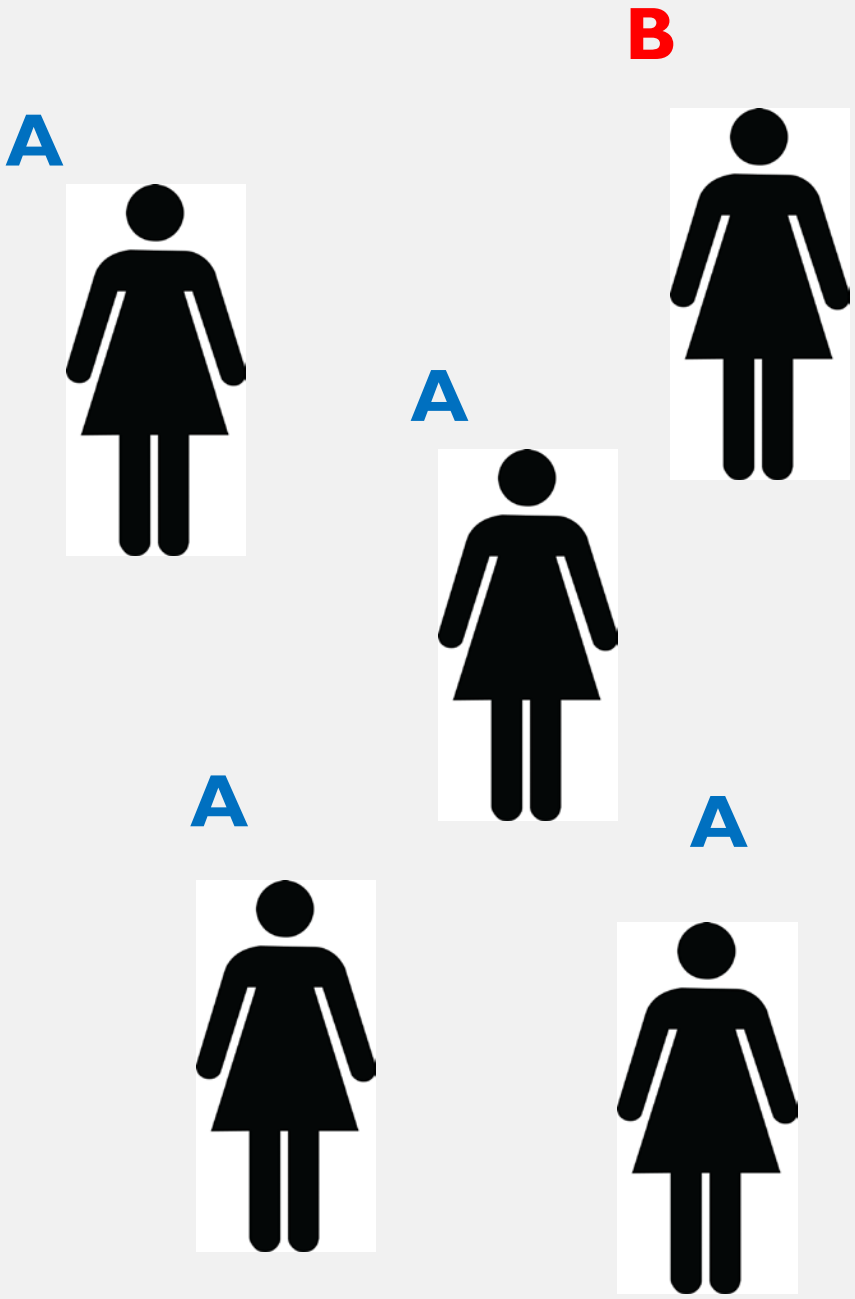
B

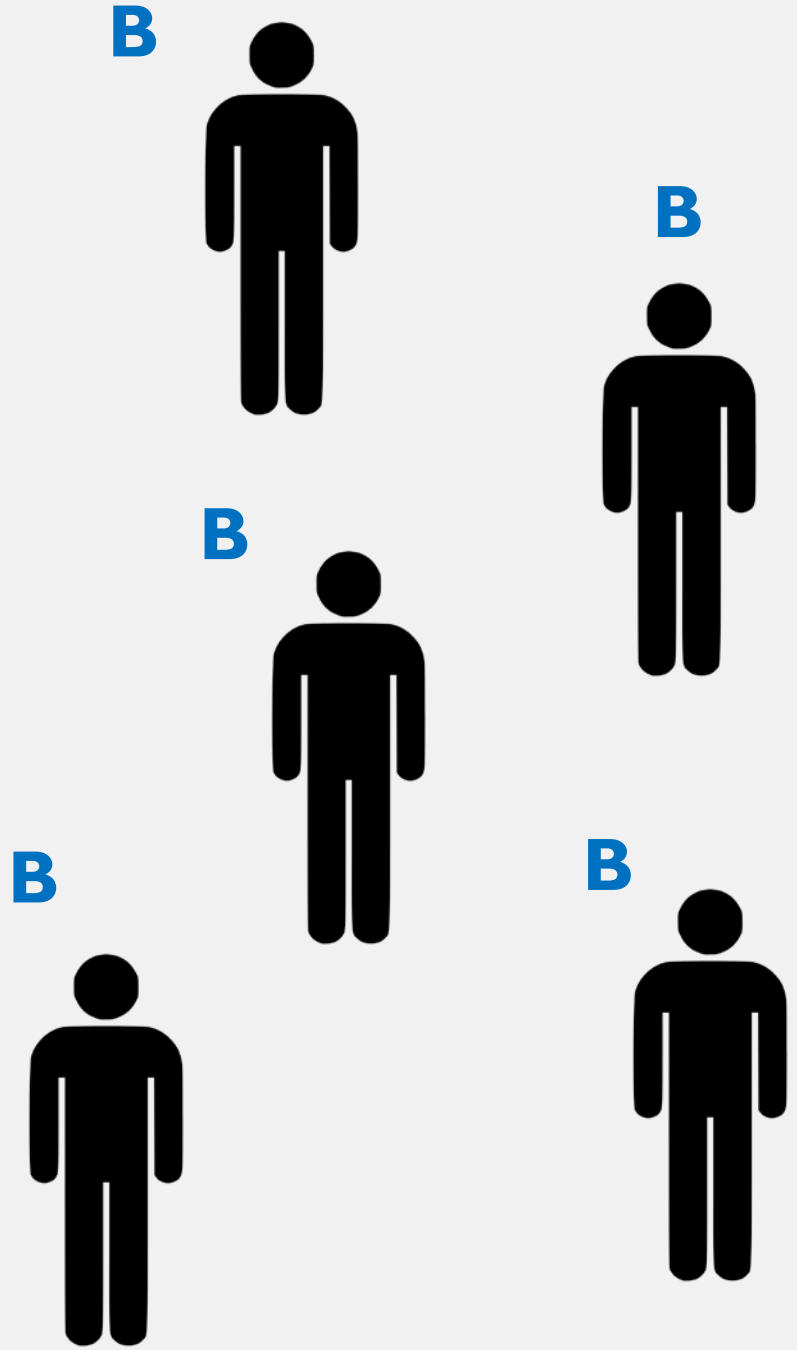
B

A

B

B


A
B
A
A
A


B
B
B
B
B
B

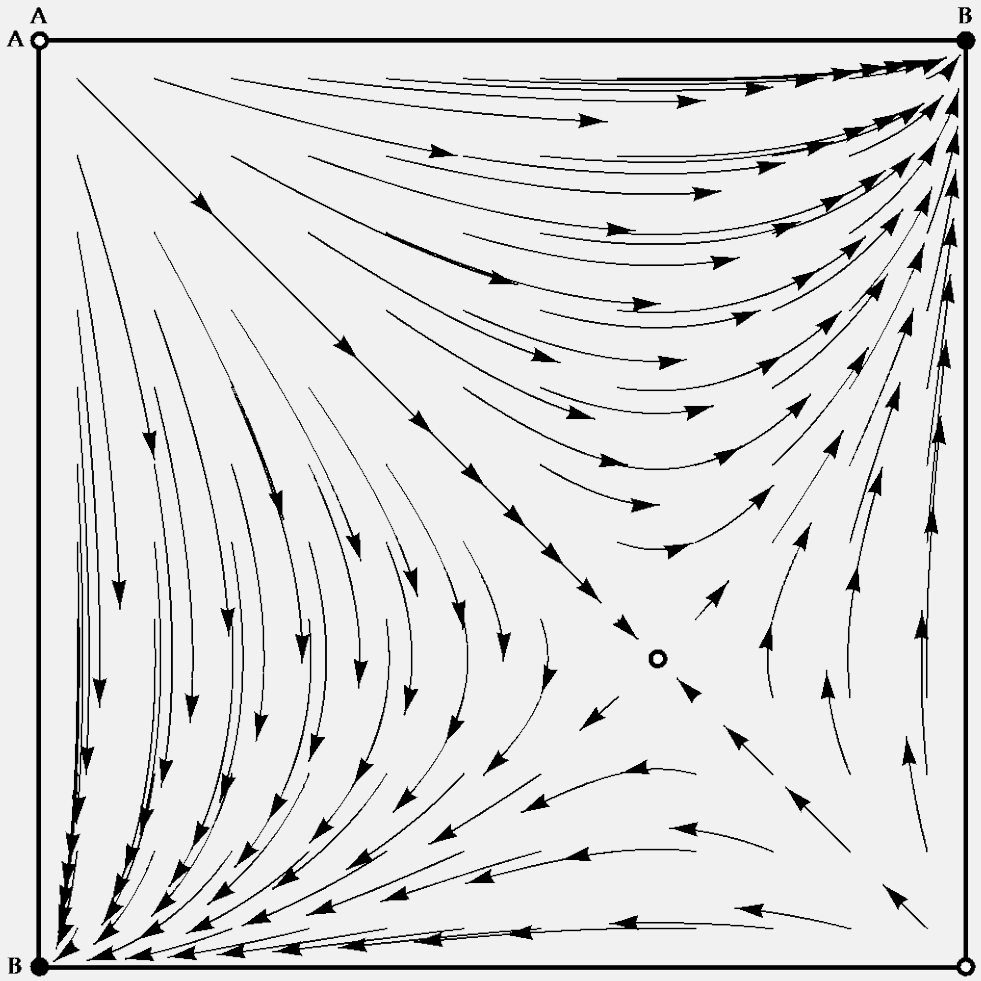
RESULTS

The result is that populations inevitably move towards equilibria where the two types take complementary roles.

Notice that in this model *social learning* does the work to explain the emergence and stability of gendered DoL.

In addition, we expect the same patterns to be stable over time, since individuals keep learning the behaviors of their type.

EVOLUTION OF ANTI-COORDINATION



CONVENTIONALITY AND GENDERED DOL

These models also help us explain why the particular gendered divisions of labor vary in degrees of arbitrariness or conventionality.

Some tasks (big game hunting, small infant care) tend to almost exclusively be performed by one gender cross-culturally. Others are typically performed by men or women (skinning game, spinning yarn). For others, the assignment is almost entirely random (carry burdens, making rope).

PAYOFF AND LIKELIHOOD OF EVOLUTION

We can alter the model slightly to account for asymmetries in performance (based on innate sex differences) that make one equilibrium or the other more attractive.

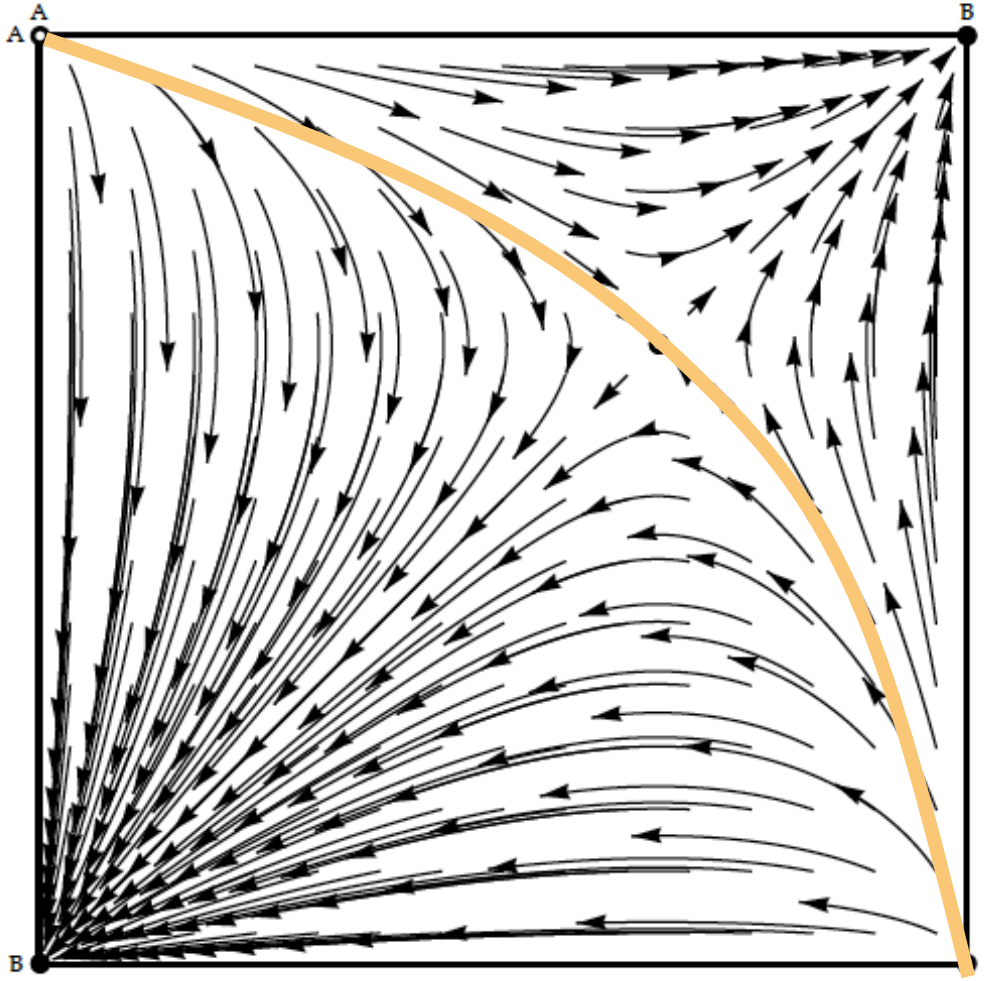
		Player 2	
		A	**B**
Player 1	**A**	0,0	1,1
	B	$1+\alpha,1+\beta$	0,0

PAYOFF AND LIKELIHOOD OF EVOLUTION

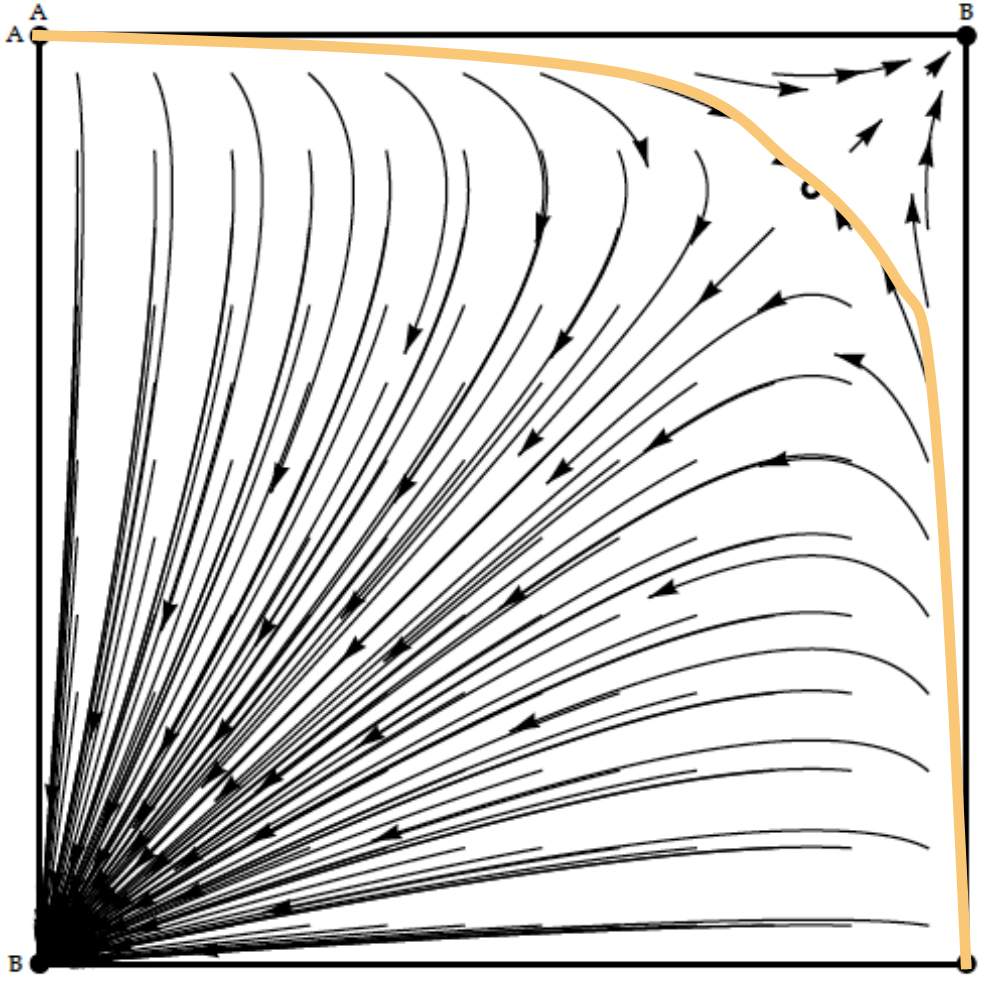
We can alter the model slightly to account for asymmetries in performance (based on innate sex differences) that make one equilibrium or the other more attractive.

Common interest, with potential asymmetry

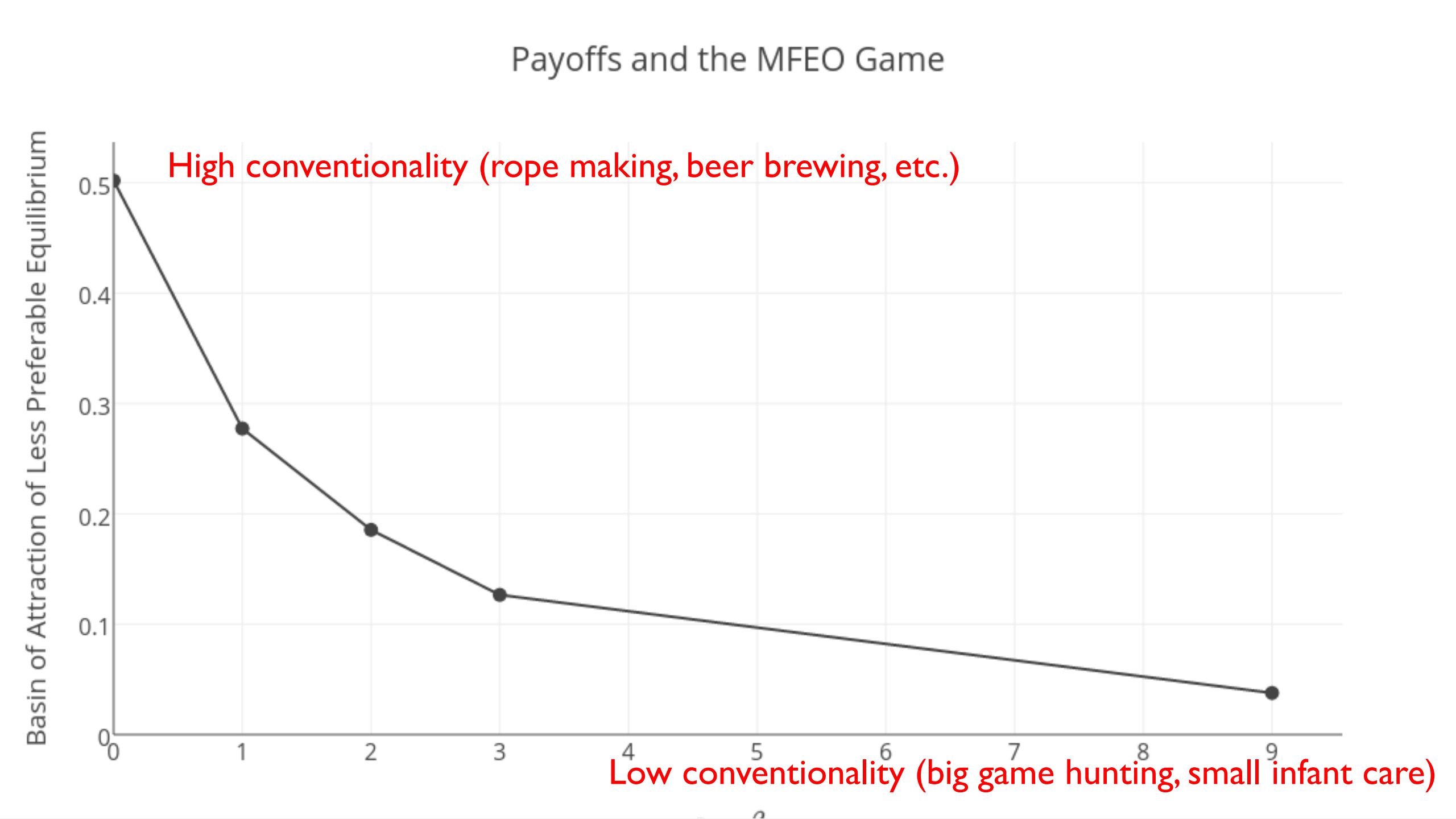
		Player 2	
		A	**B**
Player 1	**A**	0,0	1,1
	B	$1+\alpha,1+\beta$	0,0



(a) $\alpha = \beta = 1$



(b) $\alpha = \beta = 4$


Payoffs and the MFEO Game
Basin of Attraction of Less Preferable Equilibrium
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5
6
7
8
9
High conventionality (rope making, beer brewing, etc.)
Low conventionality (big game hunting, small infant care)

MEASURING CONVENTIONALITY

In another paper, I argue that we can measure the differences between these sorts of situations using information theory.

We can ask: how surprised do we tend to be (or how much do we learn) upon observing an evolved division of labor?

SUMMING UP

1) Gendered division of labor can be explained by coordination models grounded in rational choice or social learning
2) Social learning models make more reasonable assumptions about actors' abilities (and more perspicuous ones)
3) In addition, these models can explain both the persistence of patterns of gendered DoL, and variations in the conventionality of these patterns

THANK YOU!