

Week 8 – Cheap Talk

I. Introduction

- A. Now we'll consider situations where interest is not perfectly coincident in the sense of being divided into success and failure
- B. But these games also have communication
- C. Two questions
 - i. Does communication change the structure of the game (is it relevant)?
 - ii. Does meaning evolve in these contexts as well?

II. Equilibrium selection and the inefficacy of cheap talk

- A. Consider a coordination game:

	H	L
H	(2, 2)	(0, 0)
L	(0, 0)	(1, 1)

- B. Add two signals

- C. It has corresponding Nash equilibria, where individuals ignore the signal and take the same action no matter what. We have not solved the equilibrium selection problem, instead we have made it worse
- D. Aumann's Stag hunt

	S	H
S	(4, 4)	(0, 3)
H	(3, 0)	(2, 2)

- E. Aumann argues that signals should have no effect since hare hunters want to get their opponent to play stag
 - i. This argument is strange, since if the hare hunters succeed, they would prefer to play hare
 - ii. This also assumes signals have pre-existing meanings

III. Signals as destabilizers

- A. Coordination games

- i. Consider a population of $\langle 1, L, L \rangle$
- ii. This population can be invaded by $\langle 2, L, H \rangle$
- iii. But there is not a symmetric situation $\langle 1, H, H \rangle$ cannot be invaded
- iv. Waerneryd shows that only strategies that achieve the high payoff in this game can be NSS

- v. Similarly with respect to a class of dynamics Kim and Sobel show the same thing for all games with a symmetric pareto dominant equilibria

B. Prisoner's dilemma

- i. Consider a population of $\langle 1, D, D \rangle$
- ii. This can be invaded by $\langle 2, D, C \rangle$
- iii. But these too can be invaded by $\langle 2, D, D \rangle$
- iv. Robson points out this process can occur over and over again

IV. Population Dynamics

A. Kim and Sobel's class of dynamics:

- i. Assumption (I): Exactly one member has the opportunity to change his strategy
- ii. Assumption (S): The individual who does worst has positive probability of switching
- iii. Assumption (R): Any strategy that improves on the current one can be adopted with positive probability
- iv. Assumption (NL): Any strategy that doesn't improve has 0 probability
 - a) This is not actually what they use... because the proof of prop 2 allows for drift
- v. They show that the only stable states are those that achieve pareto dominant payoffs
- vi. If communication is from one to another then the only stable sets involve that person's favorite outcome
- vii. Signals don't necessarily mean anything

B. Replicator dynamics

- i. Stag Hunt
 - a) The game

	H	L
H	(3, 3)	(0, 2)
L	(2, 0)	(2, 2)

- b) The Standard replicator dynamic picture:

- c) The game with preplay communication
- d) The only ESS is a strange equilibrium $\langle 1, \text{Hare}, \text{Stag} \rangle \langle 2, \text{Stag}, \text{Hare} \rangle$
- e) Simulation results for replicator dynamics: 75% Stag, 13% Hare, 11% Poly
- f) What about meaning? Not much

- ii. Nash Bargaining Game

- a) The game: Proposals
- b) The Nash equilibria: $x+y = 1$ and $x=1, y=1$
- c) The standard replicator dynamic picture:

- d) What about with communication?
- e) Some strange polymorphisms here too
- f) But 98% go to the efficient equilibrium
- g) Meaning? None again
- iii. Transient information
 - a) Some information is initially available because of chance
 - b) Those that take advantage of that information do well
 - c) Once a preponderance are doing one thing, meaning is irrelevant and disappears

V. Structured populations

- A. Spatial interaction
- B. Imitate the Best
 - i. Social interpretation
 - ii. Evolution interpretation
- C. Best response to neighbors
 - i. Too smart and too dumb
- D. Spatial interactions effects on games
 - i. Stag Hunt
 - a) Stag hunting can invade much easier (example)
 - b) Stag hunting has a larger basin of attraction
 - ii. Bargaining
 - a) Propose a half can invade
 - b) $\frac{1}{2}$ has a larger basin of attraction
 - iii. So now we have two explanations for the apparent universality of these outcomes
 - a) But are they compatible?
- E. Spatial communication games
 - i. Lewis Signaling
 - a) Multiple signaling systems are stable
 - b) Signaling invades
 - c) Signaling systems are the only uninvadible strategies
 - d) But, in a certain sense there is no meaning
 - e) Regional meaning
 - ii. Stag Hunt
 - a) Strange results where you have local, but not global meaning again
 - b) A largely polymorphic population that plays all stag