Session 12: Coordination and Culture

12.1 – Coordination and Culture

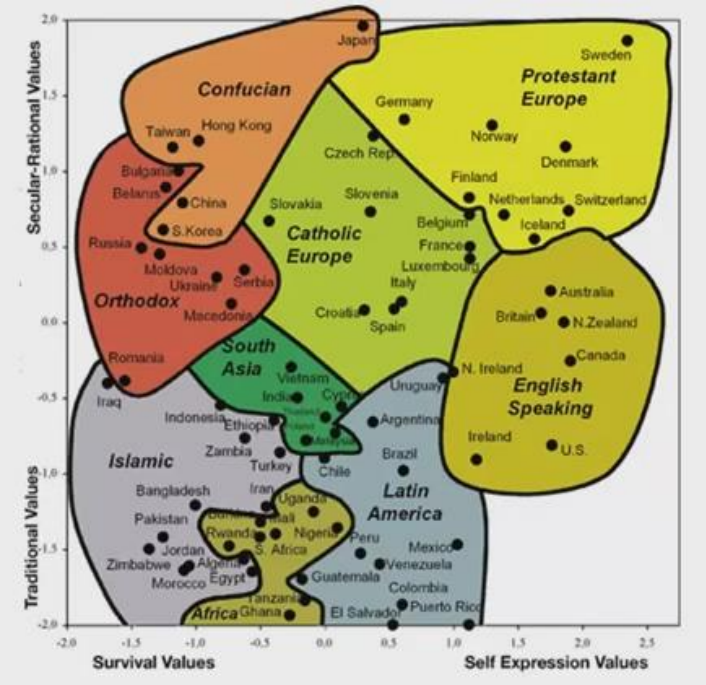
Coordination: doing same thing as someone else. Coordination on behavior, action, belief, etc. Common within groups. **Culture:** differences between countries or between groups of interacting people. **Culture is 'interesting'**: i.e., it can be suboptimal (in the rational sense *from an outsider's perspective*).	**Approach:** 1. **Insights:** ***Differences*** between ***Similarities*** within ***Interesting*** 2. **Pure Coordination game** why people do the same thing and why it is suboptimal in many cases. Will us Lyapunov function to explain
Coordinating Multiple Behaviors: • Explain cultural differences • Axelrod's Model – emergence of culture and possible 'thick' boundaries between • Inconsistency within cultures	**Coordination Consistency Model:** • Coordination between people and consistency within a person in a single model. • Markov processes to describe.

12.2 – What is Culture and Why Do We Care?

Culture – What? Why?: • Hundreds of definitions of culture. • Start historical definitions followed by social scientists quantify it – taking the abstract into the measurable – to enable country comparisons. • Can use to relate to country success.	**Culture Definitions:** **Tylor (1871)** – complex whole which includes ***knowledge, belief, art, law, morals, customs***. **Boas (1911)** – totality of ***mental and physical reactions and activities*** that characterize *behavioral responses to environment*, others, and to himself.
Culture Definitions (cont.): **Trilling (1955):** When we look at a people in the degree of abstraction which the idea of culture implies, we cannot but be touched and impressed by what we see, we cannot help but be awed by something mysterious at work, some creative power which seems to transcend any particular act or habit or quality that may be observed. ***To make a coherent life***, to confront the terrors of the outer and the inner world, to establish the ritual and art, the pieties and duties which ***make possible the life of the group and the individual*** – these are culture, and to contemplate these various enterprises which constitute a culture is inevitably moving. • Note the relation to the ***similarities within*** attribute and • ***Differences between*** cultures, between companies as well as • ***Interesting*** – odd, suboptimal from our perspective.	
Ultimate Game: • Player 1: offers to split $10 • Player 2: accepts or rejects the offer If 'accept': gets the split If 'reject': both get $0 • Player 1 Dilemma: How much to offer?	**Ultimate Game (cont.):** Social science question - how do different cultures play? • Lamalera: Indonesian whale hunters (act collectively). Offer $5,70 • Machigenga: Amazonian (lack personal names, more selfish culture). $2,60

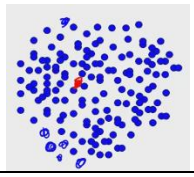
World Values Survey:

- Ron Ingelhart – relative dimensions of culture.
- Key dimensions:
  (X), Survival → Self Expression values
  (Y), Traditional → Secular-Relational values
- Maps the whole world by emphasis related to these two dimensions of values.
- Note:
  Protestant Europe (upper right)
  Islamic (lower left)
  Latin America (lower center)
  Confucian (upper left)
  English Speaking (right center)
- Catholic Europe (center)

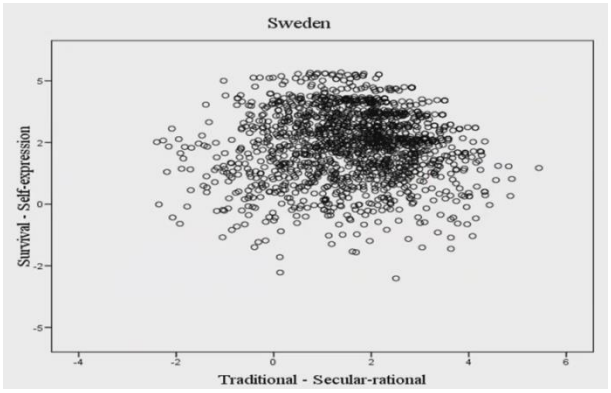


Clarification:

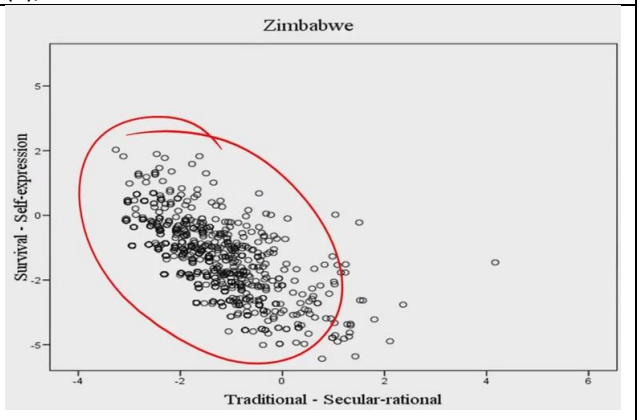
Culture is the dynamic mean of behaviors of the group. Great Blue Heron example: Red dies, add somewhat different blue.



Sweden: (X – Y)
(X), Survival → Self Expression values
(Y), Traditional → Secular-Relational values



Zimbabwe: (X – Y)
(X), Survival → Self Expression values
(Y), Traditional → Secular-Relational values



Hofstede's Dimensions:

- Power Distance (inequality acceptance)
- Uncertainty Avoidance
- Individualism / Collectivism
- Masculinity / Femininity
- Confucian / Dynamism (forward looking)

USA Example:

- Power Distance = 32 (tolerate inequality)
- Individualism = 90
- Masculinity = 60
- Uncertainty Avoidance = 40

France Example:
- Power Distance = 61
- Individualism = 63
- Masculinity = 32
- Uncertainty Avoidance = 80

El Salvador vs. Korea:

	El Sal	Korea
Power Distance =	62	56
Individualism =	12	11
Masculinity =	41	33
Uncertainty Avoidance =	80	80

Lesson: similar metrics but different 'cultures' implies a few metrics don't capture all facets.

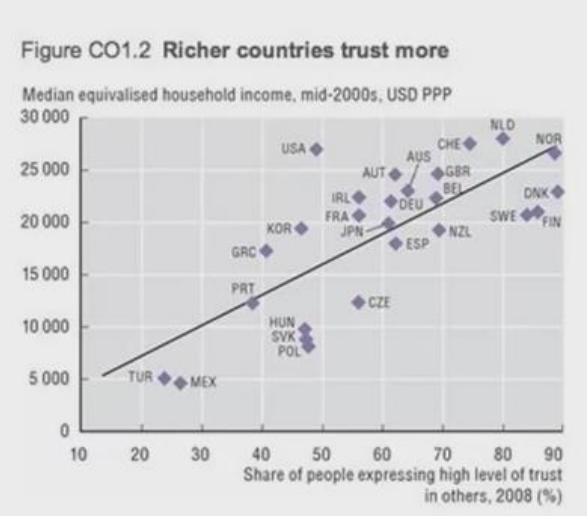
Why do we care?:
- **Kenneth Arrow –** *"Gifts and Exchanges,"* Philosophy and Public Affairs (1972)
  "Virually every commercial transaction has within itself an element of ***trust***, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the ***lack of mutual confidence***."
- **Solow** (1995)
  states that social capital and trust have to be "***measurable***", they cannot just be buzzwords.

How to Measure – Survey Questions: Example on measurement of trust level.

a) "claiming government benefits which you are not entitled to"
b) "avoiding a fare on public transport"
c) "cheating on taxes if you have the chance"
d) "keeping money that you have found"
e) "failing to report damage you've done accidentally to a parked vehicle."

World Values Survey:
Generally speaking, would you say that most people can be trusted?
Results:
(a) Sweden – 70%,
(b) Italy – 33%,
(c) Turkey – 10%

Richer Countries Trust More:
Results of Trust versus GDP survey
Caution:
This is a correlation metric, not necessarily a causal relation.



12.3 – Pure Coordination Game

The Ketchup Questions: Where do you store your ketchup? Fridge (US) or cupboard (UK). You follow what your people do. It helps coordinate since they then know where to look first.
Electrical plugs/outlets: US, Europe (many types),

Sweden road protocol switch:

- Switched in middle of night. But everyone was there.
- Helps standardize cars and driving safety between countries.
- British colonies tend to drive opposite to US / Europe (being an island nation helps.)

Pure Coordination Game:
Players, Actions, Payoffs
Ketchup location (Fridge or Cupboard)
Payoff:
1 if same,
0 if
different

		Player #2 F	Player #2 C
Player #1	F	1,1	0,0
	C	0,0	1,1

N Person Coordination Game:
Change behavior to match others (graphic)

Churn or Equilibrium? Recall Lyapunov!

- F(x), a ***Lyapunov*** function
- A1: has a maximum (or minimum) value
- A2: there is a > 0 such that if $x_{t+1} \neq x_t$, maximum, $F(x_{t+1}) > F(x_t) +$, or for a minimum, $F(x_{t+1}) < F(x_t) -$
- **Claim:** at some point $x_{t+1} = x_t$

N Person Coordination – Lyapunov:

- Let LF = number of co-ordinations, $= 2$

- Has a maximum number of co-ordinations
- Will stop with this starting initial condition.
- Initial condition below is stable.

- Social structure dependent: Axelrod's culture model - everyone doing the exact same thing, or blocks of people doing very different behavior

Coordination or Standing Ovation?:

- **Coordination Game:** Measurable difference in payoffs, no one would choose not to coordinate. Think autos and which side of road they are to drive on – clear payoff. Physical (not just psychological) effect. Dagen H (Sweden) is a coordination game.

- **Standing Ovation:** could be more "psychological," it's okay to differ. You may choose to stand or not, it's a choice and the payoff is not black and white.

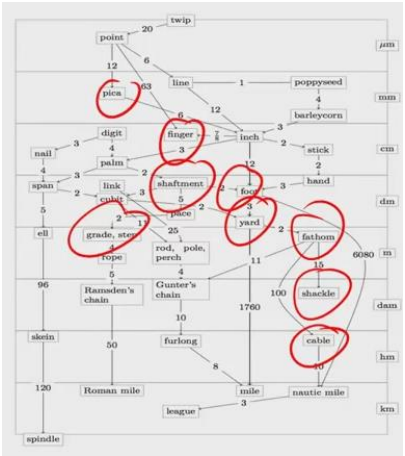
Inefficient Co-ordination:
Maui – Des Moines Game
Clear advantage to both players to choose the same with Maui clearly better than Des Moines.

		#2 M	#2 D
#1	M	2,2	0,0
	D	0,0	1,1

Metric – English Game: Stuck in inefficient world (USA) where suboptimal coordination payoff.

		#2 M	#2 D
#1	M	2,2	0,0
	D	0,0	1,1

English System of Measurement Chart:
Barly corns,
fingers,
ounces,
Etc.



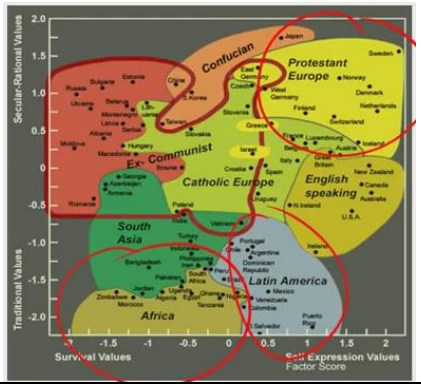
Shake – Bow Game:
Values (a) can change over time, thus changing preference and optimal coordination. $a < 1, or\ a > 1$

		#2 B	#2 S
#1	B	a,a	0,0
	S	0,0	1,1

Quiz: Suppose that two people play a coordination game. Initially, each chooses randomly to shake or bow. If they coordinate, they stick to that action. If they don't coordinate, they randomly choose again (with equal likelihood of coordinating). What's the greatest number of attempts it could take for these two people to coordinate?
(a) Two Periods, (b) Four Periods, (c) Six Periods, (d) It could take forever
Analysis: This is like a sequence of fair two-coin tosses. Let both = Heads = coordination. Since each is independent, you are lookiing for a sequence of tails followed by heads. This could be infinite.
Ans: (d) this could take forever
Explanation: *They could take forever to coordinate. With probability 1/2 they will coordinate in period one. With probability 1/4 the coordination will occur in period two. With probability* $1/2^N$*, the coordination will occur in period N. Of course, in reality we would expect these two people to converge must faster than that.*
[See 12.3, "Pure Coordination Game"]

12.4 – Emergence of Culture

Why cultures Differ or are the Same:
Take coordination game and extend to multiple games.



Games we Play:
Examples of pure coordination games. Important to understand and coordinate behaviors for efficiency and meeting expectations.

- Do people wear shoes inside your house?
- Do you cross the street when the don't-walk sign is flashing?
- Read the newspaper at the breakfast table?
- Do you hug your friends when you see them?
- Interrupt someone who is talking?

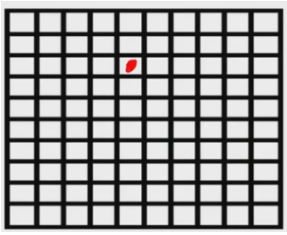
Are you like me in your answers?

Complexity of Coordination:
20 co-ordinations, Yes/No answers (2), yields over a million cultures ($2^{20} > 1{,}000{,}000$)

Axelrod's Culture Model (Bob):
Cultural Emergence Model.

- **Features:** {1,2,3, . . . ,N}
  (e.g., ketchup, newspapers, streets, greeting)
- **Traits:** a_i in {1, 2, 3, 4, 5, 6, 7}
  (coordinating behaviors, e.g., fridge or cupboard, could be more than two options)
- **Person:** (a_i, a_i,…, a_N)
  (a vector of traits on features)

Axelrod's Model (cont.):
Start with grid. Then: (1) assign values,
(2) pick a person,
(3) pick a neighbor,
(4) N-S-E-W neighbor.

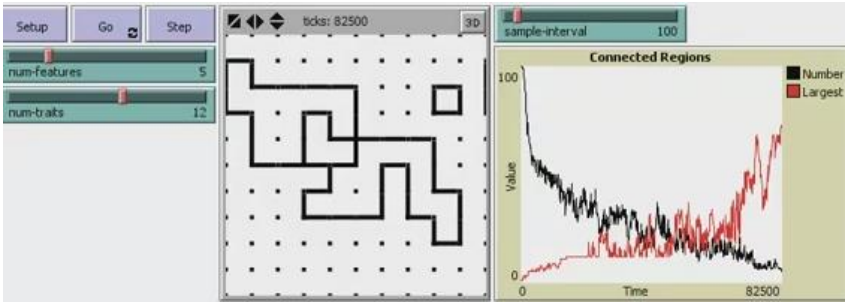


With probability = similarity, pick a feature and match their traits: (a) if someone like us, we interact with them and are playing the coordination game and match, (b) if someone very different choose not to play so we don't change our behavior.

Axelrod's Game – What Happens?:
5 features, 10 values, 4 neighbors (NSEW), and
$Similarity = \%\ equal\ traits$
Before Meeting → After Meeting
Leader: 53211 ➔ 53211
Follower: 51331 ➔ 53311
Shared: P=40%

Quiz: Leader has characteristics: 732163.
Follower has characteristics: 436162.
What is the probability these two people interact?
(a) 50%, (b) 40%, (c) 100%, (d) 20%
Analysis: 3 of 6 traits are the same. 50%
Ans: (a) 50%
Explanation: *Probability of interaction = # of dimensions where the leader and the follower share a value divided by the total # of dimensions. In this case, Leader and Follower match on 2nd (both have 3s), 4th (both have 1s) and 5th (both have 6s) dimensions. That's 3 dimensions out of the 6 total. Therefore,* $P = \frac{1}{2} = 50\%$.

Netlogo Example:
Features = 5, **Traits** = 12.
Result: 4 different cultures
URL for model
Thick Boundaries: People near each other will either be exactly the same or differ by a lot. These emerge as indications of where people don't interact because of trait differences.

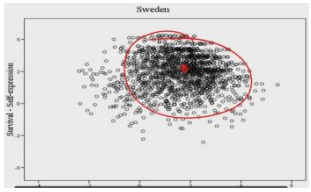


- **Axelrod's model** shows how in a social space, we can get distinct cultures on multi dimensions, and those boundaries can be self-reinforcing. People don't interact across the boundaries, and the cultures remain disparate. But leaves out any notion of consistency within a culture.

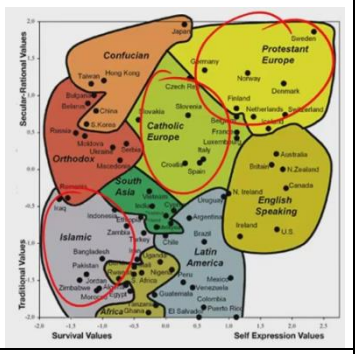
12.5 – Coordination and Consistency

Bednar et al Model: Adds two things missing from previous model. (1) Coherence and consistency – recall Trilling (1955)

But heterogeneity of behaviors within a culture (e.g. Sweden)



Map of (macro) Consistent Behavior: Would like a model that includes both macro consistency and group heterogeneity.



How? Make *assumptions* to get those results by:
1. Values people coordinate on (actions, behaviors) have 'meaning'
2. People desire consistency
3. Include tiny bit of Innovation / Errors to get observed variations.

In short, adjust model parameters to match the observed data.

Model:
Include (1) Coordination (as before) and (2) add try to be Consistent, and (3) add errors to get heterogeneity.
Coordination rule:
Before Meeting After Meeting
Leader: 53211 ➔ 53211
Follower: 51331 ➔ 53311
Shared: P=40%

Consistency Rule Explanation:
- Pick two attributes,
- Set the value of the second equal to the value of the first.

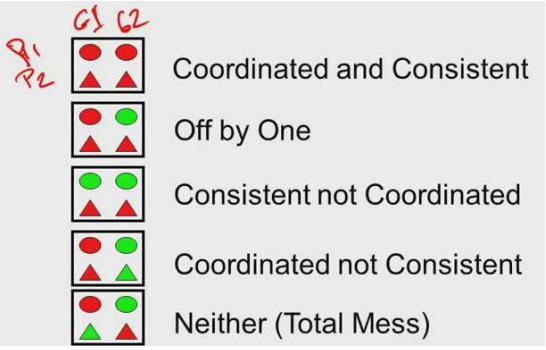
51441 becomes 55441

Expected Result:
Consistency and Coordination
But it took a long time to converge.
Unexpected Result: Small error lead to substantial population level heterogeneity. That is only a small number need to innovate to generate heterogeneity.

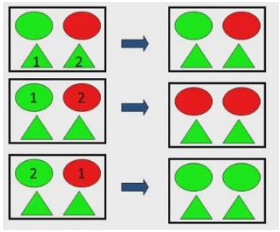
Why only a tiny error?: Assume all 5's. If someone innovates (5 becomes 6)
1. May change back to 5 or may meet someone who induces them to change back to a 5.
2. Alternatively, may meet someone else who copies the 6.
3. Result is 6 can spread vertically or horizontally and process will be slow to converge.

55555555
55556555
55555555
55555555

Simplest Model:
Two agents, two games, two actions
States of the World:



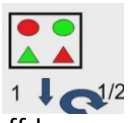
Consistency Dynamic:
Three examples

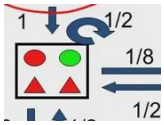


1. P2 consistent ➔ no change
2. P1 inconsistent ➔becomes red-red
3. P1 inconsistent ➔becomes green-green

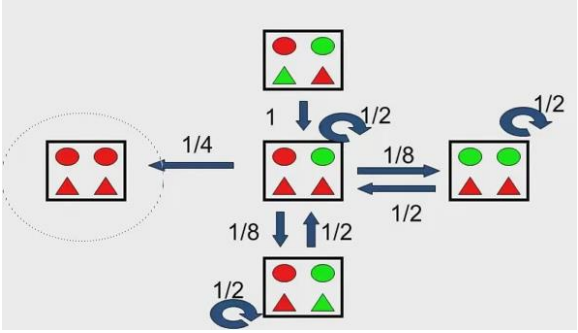
Note assume (2) and (3) independent choices for direction of consistency so each has $P = \frac{1}{2}$

Coordination and Consistency Map:
If starting here at 'total mess' and P2 decides on red-red consistency, then move to 'off-by-one' state. Alternatively, P1 and P2 could coordinate and again move to the 'off-by-one' state

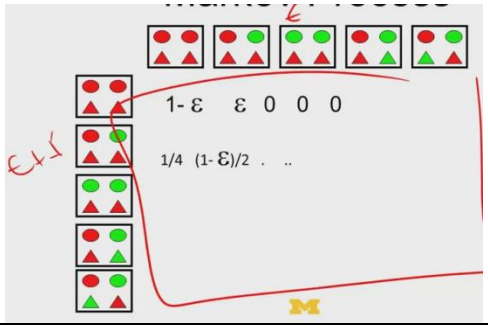




- Similar to Markov BUT cannot get to every state, i.e., all red on the left
- But if add error to the all-red equilibrium state, then the system becomes Markov!



Markov Matrix: Can then create Markov transition matrix. Note ε is the error.



Recall:
Differences between
Similarities within
Interesting

Coordination explains many differences.
We can coordinate on 'wrong' actions by:

1. Idiosyncratically coordinate on the wrong thing
2. Shake or Bow – payoffs can change over time
3. Consistency priority can require suboptimal behavior to be consistent.

Lessons:

1. Culture as multiple and consistent coordination:
2. Small amounts of innovation/error lead to within-culture heterogeneity (Markov model example)
3. Lyapunov and Markov models help us understand these processes. Pure coordinating behavior creates a Lyapunov function ➔ fast convergence. Consistency and error lead to a Markov model to explain equilibrium (macro) with a lot of heterogeneity.

Note: Use models (Lyapunov and Markov) to model our culture models.

Quiz: Which of the following can explain why cultures may have some widespread sub-optimal behaviors? (a) Idiosyncratic coordination on a sub-optimal behavior. (b)Sub-optimal behavior in one dimension if it means more overall consistency. (c) Payoffs to behavior have changed over time; what was once optimal is no longer optimal. (d) The metric system is confusing.
Ans: (a), (b), and (c) are all examples discussed explaining heterogeneity.

Explanation: *I discussed the reasons behind sub-optimal behavior a few minutes ago.*
In cases such as use of the English measurement system (instead of the metric), idiosyncrasy leads to coordination on a sub-optimal behavior.
We might hug our mom (even if she's not much for hugging) if it means more overall consistency. So sub-optimal behavior in one dimension (greeting our mom) would be explained by the desire for overall consistency.
Finally, we saw with the decision to bow instead of shake that payoffs may change over time, so what was once an optimal behavior becomes a sub-optimal behavior.
The incorrect option - that the metric system is just plain old confusing - well, let's hope that's not what anyone took away from this lecture.

Summary: Basic Cultural properties: there's a lot of **difference between cultures**, and those difference may arise because the fact that people **need to coordinate** within groups with which they interact. There's also **consistency within cultures**, and that happens because it gets cognitively easier to do the **same behavior** in lots of different domains. And then third, we see a **lot of heterogeneity within** cultures. And that happens, as we saw by using a Markov analysis on our model, because if people just make small mistakes or occasionally try an **innovation**, those differences are **going to propagate** through the population in two ways; within an individual and across individuals. And that's going to give us a lot of within-culture heterogeneity. So cultures differ between themselves. Cultures differ within themselves. But they still have this consistency. They have what you might call a **cultural signature**. These very simple models combined with our tools of Lyapunov functions and Markov processes have helped us understand why that happens.