Revealed Reputations in Finitely-Repeated Prisoners' Dilemmas

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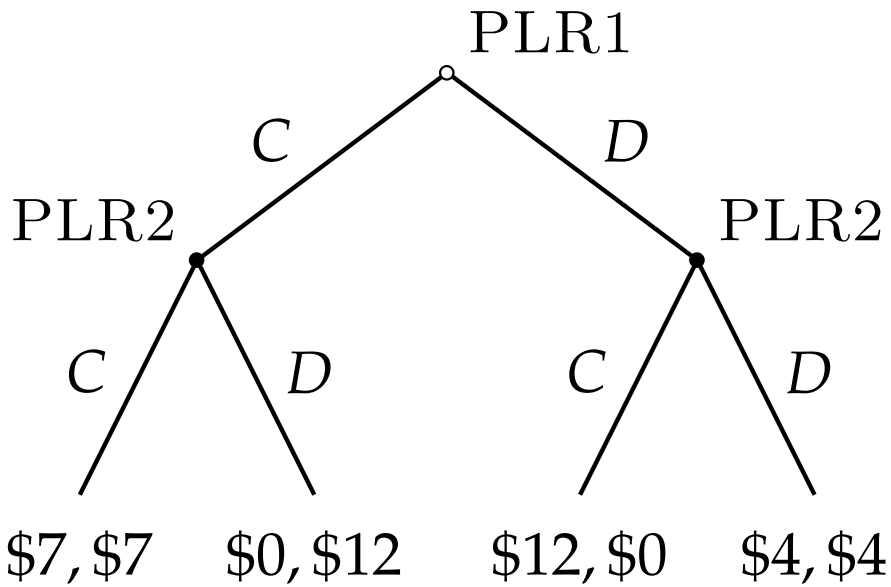
July 10, 2011
Chicago, IL

Finitely-Repeated Sequential-Move Prisoners' Dilemma

Single Stage:



Actual Display (PLR2)

Round:	1	2	3	4	5	6	7	8	9	10	Tot.
Other Player:	L	L	R	L	L	?					
You:	L	L	R	R	R						
Your Points:	7	7	4	12	12						42

It is your turn to move.

The Other Player may have chosen LEFT or RIGHT. For each case select your move.

Payoff From Your Move (in **BOLD**)

Case 1.) The Other Player moves **LEFT**

Other Player's Payoff	○ LEFT	○ RIGHT
LEFT	**7** 7	**12** 0
RIGHT	**0** 12	**4** 4

Case 2.) The Other Player moves **RIGHT**

	○ LEFT	○ RIGHT
LEFT	7 7	12 0
RIGHT	**0** 12	**4** 4

Submit

Experiment Structure

- A Supergame:
  - 10 periods of the PD stage game
  - Fixed opponent
  - Fixed player roles
  - Known end point (10 periods)
  - History within that supergame is shown
- A Block:
  - 5 ten-period supergames
  - Different opponent each supergame
  - Same player role across supergames
  - Known end point (5 supergames)
  - History from previous supergames *not* shown

Treatments

- A Session:
  - Block 1: Baseline (no history shown)
  - Block 2: Entire Block-1 history is revealed
- A Treatment:
  - 1-Sided History (1S): Only PLR1's Block-1 history revealed
  - 2-Sided History (2S): Both players' Block-1 history revealed

Experiment Structure

1S

BLOCK 1					BLOCK 2				
1	2	3	4	5	6	7	8	9	10
10per	10per	10per	10per	10per	10per	10per	10per	10per	10per
NO HISTORY SHOWN					PLR1'S BlOCK-1 HISTORY SHOWN				

2S

BLOCK 1					BLOCK 2				
1	2	3	4	5	6	7	8	9	10
10per	10per	10per	10per	10per	10per	10per	10per	10per	10per
NO HISTORY SHOWN					BOTH PLAYERS' BlOCK-1 HISTORY SHOWN				

'The Surprise'

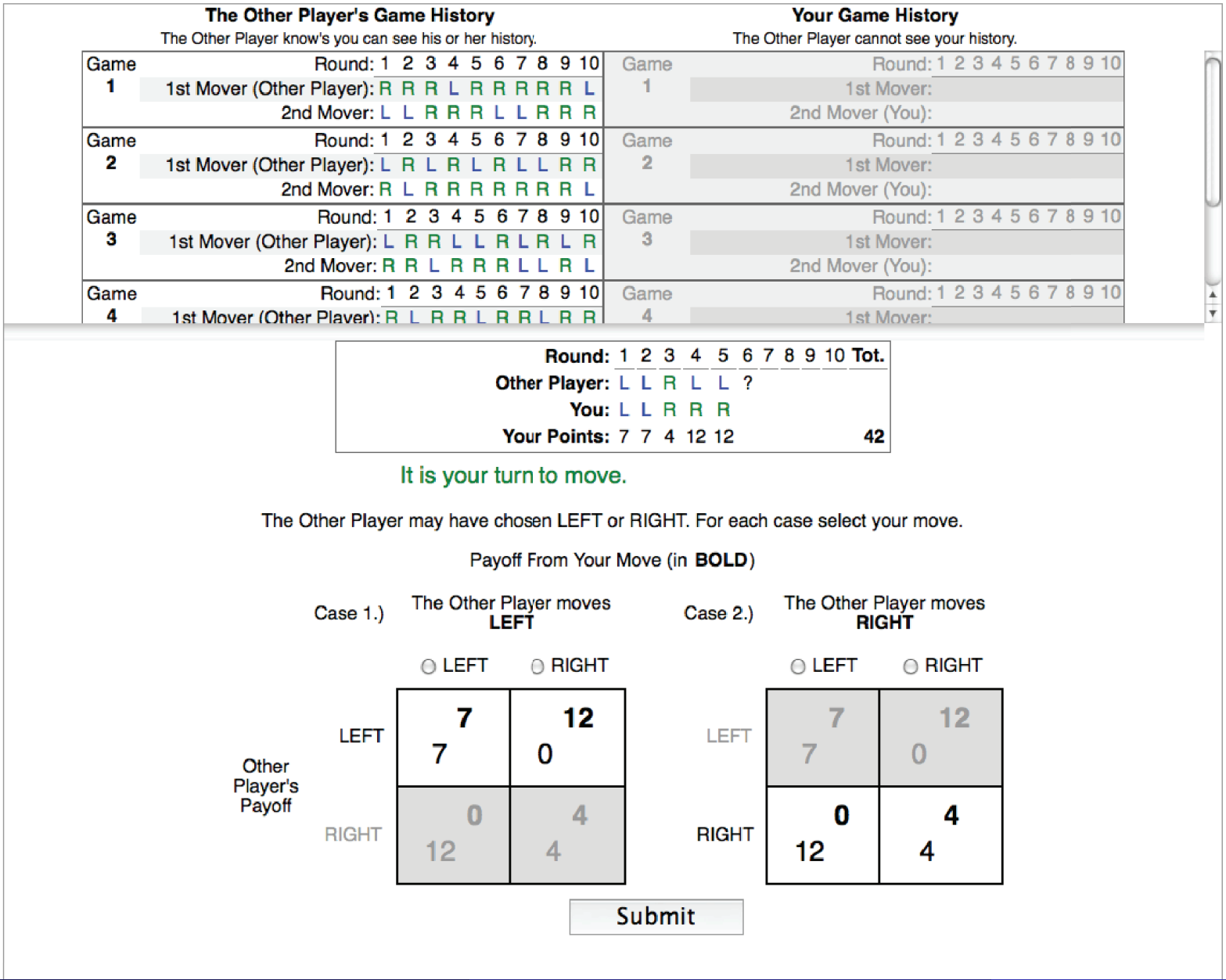
Players know NOTHING about Block 2 when playing Block 1.

- ~~Deception~~ Concealment
- "Regret-inducing concealment"

Defenses:

- Each block = separate experiment (payments, consent, etc.)
  - Told initially a 2nd experiment would be run, but no details.
  - Unlikely mistrust would carry to later experiments
- Concealment is not uncommon in economics experiments (e.g. ambiguity)
- OK of other OSU lab users (Kagel, Levin, Coffman)
- Not clever enough to avoid it

Screenshot: 2nd Mover, Block 2



The Other Player's Game History

The Other Player know's you can see his or her history.

Game		Round: 1 2 3 4 5 6 7 8 9 10
1	1st Mover (Other Player):	R R R L R R R R R L
	2nd Mover:	L L R R R L L R R R
Game 2	Round:	1 2 3 4 5 6 7 8 9 10
	1st Mover (Other Player):	L R L R L R L L R R
	2nd Mover:	R L R R R R R R R L
Game 3	Round:	1 2 3 4 5 6 7 8 9 10
	1st Mover (Other Player):	L R R L L R L R L R
	2nd Mover:	R R L R R R L L R L
Game 4	Round:	1 2 3 4 5 6 7 8 9 10
	1st Mover (Other Player):	R L R R L R R L R R

Your Game History

The Other Player cannot see your history.

Game		Round: 1 2 3 4 5 6 7 8 9 10
1	1st Mover:	
	2nd Mover (You):	
Game 2	Round:	1 2 3 4 5 6 7 8 9 10
	1st Mover:	
	2nd Mover (You):	
Game 3	Round:	1 2 3 4 5 6 7 8 9 10
	1st Mover:	
	2nd Mover (You):	
Game 4	Round:	1 2 3 4 5 6 7 8 9 10
	1st Mover:	

Round:	1	2	3	4	5	6	7	8	9	10	**Tot.**
Other Player:	L	L	R	L	L	?					
You:	L	L	R	R	R						
Your Points:	7	7	4	12	12						**42**

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Payoff From Your Move (in **BOLD**)

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Other Player's Payoff	○ LEFT	○ RIGHT
LEFT	**7** / 7	**12** / 0
RIGHT	0 / 12	4 / 4

Case 2.) The Other Player moves **RIGHT**

	○ LEFT	○ RIGHT
LEFT	7 / 7	12 / 0
RIGHT	**0** / 12	**4** / 4

Submit

Motivation

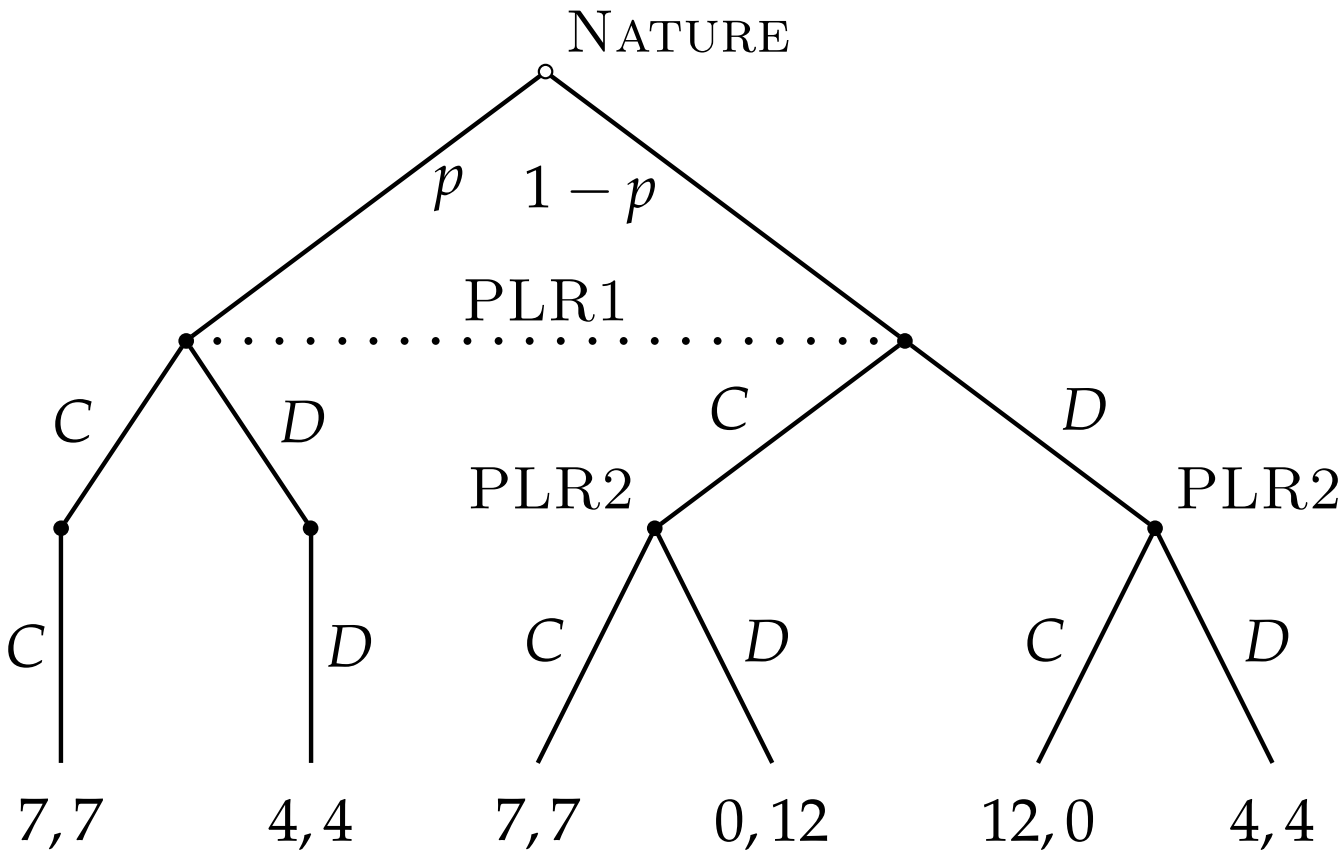
Why do we see cooperation in finitely-repeated interactions?

"Gang of Four": Kreps et al. (1982)

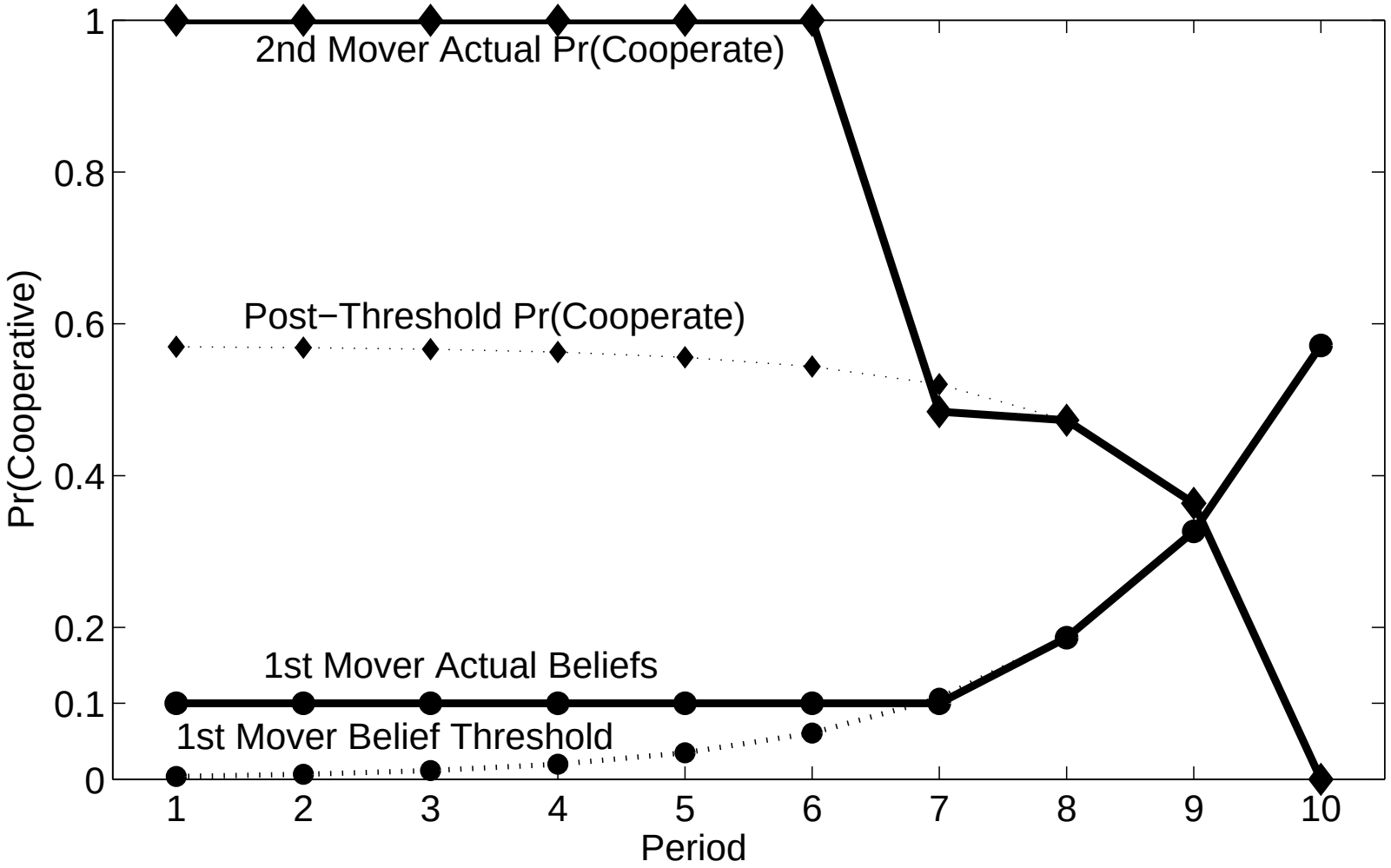
- 2nd mover *might* be reciprocal type
- 1st mover willing to trust 2nd mover
- Selfish 2nd mover imitates reciprocal type
- Example equil. path: $((C,C),(C,C),(C,C),(C,D),(D,D))$
- Long enough game $\Rightarrow$ only need ε belief to C in period 1

The Gang of Four

Kreps et al. (1982) "Rational Cooperation in the FRPD"



GoF Illustrated



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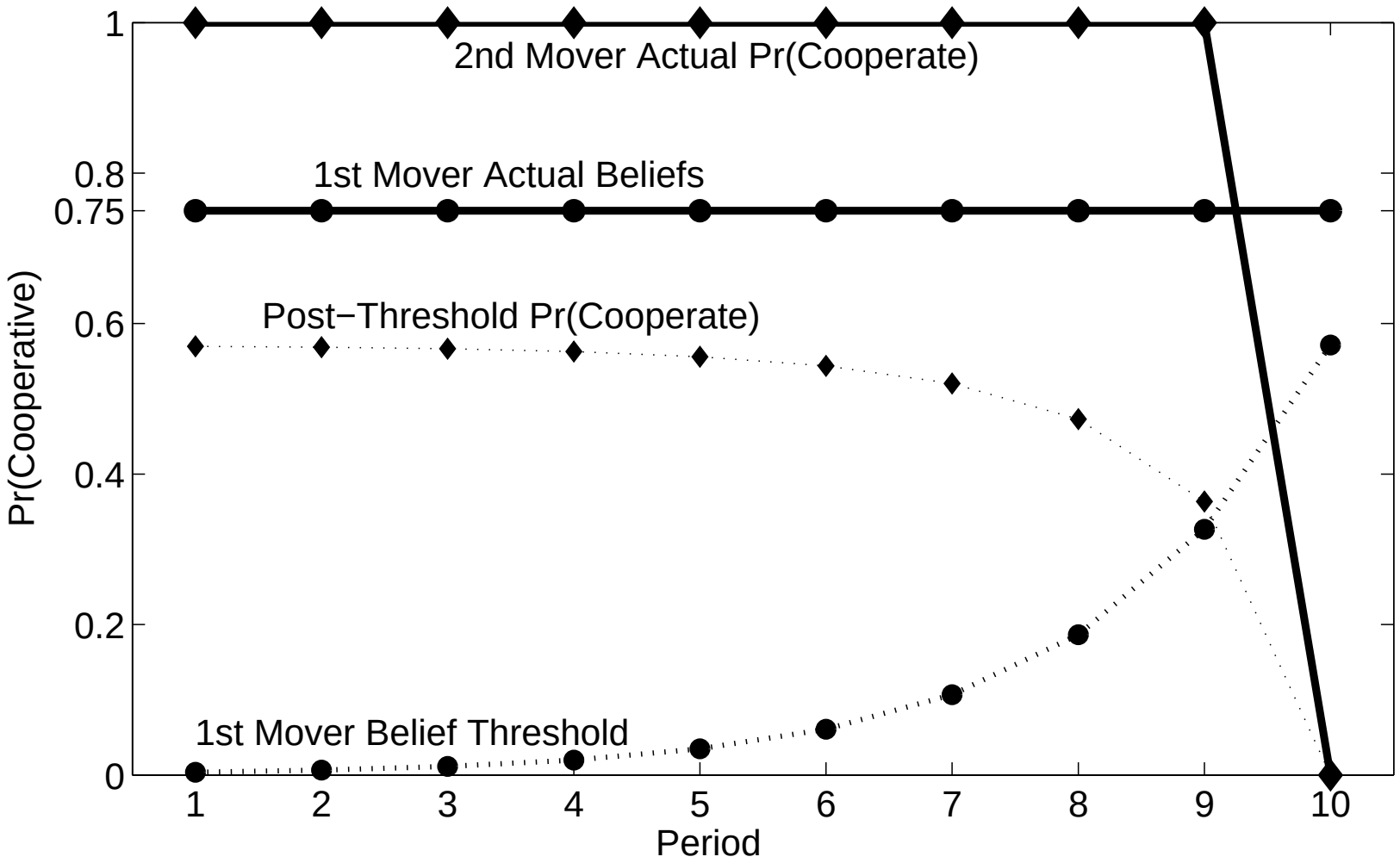
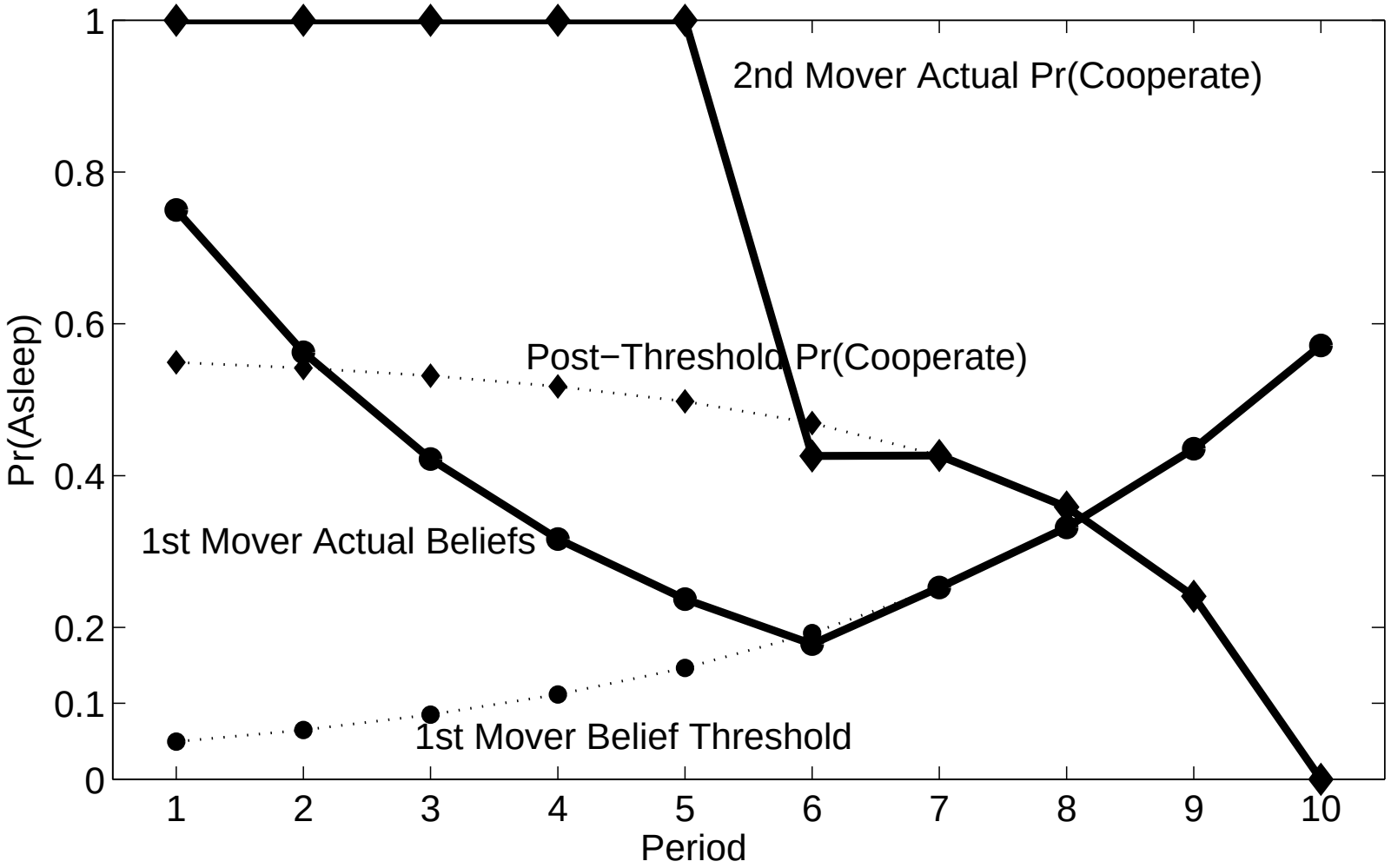


A Generalization

- Players start the supergame 'asleep': Grim Trigger
- Players randomly 'wake up', perform backward induction
- Early-waking players pretend to be asleep

Asleep-Awake Illustrated

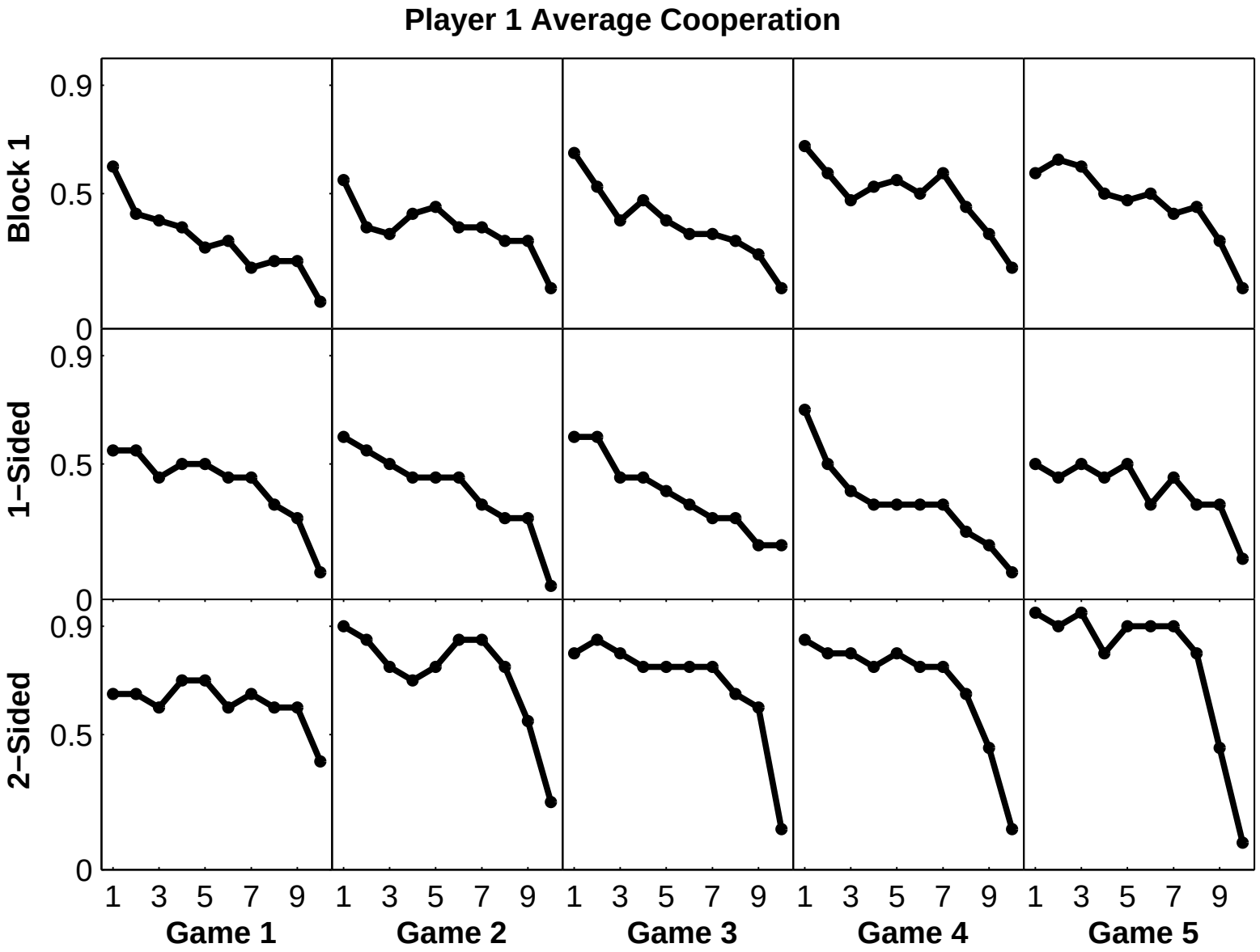


Evidence

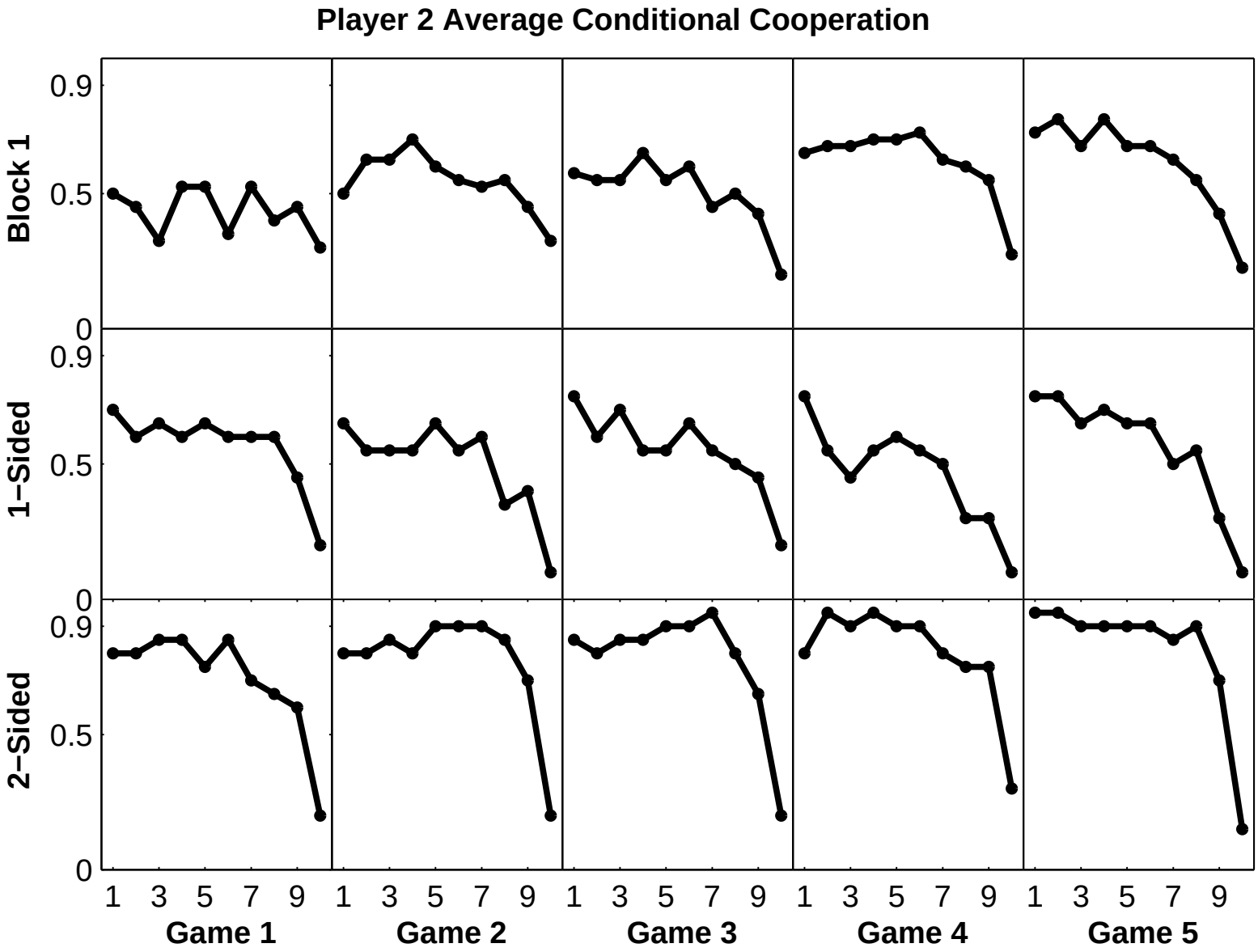
- End-game effects are observed in FRPDs
  - Selten and Stoecker (1986): End-game defection, shifts earlier.
  - Andreoni and Miller (1993): Vary Pr(reciprocal) via computer plrs
  - Cooper et al. (1996): One-shot vs. finitely repeated.
  - Clark and Sefton (2001): Sequential PD. PLR2 reciprocates
  - Gachter and Fehr (2002): One-shot vs. repeated labor market
  - Bolton et al (1995): Reputation & history in other game
  - Roe & Wu (2009): Type classification & reputation-building
  - Camera & Casari, Schwartz et al, Gong & Yang: history helps cooperation in other games. Duffy & Ochs don't find this.

The Results

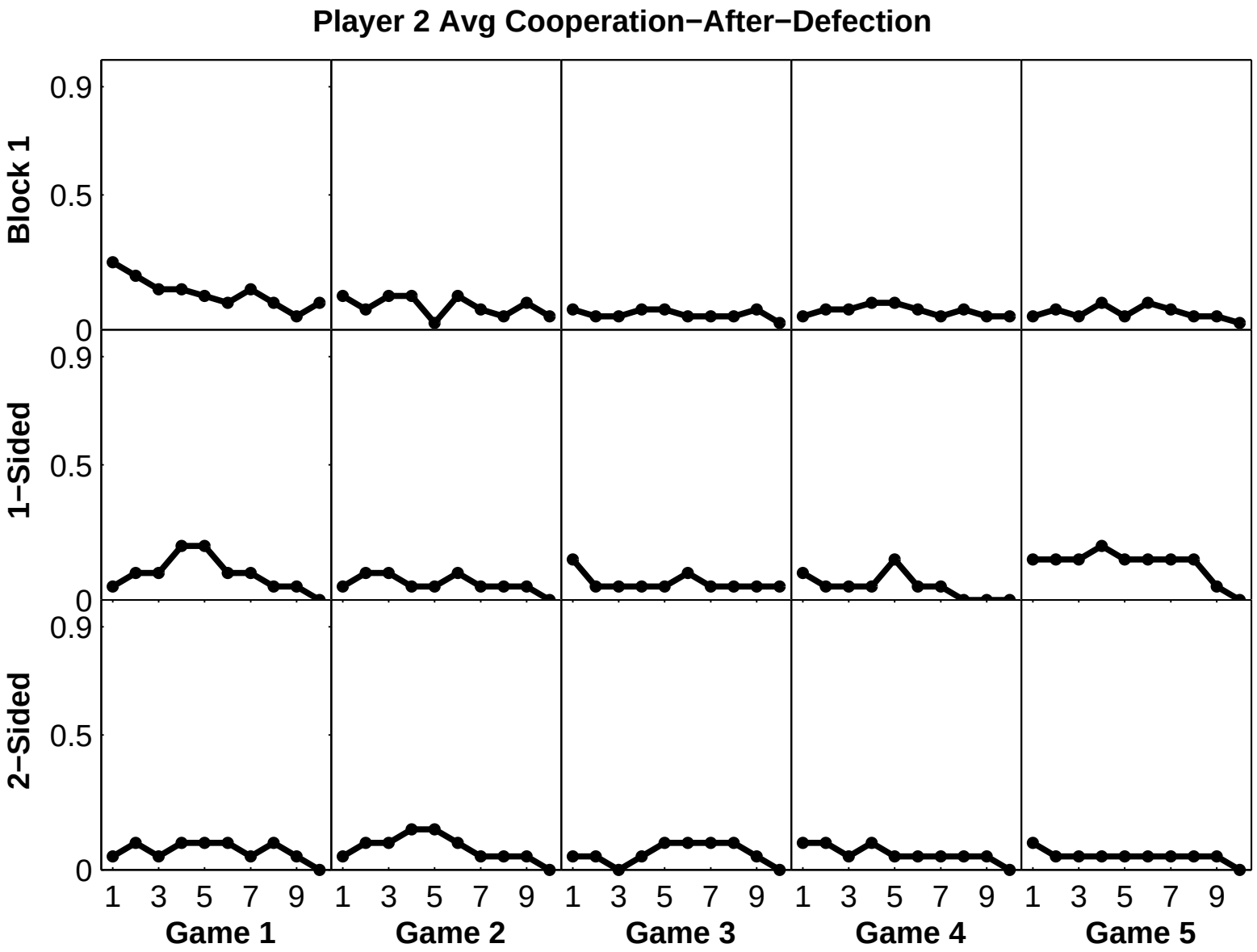
Player 1 Cooperation



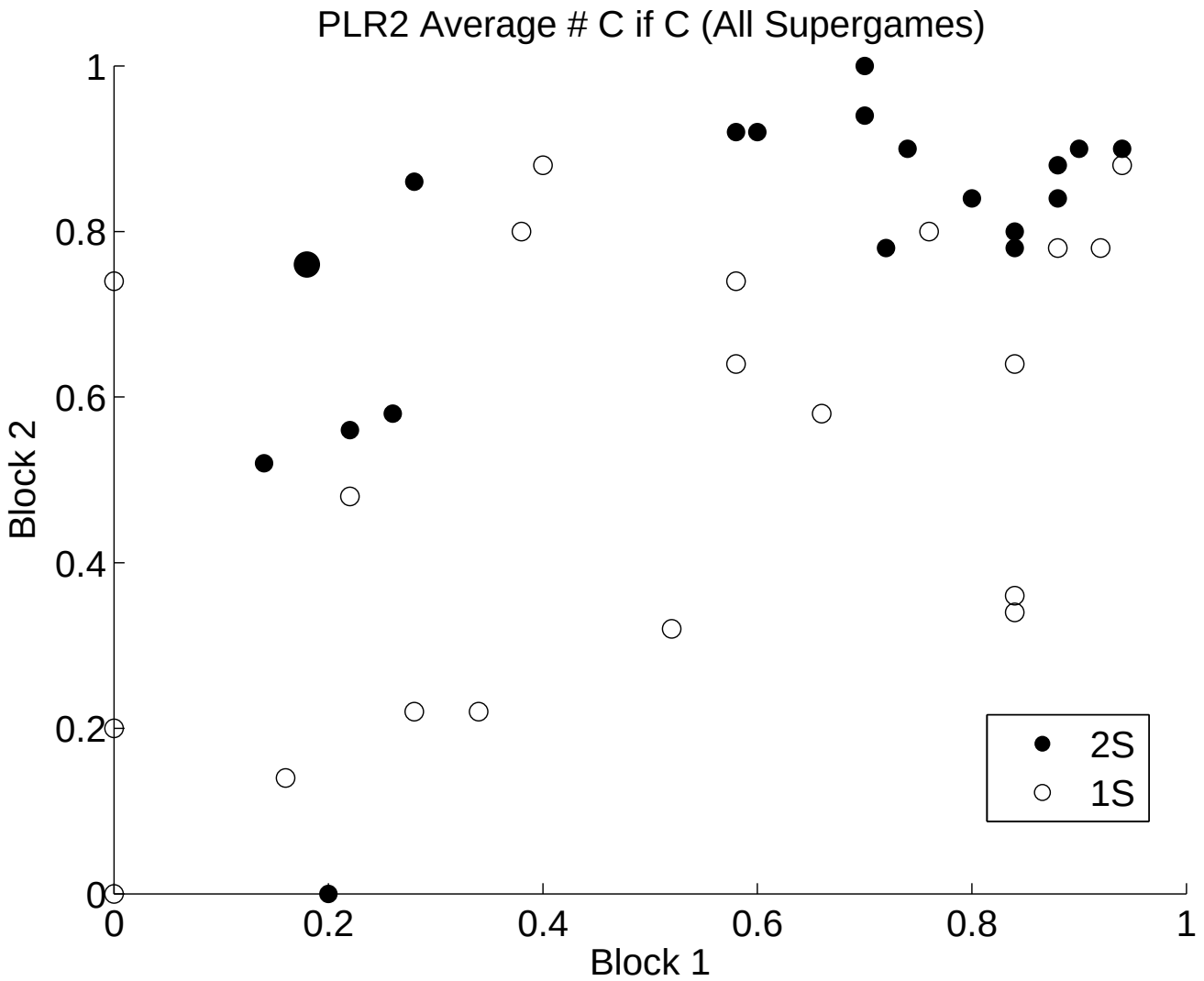
Player 2 Cooperation Given C



Player 2 Cooperation Given D

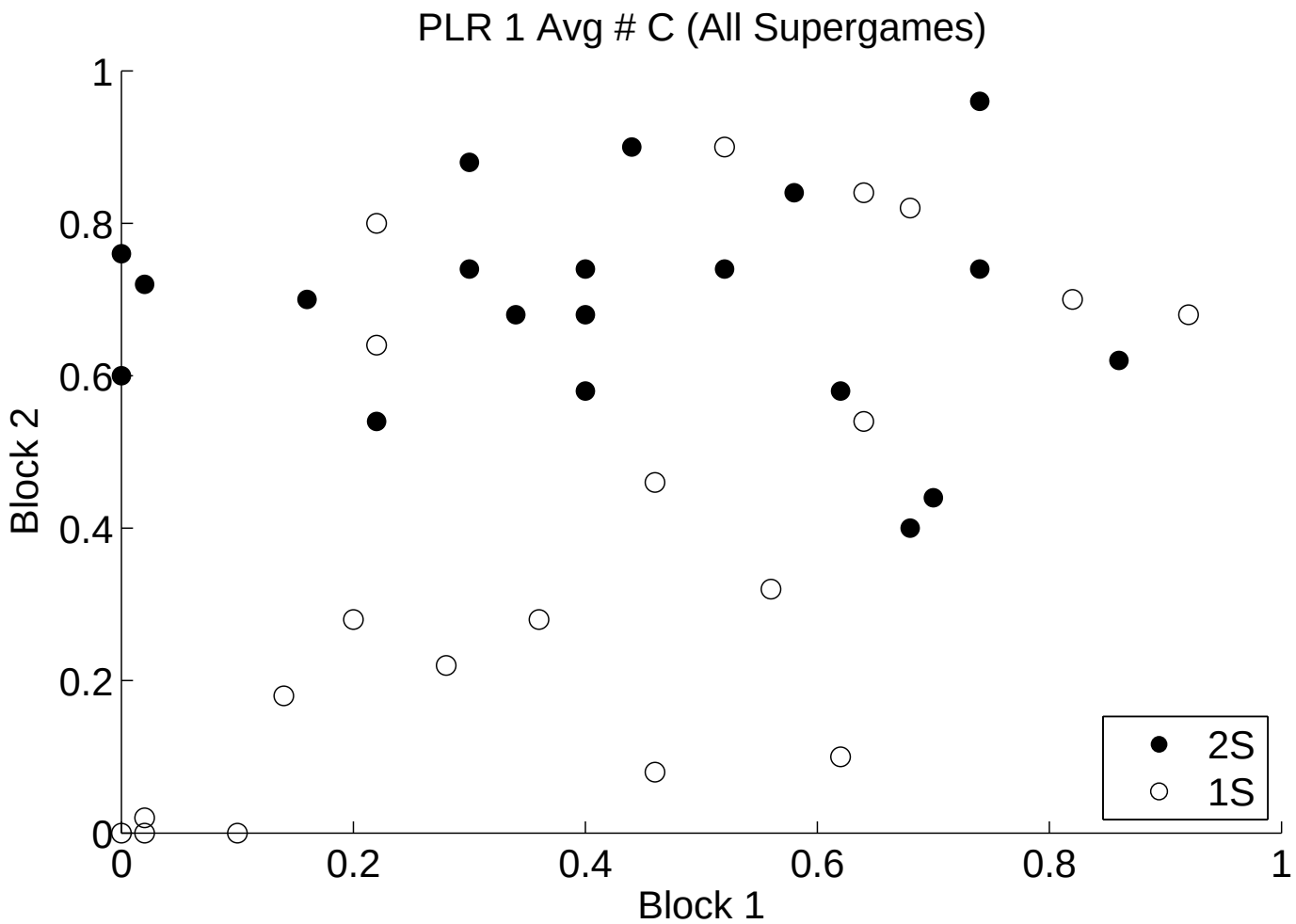


Player 2: Block 2 vs. Block 1



Wilcoxon: 2S Block 2 $>$ 1S Block 2: p-value $= 0.0018$

Player 1: Block 2 vs. Block 1



Wilcoxon: 2S Block 2 $>$ 1S Block 2: p-value $= 0.0051$

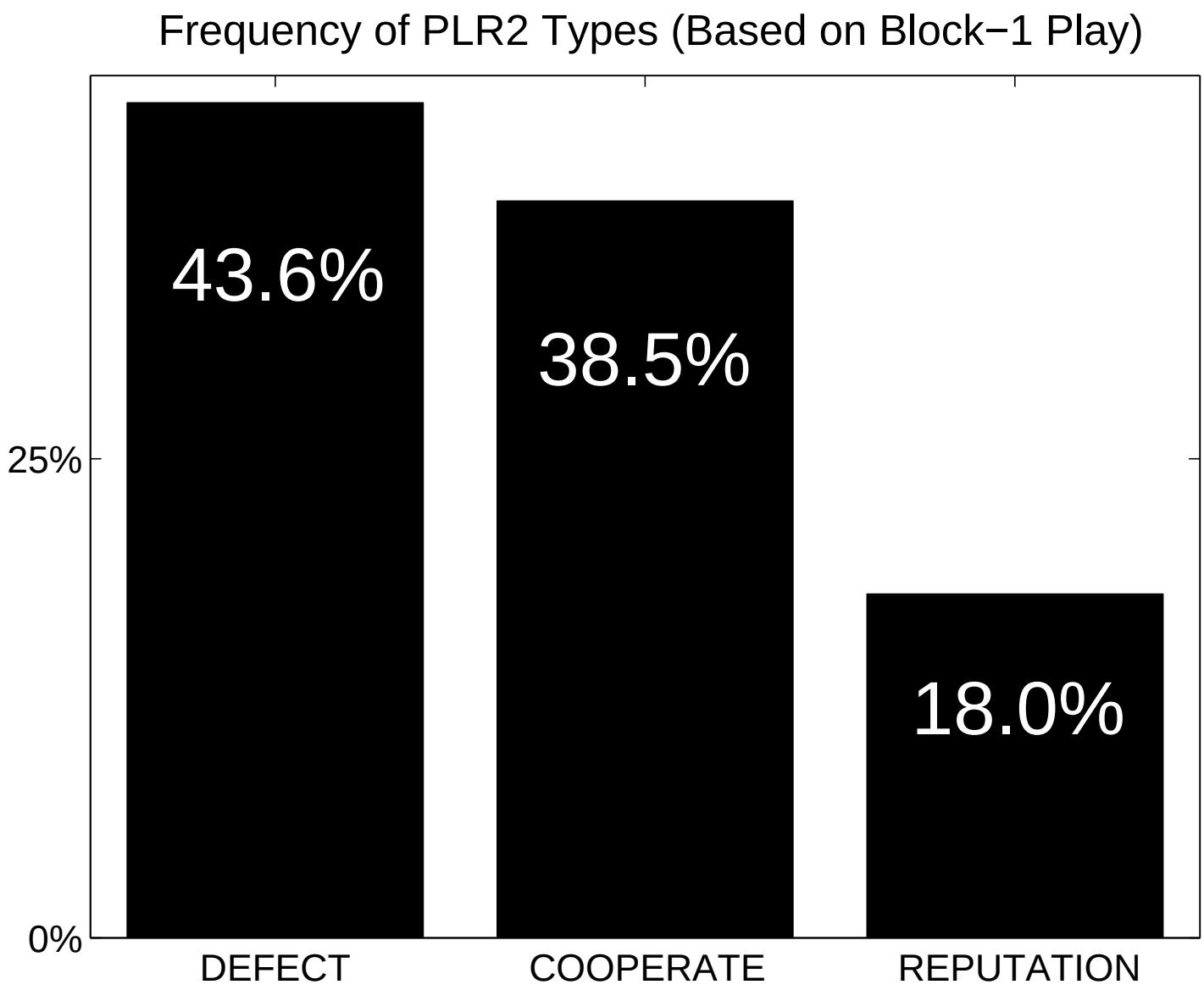
Assigning PLR2 Types

- Types based on PLR2's Block-1 behavior
- Assign type θ_g for each Block-1 supergame $g \in (1, \ldots, 5)$
- Let $C\% = (\#$ C given C$)/(\#$ PLR1 chose C$)$

1. If always C then always D, $\theta_g =$ 'REPUTATION'.
2. Else if $C\% > 1/3$ then $\theta_g =$ 'COOPERATE'.
3. Else $\theta_g =$ 'DEFECT'.
   $(1/3$ is median $C\%$ among $\theta_g \neq$ 'REPUTATION'$)$

Actual assigned type: $\theta = \text{mode}(\theta_1, \ldots, \theta_5)$
(Tie: use most recently-played modal type)

Type Histogram

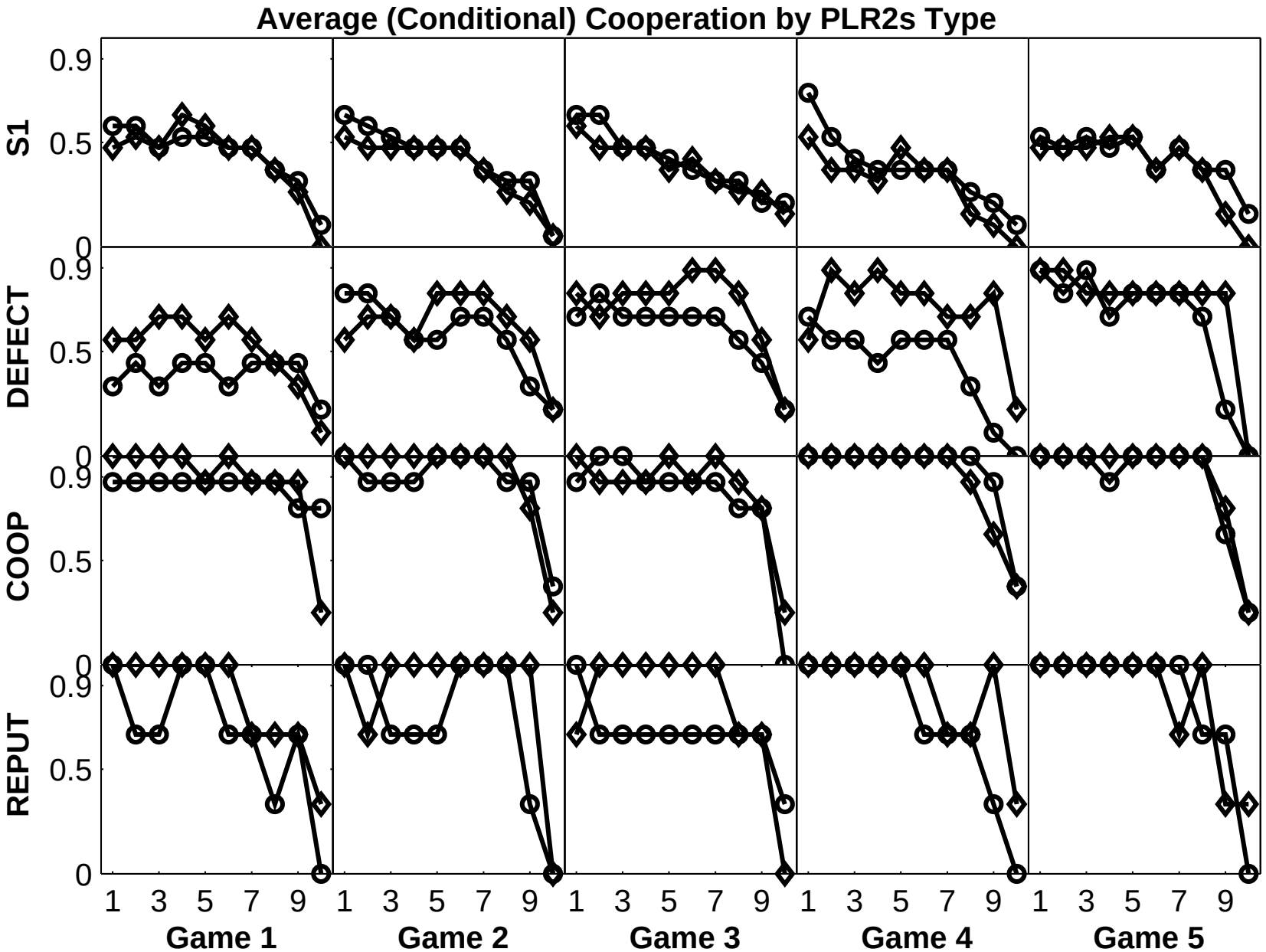


Predicting Trust

Logit: $Y = 1$ if PLR1 Trusts in period 1 of each supergame (Block 2 Only)
Omitted category: 1S Treatment (no history)

Variable	Estimate (p-val)	Odds Ratio
Constant	-0.750 (0.357)	
Supergame#	0.829 (0.184)	2.290
(Supergame#)^2	-0.112 (0.275)	0.894
DEFECT	0.203 (0.597)	1.225
COOPERATE	2.482 (**0.001**)	11.970
REPUTATION	∞^*	∞^*

Block 2 Time Paths by PLR2 Type



Interpretation

- Bad history $\approx$ No history
- Good history improves trust
- Showing history ALWAYS improves cooperation!

Changing Types

1S		Block 2		
		DEFECT	COOPERATE	REPUTATION
	DEFECT	3	3	2
Block 1	COOPERATE	1	5	1
	REPUTATION	1	0	3

2S		Block 2		
		DEFECT	COOPERATE	REPUTATION
	DEFECT	1	**8**	0
Block 1	COOPERATE	0	4	4
	REPUTATION	**0**	2	1

Analyzing Reputation Models

- If types are persistent across blocks:
  - REPUTATION types should become DEFECT types
    - ★ Data: They don't.
  - PLR1 shouldn't trust a REPUTATION type
    - ★ Data: They do.
  - PLR1 shouldn't trust a DEFECT type
    - ★ Data: They do (as much as with no info)
- Number of truly selfish types:
  - In 78% of last periods PLR2 plays D-if-C

Summary

- Revealing history improves cooperation
- Bad news $\equiv$ no news
- Reputation models don't explain data
- Alternative models? Pick-your-defect-period?
- More to come...

The End

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