

APPENDIX A. ADDITIONAL TABLES AND FIGURES

TABLE A.1. Cooperation rates (All supergames)

Cooperation rates	$x = \$9$		$x = \$1$	
	$N = 2$	$N = 4$	$N = 4$	$N = 10$
Initial coop.	0.466 (0.046)	0.100 (0.021)	0.719 (0.039)	0.457 (0.044)
Ongoing coop.	0.296 (0.029)	0.044 (0.012)	0.433 (0.034)	0.243 (0.039)
Initial success	0.466	0.003	0.408	0.010
Ongoing success	0.296	0.002	0.275	0.009

Note: Results are calculated using data from all supergames. Cooperation rates present raw proportions (with subject-clustered standard errors).

TABLE A.2. Cooperation in reaction to previous round's history

History	$x = \$9$		$x = \$1$		Chat ( $x = \$9, N = 4$ )	
	$N = 2$	$N = 4$	$N = 4$	$N = 10$	$\delta = 3/4$	$\delta = 1/2$
(C, S)	0.977 (0.011)	–	0.988 (0.013)	–	0.980 (0.006)	0.750 (0.217)
(C, F)	0.317 (0.063)	0.000	0.521 (0.085)	0.739 (0.077)	0.342 (0.0073)	0.255 (0.104)
(D, S)	0.150 (0.060)	–	0.263 (0.110)	–	0.143 (0.136)	0.750 (0.217)
(D, F)	0.033 (0.006)	0.006 (0.004)	0.023 (0.009)	0.025 (0.009)	0.019 (0.019)	0.006 (0.004)

Note: Data taken from last five supergames in each treatment (with subject-clustered standard errors). Cells marked “–” have no observations at the relevant history. History shows the own-action-signal pair from the previous round,  $(a_{t-1}, \sigma_{t-1})$ .

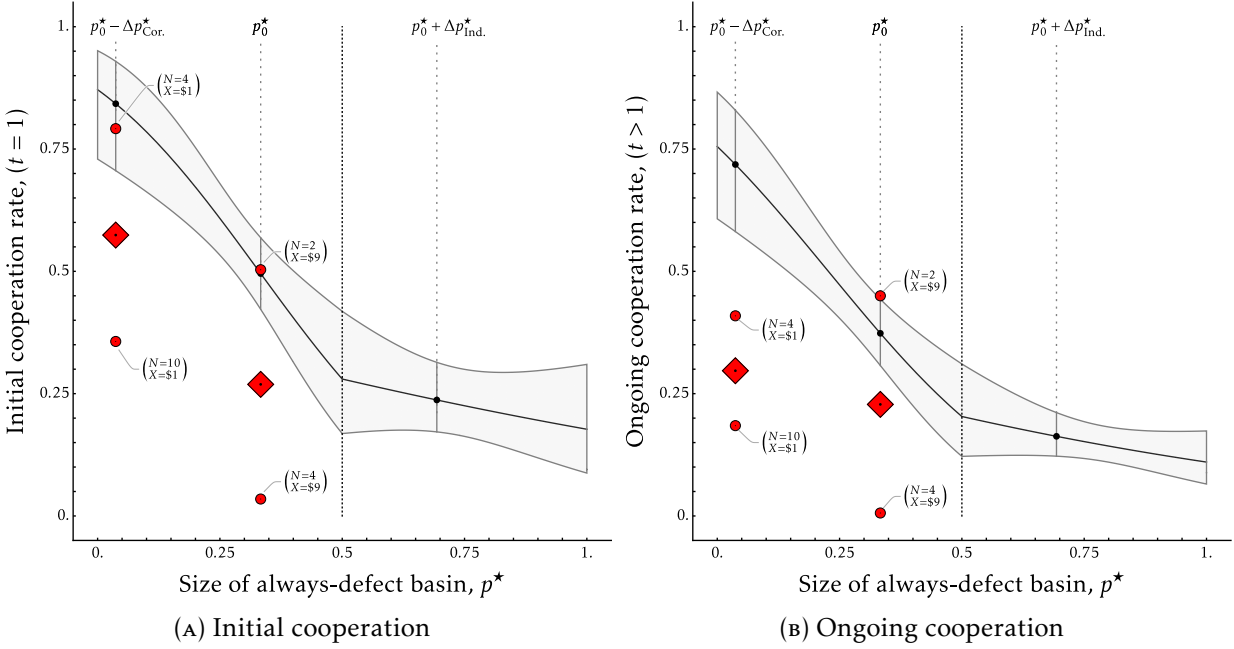


FIGURE A.1. Cooperation and the Correlated Basin-Size Model

*Note:* Figures show pooled data by the correlated basin (diamonds) while the separate treatments are illustrated as the surrounding circles. See Figure 2 in the main paper for the analogous figure under the independent basin.

#### APPENDIX B. FURTHER ANALYSIS OF THE WITHIN-SUBJECT TREATMENTS

We do find evidence that is hysteresis in the dynamics though. A large and immediate jump in cooperation is observed as the game moves from  $N = 4$  to  $N = 2$ , but with no initial response when  $N$  moves in the opposite direction. This suggests that in the short run, absent experience with the new environment subjects are likely to try to coordinate on cooperation. Notice, however, that the response to the change in  $N$  in the initial supergames of the second half can be compared against the initial supergames of the first half. Shifting the illustrated behavior for supergames 11–20 in Figure 3(A) ten supergames to the left and comparing the observed levels to supergames 1–10 makes the jump patterns less clear. In the first ten supergames under  $N = 4$  the pattern is very similar: cooperation is initially high, but it falls rapidly as the subjects gain experience. Similarly for the  $N = 2$  trend.

While some caution is warranted as the qualitative trends as they gain experience under the new parameterization are similar to the initial trends with no prior experience, direct comparisons of behavior in supergames one and eleven do reject equivalence. With no experience at all in the environment, 43.2 percent of subjects cooperate for  $N = 2$  in the first round of the first supergame, compared to 29.4 percent for  $N = 4$  (significantly different with  $p = 0.005$  from a test of proportions). In contrast to the significant difference over  $N$  in the very first decision, in supergame 11 of our within-subject sessions (with prior experience at an alternate value of  $N$ ) the initial cooperation rates at  $N = 2$  and  $N = 4$  can not be distinguished from one another in the plotted figure (at 60.0 and 59.7

TABLE A.3. Cooperation: Between vs. Within

	Between (SG 6–10)		Within (SG 16–20)		$\Delta_{\text{Btwn.}}$	$\Delta_{\text{Wthn.}}$	
	$N = 2$	$N = 4$	$N = 2$	$N = 4$		$2 \rightarrow 4$	$4 \rightarrow 2$
Initial coop.	0.474 (0.036)	0.139 (0.025)	0.643 (0.056)	0.214 (0.041)	-0.469 (0.060)	-0.260 (0.042)	-0.504 (0.056)
Ongoing coop.	0.299 (0.026)	0.054 (0.012)	0.598 (0.051)	0.042 (0.016)	-0.444 (0.055)	-0.258 (0.029)	-0.544 (0.050)
Initial success	0.474	0.011	0.643	0.042	-0.503	-0.433	-0.632
Ongoing success	0.299	0.004	0.598	0.008	-0.450	-0.292	-0.594

Note: Comparisons at the same experience level are generated using supergames 6–10 across all sessions (fixing  $N$ , between and within sessions are identical until supergame 11). For the within change we measure the cooperation rates in supergames 16–20. All cooperation rates are raw proportions (with subject-clustered standard errors). The last three columns measure the corresponding cooperation rate when  $N = 4$  minus the cooperation rate when  $N = 2$ .

percent cooperation, respectively), let alone statistically ( $p = 0.974$ ). Both cooperation rates are significantly greater than the initial responses in supergame one.<sup>42</sup> We conclude that experience at another parameter value in the first half does cause both treatments’ cooperation rates to increase.

In Table A.3 we provide more details, where we compare and contrast the behavior after 5 rounds of experience. In the first two data columns we present average behavior (initial/ongoing cooperation and success, with subject-clustered standard errors for the individual choices) in supergames 6–10 for  $N = 2$ ,  $N = 4$ . In the next column pair we present the same information in supergames 16–20 for the within treatments only. Examining the differences across the *within* and *between* cooperation levels, while we find no significant differences in behavior for  $N = 4$  ( $p = 0.117/p = 0.539$  for initial/ongoing cooperation) we do find significant differences across the  $N = 2$  cooperation rates ( $p = 0.011$  for initial,  $p < 0.001$  for ongoing). The significant differences here reflect the substantially greater upward shift in the  $4 \rightarrow 2$  treatment.

In the final three columns, we compute (for three different cases) the average cooperation rate in supergames when  $N = 4$  minus the cooperation rate when  $N = 2$ . In the first column ( $\Delta_{\text{Btwn}}$ ) we calculate the between-subject change using data from supergames 16–20 in the  $X = \$9$  between-subject treatments. The results here are analogous to the marginal effect attributable to an increase in the independent basin of  $\Delta p_{\text{Ind.}}^* = +0.36$  in Table 2 once we remove the  $X = \$1$  treatments. In the final column pair we present the same assessed treatment effect if we used the within-subject difference in the  $2 \rightarrow 4$  and  $4 \rightarrow 2$  treatments (here we compare data in supergames 6–10 to supergames 16–20).

While the three measures agree qualitatively—and exhibit economically large effects in  $N$  in the same direction—there are differences, particularly in the comparisons to the  $2 \rightarrow 4$

<sup>42</sup>Given the disjoint subject groups and identical treatment in supergames 1–10, we compare proportions using  $t$ -tests without clustering. We then compare the initial response under each value of  $N$  in the within-subject supergame eleven to all subjects at that  $N$  in supergame one. Using these tests we reject equivalence with  $p = 0.021$  for  $N = 2$  and  $p < 0.001$  for  $N = 4$ .

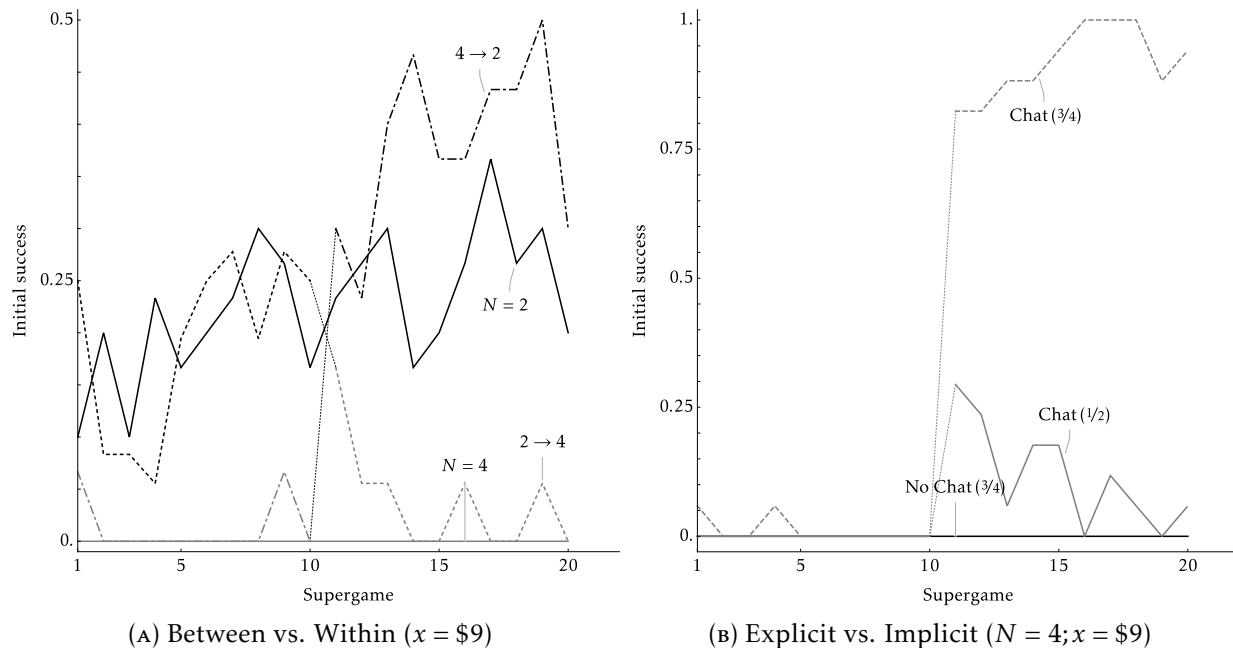


FIGURE A.2. Initial success rates in extensions (by supergame)

case. However, we note that there are two effects at play here. In the  $2 \rightarrow 4$  comparison, reduced magnitudes are driven primarily by the fact that behavior in this treatment has not converged. To see this, consider the assessed between-subject effect if we used data from supergames 6–10: a -33.5 percentage point effect on initial cooperation, which is not significantly different from the -26.0 percent effect identified in the within comparison ( $p = 0.117$ ).<sup>43</sup> In contrast, the greater assessed effect in the  $4 \rightarrow 2$  comparison is the composite of the same *reduction* in the effect from looking at the still-converging data for  $N = 4$ , with a substantial increase in cooperation at  $N = 2$  in the second half over the between-subject levels.

<sup>43</sup>Similarly for ongoing cooperation the between-effect assessed in supergames 6–10 is -24.6 percent compared to -25.8 percent within ( $p = 0.539$ ).

APPENDIX C. INTERFACE SCREENSHOTS

Cycle: 1 - Round: 1

### Your Past Results

Round	Your Action	Other's Action	Your Payoff	Die Roll

### Your Decision This Round

Note: Please select from the payoff matrix below.

		Other	
		All Green	Not All Green
You	Green	\$20.00	\$2.00
	Red	\$29.00	\$11.00

[Confirm Green](#)

(A) Action Selection

Cycle: 1 - Round: 1

### Your Past Results

Round	Your Action	Other's Action	Your Payoff	Die Roll
1	Green	Not All Green	\$2.00	22

### Outcome in This Round

		Other	
		All Green	Not All Green
You	Green	\$20.00	\$2.00
	Red	\$29.00	\$11.00

[Next](#)

(B) Round Feedback

Summary

Cycle 1				
Round	Your Action	Other's Action	Your Payoff	Die Roll
1	Red	Not All Green	\$11.00	22
2	Green	All Green	\$20.00	6
3	Green	Not All Green	\$2.00	58
4	Red	Not All Green	\$11.00	88

Your history from **Cycle 1** is displayed to the left. This table shows your action, the other's action, and your payoff in each round.

In this cycle, **Round 4** is the last round and counts toward payment.

Click next to continue.

[Next](#)

(c) Supergame Feedback

FIGURE A.3. Interface Screenshots

#### APPENDIX D. PROVIDED INSTRUCTIONS

Below we include the instructions given to participants. All language deltas/treatment-specific language are included in braces. Text in red is for the  $N = 2$  treatment, in blue for the  $N > 2$  treatments (here we provide the  $N = 4$  implementation, where  $N = 10$  has only minor changes.). In green we provide the payoff text for  $X = \$9$ , in orange for  $X = \$1$ . Separate instructions for {Part two} are given by treatment for the extensions. The only unlisted treatment variation here is for the Chat( $1/2$ ) treatment, where the only changes are for the critical die rolls in the *Study Organization & Payment* section, where the supergame cutoff changes from 75 to 50.

## INSTRUCTIONS

**Welcome.** You are about to participate in a study on decision-making. What you earn depends on your decisions, and the decisions of others in this room. Please turn off your cell phones and any similar devices now. Please do not talk or in any way try to communicate with other participants. We will start with a brief instruction period. During the instruction period you will be given a description of the main features of the study. If you have any questions during this period, raise your hand and your question will be answered in private at your computer carrel.

### Study Organization & Payment.

- The study has two Parts, where each Part has 10 decision-making **Cycles**. Each Cycle consists of a random number of **Rounds** where you make decisions.
- At the end of the study, one of the two Parts will be selected for payment with equal probability. For the selected Part, one of the 10 Cycles will be randomly selected for payment. Your payment for this randomly selected Cycle will be based on your decision's in that Cycle's last Round.
- The number of Rounds in each Cycle is random, where only the last Round in each Cycle counts for payment. Which Round is the last is determined as follows:
  - In every Round, after participants make their decisions, the computer will roll a fair 100-sided die. If the die roll is greater than 75 (so 76–100) the round just completed is the one that is used to determine the current Cycle's payment, and the Cycle ends. If instead the computer's roll is less than 75 (so 1–75) then the Cycle continues into another Round.
  - Because of this rule, after every Round decision there is a 25 percent chance that the current Round is the ones that count for the Cycle's payment, and a 75 percent chance that the Cycle continues and the decisions in a subsequent round will count for that Cycle payment.
- Your final payment for the study will be made up of a \$6 show-up fee, and your payment from the last Round in the randomly selected Cycle.

### Part 1.

- In the first part of the study you will make decisions in 10 Cycles. In each Cycle you will be matched with {another participant}{a group of three other participants} in the room for a sequence of Rounds. You will interact with the same {other participant}{group of three other participants} in all rounds of the cycle.
- Once a Cycle is completed, you will be randomly matched to a new {participant}{group of three participants} for the next Cycle.
- While the specific {participant}{participants} you are matched to is fixed across all Rounds in the Cycle, the computer interface in which you make your decisions

is anonymous, so you will never find out which participants in the room you interacted with in a particular Cycle, nor will others be able to find out that they interacted with you.

**Round Choices and Payoffs.** For each Round in each Cycle, you and the matched {participant}{participants in your group} will make simultaneous choices. {Both}{All four} of you must choose between either the **Green** action or the **Red** action. After you and the other {participant}{three participants} have made your choices, you will be given feedback on the {other participant's}{other participants'} choices that Round, alongside the Computer's die roll to determine if that Round counts for the Cycle payment.

If a particular Round is the Cycle's last, and that Cycle is the one selected for final payment, there are four possible payoff outcomes.

- (i) If both you and {the other participant}{all three of the other participants} choose the Green action, you get a round payoff of \$20.
- (ii) If you choose the Green action and {the other participant chooses}{any of the other participants choose} Red, you get a round payoff of {\$2}{\$10}.
- (iii) If you choose the Red action and {the other participant chooses}{all of the three other participants choose} Green, you get a round payoff of {\$29}{\$21}.
- (iv) If both you and {the other participant}{any of the other three participants} choose the Red action, you get a round payoff of \$11.

These four payoffs are summarized in the following table:

		Other {Participant's Action:}{Participants' Actions:}	
		{Green}{All 3 Green}	{Red}{Any of 3 Red}
Your Action:	Green	\$20	{\$2}{\$10}
	Red	{\$29}{\$21}	\$11

Some examples of these payoffs:

**Case 1.** Suppose you choose Green and {the other participant}{all three of the other participants} in the Cycle also choose Green. If that Round is the final one in the Cycle {both}{all four} of you would get a payoff of \$20.

**Case 2.** Suppose {you}{you and two of the other participants} choose Green while the other participant chooses Red. If that Round is the final one in the Cycle {you}{you and the other two participants who chose Green} would get a payoff of {\$2}{\$10}, while the other participant would get a payoff of {\$29}{\$21}.

**Case 3.** Suppose you choose Red while {the other participant chooses}{all three of the other participants choose} Green. If that Round is the final one in the Cycle you would get a payoff of {\$29}{\$21}, while the other {participant}{three participants} would get a payoff of {\$2}{\$10}.

**Case 4.** Suppose you and {the other participant choose Red.}{another participant choose Red while the other two participants choose Green.} If that Round is the final one in the



Cycle {you}{you and the other participant that chose Red} would get a payoff of {\$11}{\$11}, while the other two participants would get a payoff of {\$2}{\$10}.

**Part 2.** After Part 1 is concluded, you will be given instructions on Part 2, which will have a very similar structure to the task in Part 1.

{END OF PART 1 HANDOUT}

**Part 2 Instructions {Between Only, handed out Supergame 11}.** Part 2 is identical to Part 1. In each of the 10 Cycles in Part 2 you will again be matched to {another participant}{three other participants} in the room.

Similar to Part 1, the Cycle payoff is determined by the last round in the Cycle, where the payoff depends on the action you chose and the {action chosen by the matched participant}{actions chosen by the three matched participants} for that Cycle. Similar to Part 1, the below Table summarizes the payoff based upon the choices made in the Cycle's last round.

		Other {Participant's Action:}{Participants' Actions:}	
		{Green}{All 3 Green}	{Red}{Any of 3 Red}
Your Action:	Green	\$20	{\$2}{\$10}
	Red	{\$29}{\$21}	\$11

{END OF PART 2 HANDOUT}

**Part 2 Instructions {Within Only, handed out Supergame 11}.** Part 2 is very similar to Part 1. However, in each of the 10 Cycles in Part 2 you will instead be matched to three other participants in the room for each Cycle.

Similar to Part 1, the Cycle payoff is determined by the last round in the Cycle, where the payoff depends on the action you chose and the actions chosen by the three matched participants for that Cycle. If a particular Round is the Cycle's last, and that Cycle is the one selected for final payment, there are four possible payoff outcomes.

- (i) If both you and all three of the other participants choose the Green action, you get a round payoff of \$20.
- (ii) If you choose the Green action and any of the other participants chooses Red, you get a round payoff of \$2.
- (iii) If you choose the Red action and all three other participants choose Green, you get a round payoff of \$29.
- (iv) If both you and any of the other three participants choose the Red action, you get a round payoff of \$11.

These four payoffs are summarized in the following table:

		Other Participant's Action:	
		All 3 Green	Any of 3 Red
Your Action:	Green	\$20	\$2
	Red	\$29	\$11

Some examples of these payoffs:

**Case 1.** Suppose you choose Green and all three of the other participants in the Cycle also choose Green. If that Round is the final one in the Cycle all four of you would get a payoff of \$20.

**Case 2.** Suppose you and two of the other participants choose Green while the other participant chooses Red. If that Round is the final one in the Cycle you and the other two participants who chose Green would get a payoff of \$2, while the other participant would get a payoff of \$29.

**Case 3.** Suppose you choose Red while all three of the other participants choose Green. If that Round is the final one in the Cycle you would get a payoff of \$29, while the other three participants would get a Round payoff of \$2.

**Case 4.** Suppose you and another participant choose Red while the other two participants choose Green. If that Round is the final one in the Cycle you and the other participant that chose Red would get a payoff of \$11, while the other two participants would get a payoff of \$2.

{END OF PART 2 HANDOUT}

**Part 2 Instructions {Chat Only, handed out Supergame 11}.** Part 2 is identical to Part 1 except for the beginning of each cycle where we will now allow the matched participants to chat to one another before the cycle begins. In each of the 10 Cycles in Part 2 you will again be matched to three other participants in the room.

Similar to Part 1, the Cycle payoff is determined by the last round in the Cycle, where the payoff depends on the action you chose and the actions chosen by the three matched participants for that Cycle. Similar to Part 1, the below Table summarizes the payoff based upon the choices made in the Cycle's last round.

		Other Participants' Actions:	
		All 3 Green	Any of 3 Red
Your Action:	Green	\$20	\$2
	Red	\$29	\$11

In contrast to Part 1 though, at the beginning of each new cycle, a chat window will be given to you, which will stay open for two minutes, or until all group members close it.

You may not use the chat to discuss details about your previous earnings, nor are you to provide any details that may help other participants in this room identify you. This is important to the validity of this study and will be not tolerated. However, you are encouraged to use the chat window to discuss the upcoming Cycle.

If at any point within the two-minute limit you wish to leave the chat, you can click the "Finish Chat" button. The other participants will be informed that you left.

{END OF PART 2 HANDOUT}