On the Merits of Separate Spaces: Why Institutions Isolate Cooperation and Division Tasks

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Abstract

Do institutions shape the possibility of sustaining cooperation when together individuals must make both rival and cooperative decisions? It could be that simply having lost in a rival task undermines cooperation, reducing aggregate welfare. Alternatively, it might be that only when interacting with the same individual does this spillover occur, in which case institutions may prevent spillover. To test these arguments, we designed a two-stage incentivized experiment in which participants interact in a division of resources and then in a policy game in which cooperation can improve aggregate welfare. In two experiments, individuals were randomly assigned to either interact with the same individual for both tasks or a different individual for each task. Holding constant both past history and past behavior, the results of these experiments provide support for a Personal Partner History effect in which the mechanism that produces spillover is interacting with the same individual in both decisions.

Keywords: institutions, behavioral spillover, cooperation, experiment

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Conflict and cooperation are central elements of human social interaction. In some instances, individuals work together to achieve outcomes that are mutually beneficial for all parties, but in other instances one individual's gain comes at the expense of another. When resources need to be divided, it is a zero-sum game in which individual interests are in conflict because each individual wants to maximize their own share. In contrast, everyone's welfare can be improved in positive-sum interactions. Given the prevalence of these situations in social, political, and economic interactions, an important theoretical question is: Does "losing" in a division task cause an individual to be less cooperative in an unrelated task in which all individuals can benefit?

The design of institutions offers a clue to the answer. Theories of federalism point to decentralization as a mechanism for reducing conflict between citizens over the allocation of resources (Bednar 2009; Schattschneider 1960). Similarly, many legislative bodies have committee systems in which the most adversarial parts of legislating are fought over away from the main chamber. Businesses create departments to deal conflicts between employees in hopes that they do not hamper aggregate productivity. This compartmentalization may reduce the possibility that conflict in zero-sum situations spills over into positive-sum interactions, thereby reducing aggregate welfare.

But for this separation of decision-making to adequately isolate division tasks from cooperation tasks, the mechanism driving spillover cannot be simply experiencing a loss. That is, if losing in a zero-sum game is the key mechanism that produces welfare-reducing spillover, institutions that separate division tasks from cooperative tasks will do little to mitigate spillover given that conflict over limited resources is almost certain to cause some individuals to suffer a loss relative to their counterparts.

We propose that spillover from division tasks to cooperation tasks is driven instead by a Personal Partner History effect. Specifically, experiencing a loss will reduce cooperation if both allocation tasks take place with the same individual. This effect will be distinct from the effect of experiencing a loss and the effect of interacting with an individual who was uncooperative in the past (that is, their reputation). In other words, there is something unique about sharing a history with an individual that cannot be replicated even when all relevant information and experience are present.

To examine this Personal Partner History effect, we designed a two-stage, incentivized game. In the first stage, participants played the Division Game. This was a zero-sum game: For every token that one player gained, the other player lost. In the second stage, participants played a cooperative, positive-sum game, the Policy Game. Using this framework, we conducted two experiments to study the conditions under which receiving an inequitable allocation in the Division Game, versus an equitable division, would reduce support for adopting a Pareto-improving policy in the Policy Game. In Experiment 1, participants were randomly assigned to an allocation in the Division Game, a policy in the Policy Game, and a pairing condition in which they either played both games with the same individual or each game with a unique individual. In Experiment 2, we examined whether a Personal Group Experience Effect is present and participants treat members of the same out-group similarly to how they treat the same individual. Participants were assigned to groups and they all play the Division Game with a member of an out-group. They were then assigned to played the Policy Game with either the same member of that out-group, a different member of that out-group, or a member of a different out-group. The incentives in the experiments afforded us a behavioral measure of spillover in a costly choice environment.

This design allows to estimate the effect of receiving an allocation in a division task from a particular individual while holding constant a variety of potential confounds, such as a participant's past experience and the past behavior of the individual who they interact with in the cooperative task. Prior to casting a vote for a policy in the Policy Game, participants learned about the behavior of their partner. Regardless of their pairing, participants always learned about someone who behaved exactly the same as their partner did in the Division Game. This holds their earnings from the Division Game, their partner's earnings from the Division Game, and their partner's behavior in the Division Game constant. Thus, our design provides clear inference about playing the Division Game with the same person versus a new person after holding constant all other factors. (In other words, we create the exact counterfactual person for drawing an inference about the effect of who someone was paired with in each game.). Consequently, we can estimate the causal effect of the outcome that participants received and who they received it from on their willingness to adopted the policy in the Policy Game. Lastly, the decision rule for adopting a policy made each individual pivotal in expectation. Unlike previous research that examines spillover, this removes any strategic incentives that might confound a measure of an individual's preference for a specific outcome.

In support for our theoretical expectations, we find substantial spillover effects of receiving an inequitable division (compared to an equitable one) on support for a Pareto-improving policy in specific circumstances. In Experiment 1, we test whether spillover occurs when interacting with the same individual in both stages and whether spillover occurs when interacting with two different individuals in each stage. Controlling for policy condition (the specific payouts), we find that participants who played both stages with the same individual were 15 points less likely to vote to adopt any policy when they received an inequitable division of a private good when interacting with the same individual, confirming the Personal Partner History effect. In contrast, we do not find this effect when participants interacted with different individuals across stages.

In Experiment 2, we examine if spillover is generated only by repeated interaction with the same individual or if spillover can also be generated by repeated interaction with two different out-group members. We find that the effect of interacting with two different out-group members is approximately half as large the effect of interacting with the same individual. This is the Personal Group History effect. However, when participants only weakly prefer adopting the Pareto-improving policy, we observe spillover effects in all pairing conditions. Taken together, these results provide strong evidence that receiving an inequitable division can affect future cooperative decisions. This has implications for our understanding of the design of institutions and human behavior more broadly.

Direct Reciprocity and Personal History

Institutions that combine division tasks and cooperative tasks cause the same individuals to interact repeatedly. This type of interaction opens up the possibility of direct reciprocity. Interacting with the same person repeatedly allows individuals to establish reputations for being cooperative and as such all parties are better off as long as they avoid the short-run temptation to defect (Axelrod 1984). When defection does occur, strategies like tit-for-tat call for defection by a partner to be met with defection in the next period. Reciprocity can also occur in sequential games. For instance, in two-player ultimatum games[1], receivers commonly reject offers that are less than 30% of the total endowment leaving both players with nothing (Camerer and Thaler 1995). Similarly, participants in a one-shot public goods game engaged in costly punishment of those who contributed less than they did to the public good even though punishment reduced efficiency and many participants who were punished had made Pareto-improving contributions to the public good (Bicskei, Lankau, and Bizer 2016).

A burgeoning literature in behavioral economics has examined how interacting with the same individual(s) sequentially across contexts can affect cooperation. [2] For instance, participants who had a history of successful coordination together were more likely to cooperate in a subsequent prisoner's dilemma than participants who did not (Ahn et al. 2001; Knez and Camerer 2000). The effect of successful coordination has also been shown to increase effort in downstream profit-sharing games (Schotter 1998). Other research has found that behavior spills over from one coordination game to another and from one average opinion game to another (Cason, Savikhin, and Sheremeta 2013; Van Huyck, Battalio, and Beil 1990). An explanation for these findings is that behavior in the first interaction establishes a precedent for cooperative behavior that signals a willingness to cooperate in a different context with different strategic incentives (Knez and Camerer 2000).

But repeatedly interacting with the same individual confounds three things: the effect of a partner's past behavior, the effect of experiencing an outcome, and the effect of a shared history with the person who caused that outcome. That is, in repeated interactions, one has a shared

[1] In the ultimatum game, one participant proposers a division of a fixed amount of money between themselves and another participant who takes the role of the receiver. The receiver subsequently accepts or rejects the proposal. If the proposal is rejected, neither participant receives any money.
[2] Although our focus here is sequential interaction, past research on spillover has also addressed simultaneous interaction in two different strategic contexts (e.g. Bednar et al. 2012; Cason and Gangadharan 2013).

history of outcomes, a partner with a particular history and reputation, and a particular individual-level history with that partner. It is that last theoretical effect that we wish to isolate empirically. Disentangling these effects has potentially important consequences for the design of institutions that seek to sustain cooperation. On one hand, if the effect of experiencing a bad outcome predominates, institutions that separate responsibility for division and cooperation will not mitigate spillover because an individual will still experience a loss while others will experience a win in the division of resources. Similarly, if it is a partner's past behavior that matters because it establishes their reputation, who that partner was previously interacting with is irrelevant. On the other hand, if the mechanism driving spillover is repeated interaction with the same individual, dividing responsibility by creating different decision partners in each context may prevent conflict over the division of resources from undermining future cooperation.

Indirect Reciprocity, Experiencing an Outcome, and Reputation

Institutions that separate division tasks from cooperation tasks break apart a shared history of play between parties; however, this does not erase the outcome that was experienced nor does it eliminates a new party's past behavior toward an unrelated party. If spillover occurs in these situations, it is potentially driven by indirect reciprocity in which Individual A takes a selfish (cooperative) action towards Individual B because Individual B took a selfish (cooperative) action towards individual C.[3] Past research has found that the ability to establish and track reputation is important for indirect reciprocity to occur. For instance, participants were more likely to help another participant in a helping game when information about their prior

[3] This could also be due a different kind of reciprocity, upstream (generalized) reciprocity, in which an individual pays forward selfish/cooperative actions that were done to them to the next party they interact with (Nowak and Roch 2006). Our design, detailed below, cannot disentangle these different motivations, but instead holds constant past outcomes to allow us to isolate the relative importance of that outcome originating with the same vs. different partners.

helpfulness in the previous five periods was made public instead of kept prior (Engelmann and Fischbacher 2009). Relatedly, participants transferred more money in a dictator game when they had information about the recipient's past generous actions relative to when this information was not present (Servatka 2010).

Extant research examining spillover across contexts when interacting with different individuals has found that initial cooperative behavior begets future cooperative behavior. For instance, Ahn et al. (2001) found an association between first-stage coordination and second-stage cooperation in a prisoner's dilemma when participants were randomly matched with a new individual in the second stage, but this spillover effect is weaker than when interacting with the same individual in both stages. In this experiment, participants made eight decisions in coordination games with randomly matched individuals in sessions of 10 total individuals, which allowed them to condition their second stage behavior on the prevalence of behavior in their session cohort. Other work has found that people who were more generous to another individual received larger transfers in a subsequent trust game (Jordan et al. 2016). Further, people who gave more to a charity were cooperated with more frequently in both a prisoner's dilemma and a trust game (Albert, Guth, Kirchler, and Maciejovsky 2007). Thus, knowledge of how individuals have behaved in the past can promote future cooperation, even across different strategic contexts.

But other experiments have failed to produce spillover from one context to another when interacting with different individuals. Capraro and Marcelletti (2014) did not find that people were more cooperative towards a stranger in a prisoner's dilemma game or a dictator game after having received their endowment from the generous action of a different individual compared to those who received their endowment from the experimenter. Further, other work has found that "policy interventions" in a dictator game increase cooperation in that game and subsequent dictator games (without the interventions), but the treatment did not produce significantly more cooperation in a subsequent prisoner's dilemma context (d'Adda, Capraro, and Tavoni 2017).

This past experimental work does not directly assess the causal effect of interacting with different individuals compared to the same individual on spillover across strategic contexts. That is, spillover may not occur when someone interacts with different individuals, but may occur in situations in which individuals interact repeatedly together. Here, we hold constant the experience that an individual has to directly test how varying pairing protocols affects (or creates) spillover across contexts.

Group History and Spillover

A potentially relevant, but currently unexplored, factor that could affect spillover is the role of group affiliation. One possibility is that the hypothesized Personal Partner History effect operates only through interactions with that person. But many interactions involve individuals who are members of larger groups. Extant research has shown that group membership, even if it is established arbitrarily, can have substantial effects of social behavior (reviewed in Balliet, Wu, and De Dreu 2014). Further, past experiments have found preferential treatment of in-group members compared to out-group members and unaffiliated individuals in a plethora of economic experiments (e.g. Charness, Rigotti, and Rustichini 2007; Chen and Chen 2011; Eckel and Grossman 2005; Fowler and Kam 2007.

How does an individual respond to a loss caused by an out-group member? More specifically, will an individual who experienced a loss at the hands of one out-group member take a costly action against a different out-group member? When interacting with the exact same individual, a person is given the opportunity to retaliate against (reward) that specific person for an undesirable (desirable) outcome. Again, if the experience is what drives spillover between division and cooperation tasks, it is reasonable to expect that receiving an inequitable division from one group member will reduce their willingness to take an action that benefits a different out-group member. However, if sharing a history with an individual is the key mechanism, then two interactions with different out-group members will be treated as separable and spillover will not be observed. Prior research does not allow us to assess how much, if any, of a personal history transfers to a different group member.

Theoretical Expectations

In the experiments presented below, we test three core predictions focusing on when losing in the division of resources will cause reduced downstream cooperation. Drawing on the above arguments, we identify three specific expectations. First:

General Experience Effect: Receiving an inequitable allocation division decreases support for a Pareto-improving policy (that benefits someone who made an inequitable allocation to another person).

We view this effect as encompassing: an individual's endowment, an individual's motivation to be selfish towards someone who was selfish towards a third party, and an individual's willingness to pay forward a selfish action that was inflicted upon them. This effect is contrasted with the:

Personal Partner History Effect: Receiving an inequitable division from the same person decreases support for a Pareto-improving policy (that benefits that other person).

In this account, an individual is retaliating, by not cooperating against someone who was selfish toward them compared to selfish toward another person (as in the General Experience Effect). Notably, this effect relies on that specific person having behaved differently toward me in prior interactions. Finally, we examine the:

Personal Group History Effect: Receiving an inequitable division from a member of an out-group decreases support for a Pareto-improving policy (that benefits a different member of that out-group).

In this account, the selfish actions of one out-group member caused an individual to take an action that negatively affects a different out-group member.

Experimental Design

We test these expectations with a two stage experiment that is a division task followed by a cooperative task. Unless otherwise noted, participants were fully informed about all features of the games described below. Participants also knew that their decisions had monetary consequences for themselves and others.

Stage 1: The Division Game

In the Division Game, participants were paired with another player and each proposed an allocation of a common pot of tokens. This game is a zero-sum game because gains for one player cause losses for the other player. This task proceeded in steps and players were told about all steps before the task began. First, each player received an initial endowment of 10 tokens.. Then, both players put their tokens into a common pot that was doubled by the experimenter, resulting in a total pot of 40 tokens.

Next, each player individually made a private proposal to allocate the pot of tokens from a menu of specific options. Players could propose to: take all 40 tokens (leave none for their partner), take 30 tokens (leave 10 for their partner), or take 20 tokens (leave 20 for their partner). Note that participants could propose an inequitable division that would leave participants no better or worse off than their initial allocation of 10 tokens. After both players made a proposal, the computer chose one player to be the "Decider" and their private proposal was made public and implemented. Consequently, players made their proposal before they knew whether it would be chosen and only learned about their partner's proposal if it was chosen to be implemented.

At the conclusion of the game (after outcomes were realized) they proceeded to the next stage of the experiment, the Policy Game. Subjects were only informed about this game after the completion of the Division Game. This was done so behavior in the Division Game would not be affected by the expectation of future behavior in a subsequent game, a design feature we discuss in detail in the conclusion.

Stage 2: The Policy Game

In the Policy Game, two players voted on a policy that would generate and allocate a common pool of tokens. This task proceeded in stages and players were told about all steps before the task began. First, each player was given a new endowment of 10 tokens. Second, players were informed about the prior behavior and earnings of their partner in the Division Game (discussed in greater detail below). [4] Third, players voted for or against a policy and one of their votes was randomly chosen to be decisive. If the policy was adopted, both players paid 10 tokens from their endowment and receive a payoff. Participants were randomly assigned to one of three policy conditions shown in Table 1. Note that all policies are (weakly) Pareto improving. Because we fix the payoffs to Player B, we label the policies based off of the payoff that Player A would receive if the policy is adopted.

Table 1: Net Payoff by Policy.

	Net 0	Net 10	Net 20
Player A	0 tokens	10 tokens	20 tokens
Player B	20 tokens	20 tokens	20 tokens

[4] Players who were chosen to be the Decider in the Division Game did not learn this information due to our recruitment strategy discussed below.

Notably, Player A is never made worse off by passing a policy, although they derive less of a benefit from the policy than Player B in the Net 0 and Net 10 conditions. We view the Net 0 condition as a particularly good test case for our predictions relating to spillover as many interactions require the cooperation of individuals whose benefit will not exceed their cost while others might benefit greatly. By contrast, when a policy generates a great benefit to an individual (i.e. the Net 20 condition) choosing to not support the policy is very costly, and therefore unlikely.

Before voting on a policy, players learned three pieces of information about their partner in this game. They learned:

1. Whether their partner in this game was also their partner in the Division Game
2. Whether their partner was the Decider in the Division Game
3. Their partner's earnings in the Division Game

We randomly assigned players to play both games with the same player or to play the Policy Game with a new player. Regardless of their pairing, players were always told about an individual whose behavior exactly matched that of their partner in the Division Game. For example, if a player was partnered with someone who was chosen to be the Decider and took all 40 tokens from the common pot in the Division Game, they were always paired with player who took all 40 tokens from their pot in the Division Game (whether or not they were their partner in the Division Game). This means that we fix a player's outcome history in the Division Game and their partner's behavior in the Division Game across all conditions. Players were also reminded of their role and earnings in the Division Game.

After learning this information, players cast their votes and it was randomly determined which player's vote would be implemented. Thus, every player was casting a vote as if they were the pivotal voter in determining whether the policy was adopted. This design choice also means that players do not need to account for the behavior of others in deciding whether to take a Pareto-improving action, which removes any strategic uncertainty giving us a clear measure of support for the policy.

Experiment 1: Personal History vs. General Experience

Participants and Procedure

We recruited participants from Amazon Mechanical Turk to complete a decision-making study that was administered using the Qualtrics survey platform. [5] Participants received 50 cents for completing the study and a bonus payment based on the tokens that they earned in the study (1 token = 1 cent). Importantly, participants were not told anything about the Policy Game (including that they would play a second game) until after they had completed the Division Game. After reading the instructions for each game, participants took a short comprehension quiz to confirm that they understood what they read.[6]

Our recruitment procedure was completed in two steps. First, we recruited 20 participants who took the role of Decider in the Division Game and then cast a vote for all three policies in the Policy Game. This was done so there were at least two Deciders for each Division Game outcome and each policy who could be paired with all others players without deception.

We then recruited a second wave of participants (n = 987) who would not have their allocations implemented in the Division Game and took the role of Player A in the Policy Game. These participants were randomly assigned to a Division Game allocation (0 tokens, 10 tokens,

[5] We filtered for MTurk workers who had at least a 98% lifetime HIT approval rating and were located in the United States. Mturk workers were recruited to participate in a decision making study and were told that they could earn a bonus payment from the study that would vary based on their decisions, the decisions of others, and chance.

[6] There were a total of seven comprehension questions that were either multiple choice or true/false questions. Participants earned an additional 2 cents for each answer they got correct. After answering the questions, participants learned the correct answer for each question. Approximately 91% of our participants answered at least six questions correctly.

or 20 tokens which correspond to real decisions made by a human player recruited earlier), a policy (Net 0, Net 10, or Net 20), and a pairing condition: *Same Person:* play both stages with the same person or *Mirror Person*: play the Division Game and the Policy Game with different persons.[7] Note that regardless of pairing condition, partners in the Policy Game had played the Division Game and made the exact same allocation as a participant's partner did in the Division Game.

Results

We focus our analyses on the voting behavior of participants who were *not* the Decider in the Division Game because we are interested in the effect of the Division Game outcome induced by another player on behavior. We begin our analyses by examining the effect of receiving an inequitable allocation in the Division Game on vote choice in the Policy Game. This effect sets aside the pairing condition and the policy condition, but captures the joint effect of receiving an allocation and the Policy Game partner's past behavior. Pooling across policy conditions and pairing condition, participants who received an inequitable allocation in the Division Game were less likely to vote for the policy compared to participants who were allocated 20 tokens (Figure 1). We confirm this result with formal statistical analysis in Table 2. Participants who received 0 tokens in the Division Game were 13 points ($p < .01$) less likely to vote for a policy compared to participants who received 20 tokens. Similarly, participants who received 10 tokens were 10 points less likely to vote for a policy compared to those who received an equitable division (Table 2, Column 1). These differences are indistinguishable from one another. When controlling for policy proposal, the effect of receiving either inequitable

[7] Information about the number of participants in each cell is provided in Appendix Table A1. We randomly assigned participants (n = 1,001) to a *computer* condition to examine potential endowment effects. This condition is discussed in more detail in the Appendix. We excluded a total of 12 participants who did not provide a valid completion code that allowed them to be matched to Qualtrics data.

allocation in the Division Game is 9 points ($p < .01$; Table 2, Column 2). In other words, the worse someone's experience was in the Division Game, the less likely they were to vote for a policy proposal.

Figure 1: Proportion voting to adopt any policy, by pairing condition and Division Game outcome

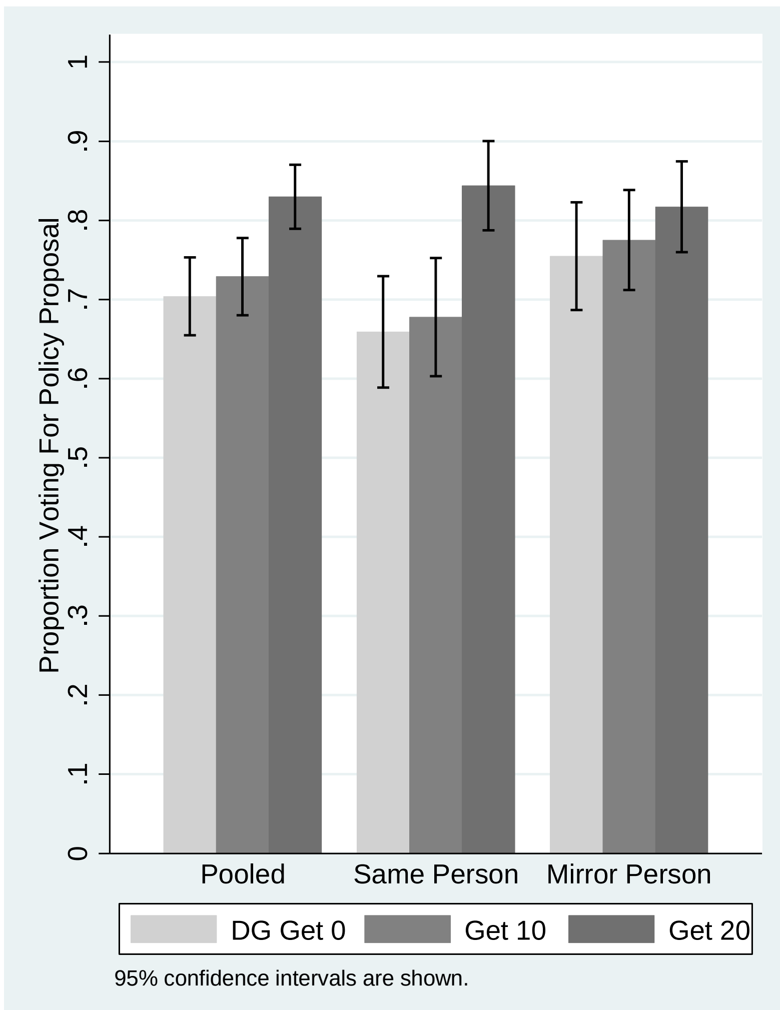

Table 2: Experiment 1. Participants are more likely to vote against the policy when they receive an inequitable division in the Same Person condition.

	(1)	(2)	(3)
	DV: Vote to adopt policy in Policy Game (1 = yes)		
DG Get 0	-0.13***	-0.09***	-0.03
	[0.03]	[0.03]	[0.04]
DG Get 10	-0.10***	-0.09***	-0.04
	[0.03]	[0.03]	[0.04]
PG Net 10		0.39***	0.39***
		[0.03]	[0.03]
PG Net 20		0.45***	0.45***
		[0.03]	[0.03]
Same Person			0.01
			[0.04]
DG Get 0 X Same Person			-0.13**
			[0.06]
DG Get 10 X Same Person			-0.11*
			[0.06]
Constant	0.83***	0.54***	0.53***
	[0.02]	[0.03]	[0.04]
R^2	0.02	0.22	0.23
N	987	987	987

*** *p*<.01, ** *p*<.05, * *p*<.10. The table reports unstandardized OLS coefficients with robust standard errors in brackets. Getting 20 tokens in the Division Game and the Net 0 policy in the Policy Game are the excluded categories.

Next, we turn to our key manipulation: How did pairing condition affect policy support? Figure 1 shows the proportion of participants who voted to adopted the policy in the Same Person condition and the Mirror Person condition by Division Game outcome, again pooling across policy. We test whether participants who received an inequitable allocation were less likely to vote to adopt a policy when they played both stages with the same person compared to when they played both stages with a different person. Controlling for policy, we find that participants in the Same Person condition were approximately 16 points ($p < .01$) less likely to vote for a policy when they received 0 tokens in the Division Game relative to when they were allocated 20 tokens from their partner (Table 2, Column 3). This effect is 13 points larger ($p < .05$) than the 3 point ($p = .53$) effect of receiving 0 tokens (instead of 20 tokens) in the Division Game in the Mirror Person condition[8]. This result supports the Personal Partner History effect that receiving an inequitable division undermines subsequent cooperation. Thus, institutions that cause people to interact repeatedly for rival and cooperative tasks put achieving cooperation in the latter at risk.

Overall, losing in the division of resources only affected subsequent cooperation when both tasks were done with the same individual. Participants who received 0 tokens had the same outcome across pairing conditions and interacted with someone who was selfish towards another individual. The only difference between conditions was whether the person who benefitted from the policy passing was a specific individual who was selfish towards you.

Does this effect of spillover change when the allocation in the Division Game is inequitable, but a participant is not made worse off than their initial endowment of 10 tokens? We find a similar spillover effect when comparing participants who received an allocation of 10 tokens in the Division Game to participants who received an equitable allocation. In the Same Person condition, participants were also 15 points ($p < .05$) less likely to vote for a policy when they receive 10 tokens compared to 20 tokens in the Division Game. For the Mirror Person condition, this effect was qualitatively smaller 4 points ($p = .29$), though not statistically distinguishable from the effect in the Same Partner condition ($p = .067$; Table 2, Column 3). In other words, participants were less likely to vote for a Pareto-improving policy in the Same

[8] In Appendix Table A3, we compare the Same Person and Mirror Person conditions to the Computer condition to examine the effect of receiving an endowment. Participants who received 0 tokens from the computer were 10 points ($p < .01$) less likely to vote for a policy compared to those who received 20 tokens. The effect of receiving 10 tokens was indistinguishable from 0. These effects were not statistically different from either the effects in Same Person or the Mirror Person condition.

Person condition when their partner gave them any inequitable allocation in the Division Game, even though they did not end up worse off than their initial endowment. Thus, in subsequent analyses we collapse participants who received 0 tokens and participants who received 10 tokens in the Division Game.

Last, we examine the effect of playing both games with the same person on voting in specific policy conditions. In accordance with our theoretical expectations, participants were less likely to vote for a policy when they only broke even on the policy passing (see Appendix Table A4). For instance, in the Net 0 condition, participants who received an inequitable division in the Same Person condition were 32 points less likely ($p < .01$) than participants who received an inequitable division. In contrast, participants in the Same Person condition were no more or less likely to vote for the policy when they received an inequitable division in the Net 10 condition compared to when they received an equitable division. For the Net 20 condition, participants in the Same Person condition voted for the policy at a very high rate, greater than 90%, regardless of whether they received an inequitable or equitable allocation. However, participants who received an inequitable allocation were 10 points less likely ($p < .01$) than those who received an equitable allocation. We do not observe any spillover effects in the Mirror Person condition for any policy condition.

Discussion

Taken together, these results show that receiving an inequitable split in the Division Game reduces subsequent support for a policy in the Policy Game, but only when players interacted with the same individual in both games interacting with two different individuals whose Division Game behavior was nonetheless identical to their partner's. This Personal Partner History Effect appears to be driven by deviations from equity, as any inequitable division reduced support for a policy in the Same Partner condition. Interestingly, however there is limited evidence of spillover when a division is made by a different individual than the individual who benefits from the policy being adopted in the Policy Game. We also find evidence that being the loser in the division of resources undermines cooperation when individuals break even on the policy. Thus, cooperation is not undermined by receiving an inequitable division, it is undermined by receiving an inequitable allocation from a person who stands to gain from that cooperation.

Experiment 2: Group History vs. Personal History

In Experiment 1, participants either interacted with the same individual for both games or a different individual in each game, but this set aside groups which are an important feature of political life. While receiving an inequitable allocation from a "stranger" did not affect support for a policy, participants did not receive any information about the individual other than their past behavior and, importantly, their Policy Game partner was in no way affiliated with the individual responsible for the inequitable allocation. But many allocation decisions are made by members of groups and these decisions are often influenced by group membership.

To examine the role of groups, we modified our experimental framework to include group membership. Before playing the Division Game, participants completed a clicking task in which they had 5 seconds to click their mouse as many times as possible. Participants were told that this task would be used to determine their group affiliation and that they would be put into groups with other participants who had a similar "clicking pattern" to them. This was done to instantiate an attachment to the group, consistent with previous work using a "minimal groups paradigm" (Tajfel and Turner 1979). Participants received 1 token for each 4 clicks that they completed, rounded down to the nearest cent. This pattern of clicks was used to place participants into one of four groups for the subsequent stages of the experiment.[9] All participants were told that they were in Group A given that the specific labels for groups were arbitrary.

Next, participants played the Division Game, as described in Experiment 1, with two notable differences. First, participants were always told that they were playing with a member of Group B, i.e. an out-group member. Second, participants were only given two choices for a Division Game allocation, they could either: take all 40 tokens (leave none for their partner) or take 20 tokens (leave 20 for their partner). Given the similarity between taking all 40 tokens and 30 tokens in Experiment 1, we adopted this approach for reasons of statistical power.

After the Division Game, participants played the Policy Game. Before voting on the policy, participants learned four pieces of information. They learned:

1. Whether their partner in this game was also their partner in the Division Game (a specific member of Group B)
2. Whether their partner was a member of Group B or Group C
3. Whether their partner was the Decider in the Division Game
4. Their partner's earnings in the Division Game

We randomly assigned participants to play the Policy Game with the same member of Group B that they played the Division Game with (same manipulation in Experiment 1), a different member of Group B who played the Division Game with a member of Group D (not the player's group), or a member of Group C who played the Division Game with a member of Group D. For the last two pairings, we chose Group D partnership to avoid invoking any in-group/out-group

[9] We used this task because it required participants to exert effort which should establish a more meaningful, albeit still relatively weak, connection to the group. Participants were assigned to groups by rounding down the following equation: (number of clicks mod 4 + (number of clicks/4)) mod 4. By doing so, there is a correlation of 0 between the number of times participants clicked and their group assignment.

dynamics beyond what was directly experienced by participants in the Division Game. As in Experiment 1, regardless of a participant's pairing they were always told about an individual whose behavior in the Division Game exactly matched that of their partner in the Division Game to allow us to isolate the causal effect of pairing condition.

After learning this information, player's cast their votes and it was randomly determined whose vote would be implemented.

Participants and Procedure

We recruited participants from Amazon Mechanical Turk. These participants were paid 50 cents for completion and a bonus payment based on their behavior in each stage. We completed our recruitment in two stages. In the first wave, we recruited 20 participants to take the role of the Decider in the Decision Game. These participants made decisions for all three policies in the Policy Game.

In the second wave, we recruited participants (*n* = 1,776) who were not the Decider and took the role of Player A in the Policy Game. These participants were randomly assigned to a Division Game allocation (0 tokens or 20 tokens which correspond to real decisions made by a human player recruited earlier), a policy (Net 0, Net 10, or Net 20), and a pairing condition (*Same Person*: play both stages with the same person, *Same Group*: play both stages with different persons from Group B, or *Mirror Person*: play the Division Game with a member of Group B and the Policy Game with a member of Group C). We under-sampled the Net 20 condition because participants in Experiment 1 voted for that policy at near ceiling levels. Thus the distribution of subjects in policy conditions was approximately 40% in Net 0, 40% in Net 10, and 20% in Net 20.

Results

As with Experiment 1, we focus our analyses on participants who were not the Decider in the Division Game because the outcome in the Division Game was generated by another player. We focus here on the interaction between pairing condition and receiving an inequitable outcome[10]. Figure 2 shows the rate of voting for a policy in each pairing condition, collapsed across policy conditions. We interact the pairing condition with receiving an inequitable outcome in an OLS regression to examine their joint effect on voting behavior (Table 3). We use the Mirror Person condition as a baseline for comparison and control for the effect of each policy in the Policy Game. As expected, the effect of Division Game outcome is largest, 18 points ($p < .01$) in the Same Person condition and smallest, 6 points ($p = .06$) in the Mirror Person condition. The effect of an inequitable outcome in the Same Group condition falls in between at 10 points ($p < .01$). Put differently, the effect of the Same Group condition was 56% as large as the effect of the Same Person condition, while the effect of the Mirror Person condition was 33% as large. The effect of the Same Person condition is statistically distinguishable from the effect in the Mirror Person condition ($p < .01$), though it was only qualitatively larger than the Same Group condition ($p < .09$). The difference between being matched with a Mirror Person compared to a person from the Same Group was not statistically significant ($p = .30$). These results show that interacting with the same individual is the largest driver of spillover effects. We do, however, find weaker spillover effects also occur when individuals interact with two different members of the same group, although this effect is not larger than when individual interact with a member of one out-group in the Division Game and a member of a different out-group in the Policy Game.

[10] Replicating the preliminary analysis in Experiment 1, we find, setting aside pairing condition, that participants were 11 points ($p < .01$) less likely to vote for a policy when they received an inequitable allocation in the Division Game compared to when they received an equitable allocation controlling for policy condition.

Figure 2: Proportion voting to adopt a policy by pairing condition and Division Game outcome pooled across policy conditions

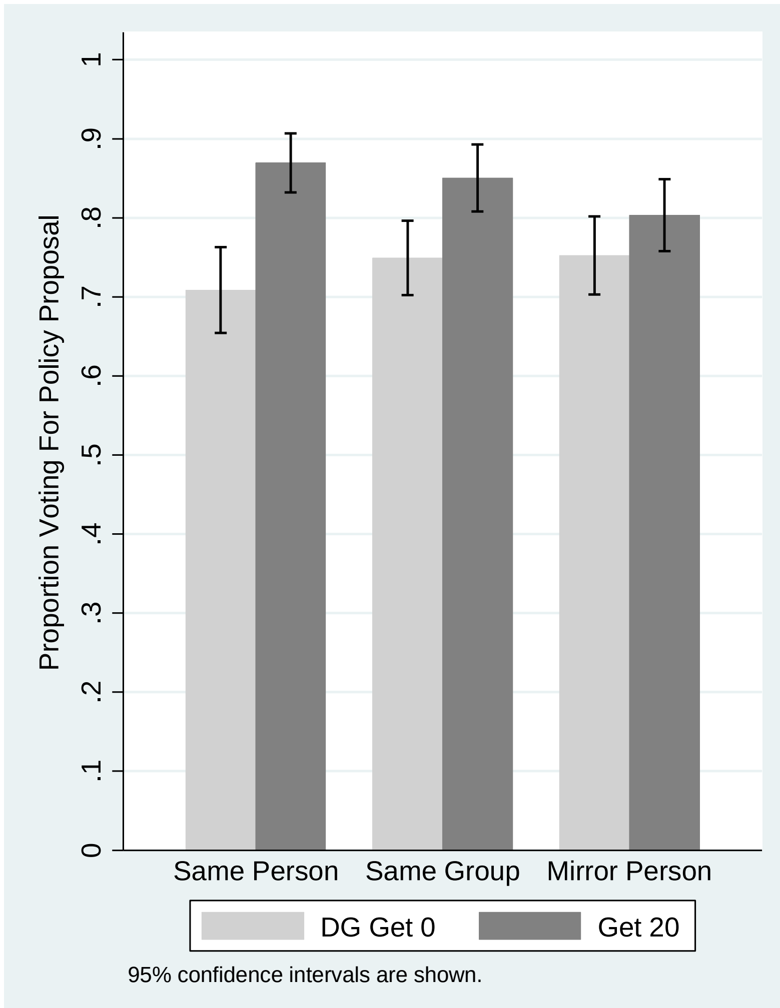

Table 3: Experiment 2. Effect of Division Game outcome and pairing condition on voting in the Policy Game

	DV: Vote to adopt policy (1 = yes)
DG Get 0	-0.06*
	[0.03]
Same Person	0.06**
	[0.03]
Same Group	0.04
	[0.03]
DG Get 0 X Same Person	-0.12***
	[0.04]
DG Get 0 X Same Group	-0.04
	[0.04]
PG Net 10	0.32***
	[0.02]
PG Net 20	0.38***
	[0.02]
Constant	0.60***
	[0.03]
R^2	0.19
N	1,776

*** p<.01, ** p<.05, * p<.10. The table reports unstandardized OLS coefficients with robust standard errors in brackets. Getting 20 tokens in the Division Game, the Mirror Person condition, and the Net 0 policy in the Policy Game are the excluded categories.

Last, we examine spillover effects within in each policy condition (Table A6). We observe spillover in all of the pairing conditions for the Net 0 policy condition. Specifically, participants in the Same Person condition were 38 points (p < .01) less likely to vote for the policy when they received an inequitable allocation compared to an equitable allocation. Participants in the Same Group and Mirror Person condition were 17 points (p < .01) and 15 points (p < .05) to vote in favor of the policy, respectively. For the Net 10 condition, participants in the Same Group and Same Person condition were 9 points (*p*s < .05) to vote for the policy when they received an inequitable allocation, but participants in the Mirror Person condition were no more or less likely to vote for the policy (p = .63). For the Net 20 condition, participants voted for the policy at approximately the same rate, regardless of who they were paired with in the Policy Game and what they received in the Division Game. These results demonstrate that spillover effects are most pronounced in situations that involve group conflict when the benefit from cooperation is comparatively low.

Discussion

Similar to Experiment 1, we observe that participants are less likely to support a policy when it benefits the individual who gave them an inequitable division. But we also find that spillover is not exclusive to situations in which people interact repeatedly. Participants who received an inequitable allocation in the Division Game from one member of Group B subsequently voted at lower rates for a policy that benefitted another member of Group B (supporting the Personal Group History Effect). Participants who received an inequitable division from a member out Group B were also less likely to vote for a Pareto-improving policy that benefitted a member of Group C. Again, we find the largest spillover effects for participants who break even in passing the policy. However, when people derived a large benefit from the policy they support it at high rates, even when they were the loser in the Division Game. Taken together, these results suggest that in contexts where group membership is particularly salient, institutions that separate division tasks from cooperative tasks may not be sufficient for mitigating welfare-reducing spillover.

General Discussion and Conclusion

In a pair of controlled experiments, we examined whether being the loser in an allocation of resources subsequently reduced cooperation. In both experiments, we find evidence in favor of a Personal Partner History effect: Interacting with the same individual causes reduced support for a policy after receiving an inequitable allocation of resources. In Experiment 1, we found that participants who interacted with the same individual for both allocation decisions were 16 points less likely to support the policy when they had received 0 tokens in an allocation compared to a 3 point effect when that loss was due to another player. This effect was considerably larger when participant's costs of contributing to the fund the policy were equal to the benefit they would receive from its provision. These results shed light on a key mechanism that drives spillover: repeated interaction with the same individual.

In Experiment 2, we investigated whether group dynamics are also a potential source of spillover between division and cooperative tasks. We find that the Personal Group History effect, interacting with two different out-group members, was approximately 56% as large as the effect of interacting with the same out-group member. However, we do find considerable spillover effects in the Net 0 policy condition when participants interacted with any out-group member (the same individual, two different members of the same out-group, or individuals who were members of different out-groups). Taken tougher, these findings demonstrate that interacting with the same individual is the largest driver of spillover effects, although out-group animosity can also result in spillover leading to less cooperation when some individuals are only weakly better off from their provision.

The Personal Partner History effect highlights a key challenge for institutions and promoting cooperation. When someone loses in the division of resources, they are less likely to be cooperative when the winner of the division of resources can benefit. The results here show that separating division tasks from cooperative tasks does indeed limit the scope of conflict as we did not observe spillover effects when individuals interacted with a different person for each task (in the absence of group attachments). This supports accounts that institutions that sequester conflictual private goods from the provision of public goods avoid welfare-reducing spillover (e.g. Schattschneider 1960). This aligns with past work arguing in favor of localizing responsibility for the provision of local public goods or the management of common pool resources (Ostrom 1990).

In contrast to prior work examining spillover, we explicitly sought to understand how varying institutions, i.e. who participants were paired with, affected behavioral spillover. While previous experiments have documented differences in spillover between pairing protocols (e.g. Ahn et al. 2001), the experiments presented here randomly assigned pairing protocols while also holding constant past personal experience and past partner behavior, factors not controlled for in past work. Given that spillover effects were substantial when participants were paired with a partner, but not when participants were paired with different individuals, future work should more thoroughly consider when strategic interactions can be viewed as nested into a broader context as opposed to when interactions can be viewed independently.

The experimental design that we employed allows us to draw clear causal inferences about the effect of pairing conditions on spillover. However, this abstraction comes with a trade off in that it sets aside potentially relevant factors that are present in real world political interactions. For example, in Experiment 2, we employed a minimal groups paradigm that established a weak connection between participants and their group. This design choice allowed us to rule out potential confounds that using actual groups, like political partisanship, would have introduced into our experimental design. However, this also likely lead us to estimating a floor effect on spillover in the Same Group condition of Experiment 2. Further, participants did not earn their initial endowment which has been shown to affect behavior in past experimental work (e.g. Hoffman et al. 1994).

Unlike our experimental environment, real world interactions are a repeated game and players know that they are in repeated interactions. While this feature is likely to change the behavior of "Deciders" in the allocation of private goods, actors outside of the lab setting may still not make an equitable division even though cooperation is more beneficial in the long run. This repeated nature of interaction opens up a number of potential strategies for dividing resources that could reduce the possibility for spillover into cooperative tasks. Although future work is necessary to examine how repeated play changes behavior, the effect would need to be substantial to override the spillover effects that were present in a one-shot interaction.

Finally, this work has identified an important connection between dividing limited resources and cooperative tasks from which everyone can benefit: That losing in the division of resources causes welfare-reducing spillover into Pareto-improving opportunities that benefit the winner. This finding lays the foundation for future investigation into whether real world institutions, in fact, prevent spillover from occurring and if they do not, what kinds of changes to institutional rules could eliminate spillovers that hurt the welfare of all individuals.

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Appendix for:

On the Merits of Separate Spaces: Why Institutions Isolate Cooperation and Division Tasks

FOR ONLINE PUBLICATION ONLY

Contents

Sample Size Information for Experiment 1

Table A1: Experiment 1 sample size by condition

	Same Person			Mirror Person		
	Net 0	Net 10	Net 20	Net 0	Net 10	Net 20
Get 0	63	63	50	61	54	40
Get 10	50	48	54	53	56	60
Get 20	45	59	56	55	56	64

Experiment 1 Computer Condition Design and Analysis

We randomly assigned participants (n = 1,001) to play the Division Game with the computer. These players did not make a proposal. Instead, the computer randomly chose whether they would receive 0 tokens, 10 tokens, or 20 tokens from a pot of 40 tokens. Thus, participants in this condition received the material outcome that participants who *were not* the Decider received when paired with another player.

These participants played the Policy Game in the main text. However, before casting a vote on a policy, they only learned about the payoff that their partner in the Policy Game from the computer in the Division Game, which was either 40 tokens, 30 tokens, or 20 tokens and reminded about their own earnings in the Division Game[1].

This condition allows us to parse out potential endowment effects in that was received in the Division Game on a player's decision the vote for a policy in the Policy Game.

Table A2: Computer condition sample size by condition

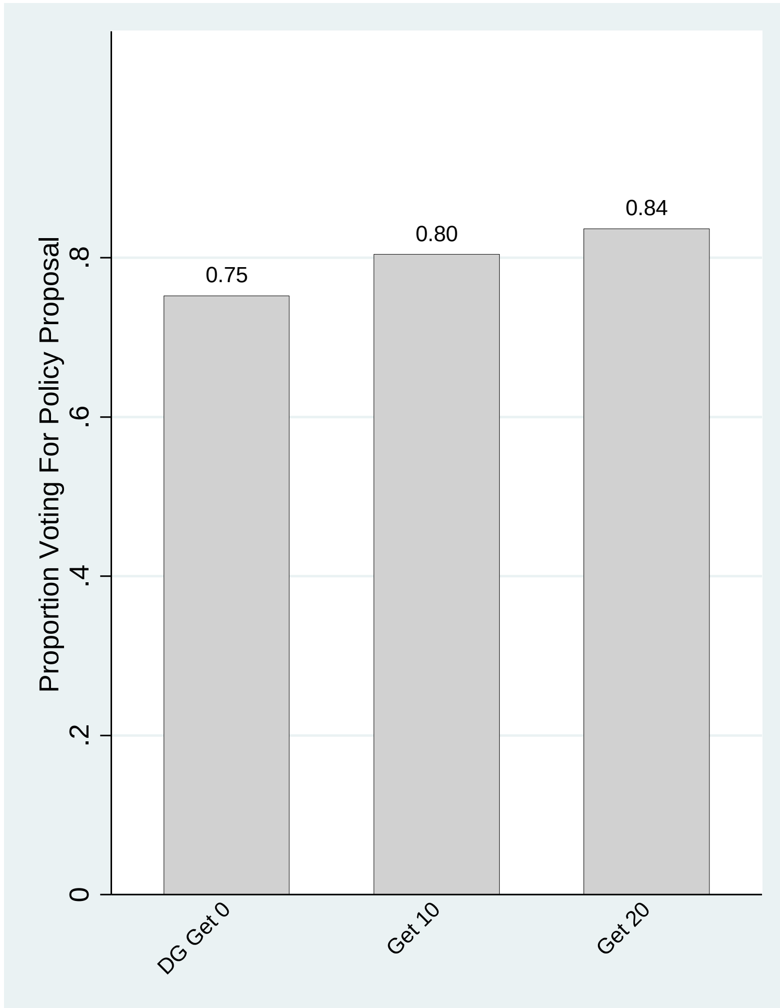
	Net 0	Net 10	Net 20
Get 0	101	95	123
Get 10	99	130	98
Get 20	127	111	117

Results for Computer Condition

Figure A1 shows the proportion of participants who voted to adopted a policy by Division Game outcome. When including the Computer condition in our analysis, participants who received 0 tokens in the Division Game were less likely to vote for a policy. Specifically, participants who received 0 tokens were 11 points (p <.01) less likely to vote for a policy, while those who received 10 tokens were 7 points (p < .01) less likely to vote for the policy (Table A3, Column 1). These results do not change substantively when controlling for policy condition (Table A3, Colum 2).

[1] We recruited two participants who were allocated 30 tokens and 40 tokens from the computer respectively, which made their Division Game earnings equivalent to a Decider who kept 30 or 40 tokens from the common pot. These participants also took the role of Player B in the Policy Game.

Figure A1: Proportion voting to adopt any policy in the Computer condition by Division Game outcome



Did participants behave differently when they received a division from the computer rather than another player? Participants who received 0 tokens from the computer were 10 points less likely to vote for a policy ($p < .01$). However, this effect was not statistically distinguishable from the effect in the Same Person condition (approximately 16 points) or the Mirror Person condition (3 points). Participants who received 10 tokens from the computer were no more or less likely to vote for a policy (4 points, $p = .10$), which closely resembles the results from the Mirror Person condition, although this effect is not statistically distinguishable from the other two pairing conditions (Table A3, Column 3). The results from the Computer condition suggest that a motivation like envy or spite may play a role in spillover effects, though this requires further investigation.

Table A3: Effect of Division Game outcome and pairing condition including Computer condition

	(1)	(2)	(3)
	DV: Vote to adopt policy in Policy Game		
DG Get 0	-0.11***	-0.10***	-0.03
	[0.02]	[0.02]	[0.04]
DG Get 10	-0.07***	-0.07***	-0.04
	[0.02]	[0.02]	[0.04]
PG Net 10		0.30***	0.30***
		[0.02]	[0.02]
PG Net 20		0.37***	0.37***
		[0.02]	[0.02]
Same Person			0.02
			[0.04]
Computer			0.04
			[0.03]
DG Get 0 X Same Person			-0.13**
			[0.06]
DG Get 0 X Computer			-0.07
			[0.05]
DG Get 10 X Same Person			-0.11*
			[0.06]
DG Get 10 X Computer			-0.01
			[0.05]
Constant	0.83***	0.61***	0.58***
	[0.01]	[0.02]	[0.03]
R^2	0.01	0.16	0.17
N	1,988	1,988	1,988

*** p<.01, ** p<.05, * p<.10. The table reports unstandardized OLS coefficients with robust standard errors in brackets. Getting 20 tokens in the Division Game and the Net 0 policy in the Policy Game are the excluded categories.

Supplementary Analysis by Policy Condition for Experiment 1

Figure A2: Experiment 1. Voting for each policy, by pairing condition and Division Game outcome

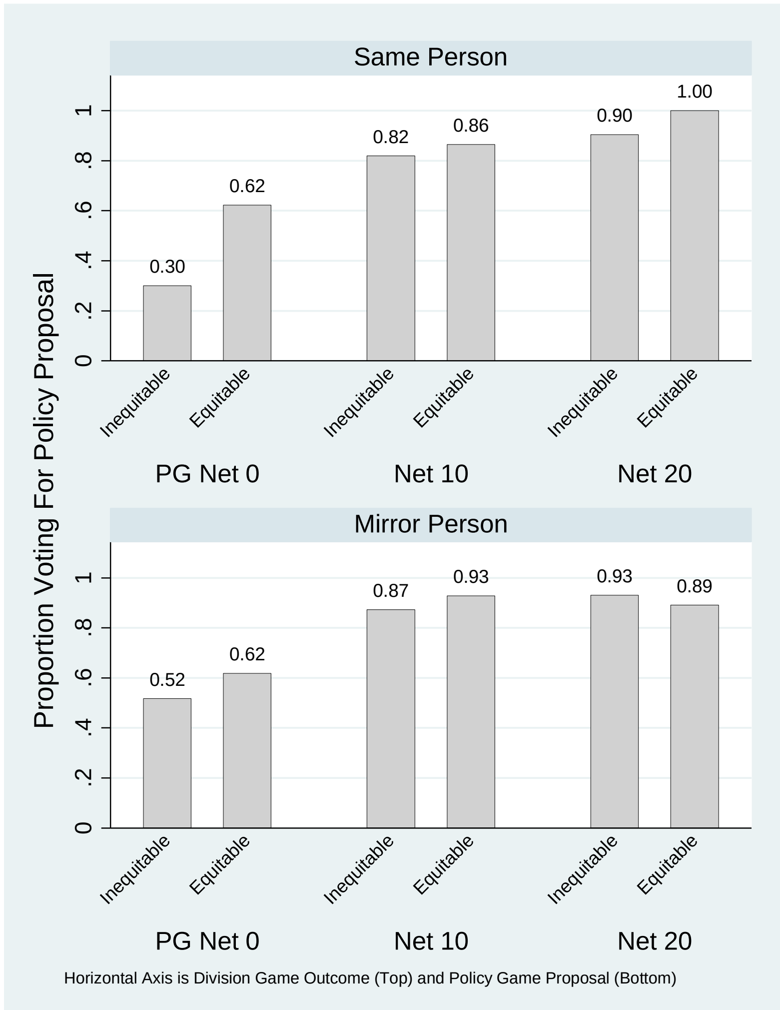


Table A4: Experiment 1. Effect of Division Game outcome and pairing condition by policy condition

	(1)	(2)	(3)
	DV: Vote to adopt policy in Policy Game		
	Net 0	Net 10	Net 20
DG Inequitable	-0.10	-0.06	0.04
	[0.08]	[0.05]	[0.05]
Same Person	0.00	-0.06	0.11***
	[0.10]	[0.06]	[0.04]
DG Inequitable X Same Person	-0.22*	0.01	-0.14**
	[0.12]	[0.07]	[0.06]
Constant	0.62***	0.93***	0.89***
	[0.07]	[0.03]	[0.04]
R^2	0.07	0.01	0.02
N	327	336	324

*** p<.01, ** p<.05, * p<.10. The table reports unstandardized OLS coefficients with robust standard errors in brackets.

Sample Size Information for Experiment 2

Table A5: Experiment 2 sample size by condition

	Same Person			Same Group			Mirror Person		
	Net 0	Net 10	Net 20	Net 0	Net 10	Net 20	Net 0	Net 10	Net 20
Get 0	100	97	74	125	129	73	115	110	70
Get 20	125	135	54	106	112	56	120	118	57

Supplementary Analysis by Policy Conditions for Experiment 2

Figure A3: Experiment 2. Proportion voting to adopt a policy broken down by Division Game outcome, pairing condition, and policy condition in the Policy Game

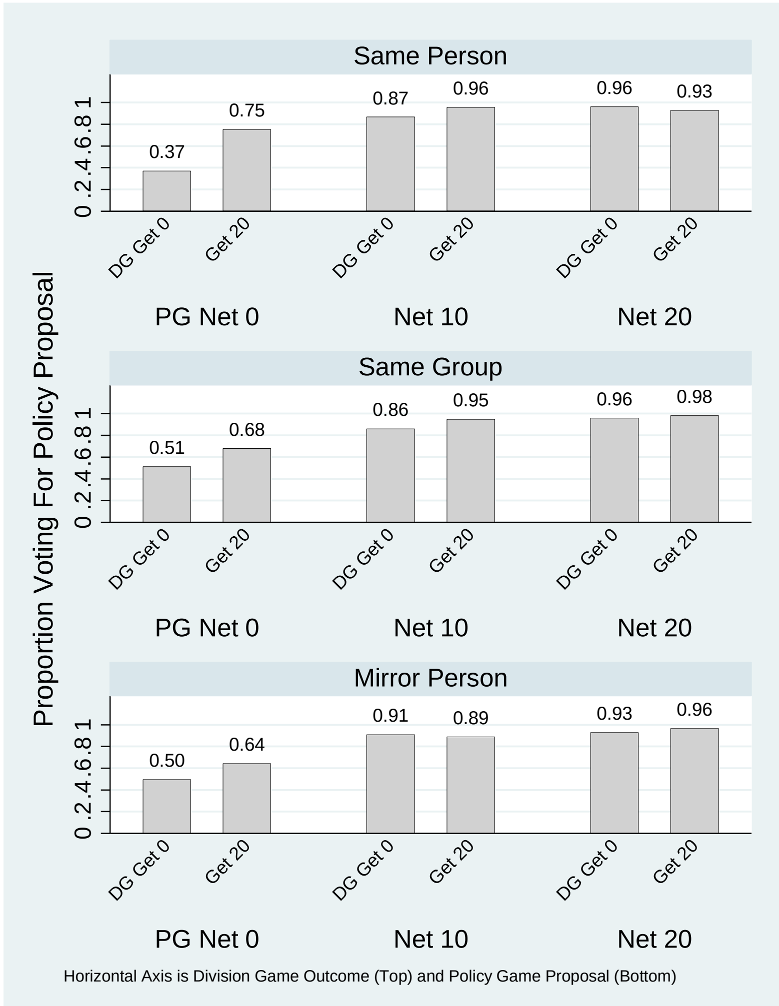


Table A6: Experiment 2. Effect of Division Game outcome and pairing condition on voting in the Policy Game, by policy condition

	(1)	(2)	(3)
	DV: Vote to adopt policy in Policy Game		
	Net 0	Net 10	Net 20
DG Get 0	0.04	0.02	-0.04
	[0.06]	[0.04]	[0.04]
Same Person	-0.15**	0.07*	-0.04
	[0.06]	[0.03]	[0.04]
Same Group	0.11*	0.06	0.02
	[0.06]	[0.04]	[0.03]
DG Get 0 X Same Person	-0.24***	-0.11*	0.07
	[0.09]	[0.06]	[0.06]
DG Get 0 X Same Group	-0.02	-0.11*	0.01
	[0.09]	[0.05]	[0.05]
Constant	0.64***	0.89***	0.96***
	[0.04]	[0.03]	[0.02]
R^2	0.07	0.02	0.01
N	691	701	384

*** p<.01, ** p<.05, * p<.10. The table reports unstandardized OLS coefficients with robust standard errors in brackets. Getting 20 tokens in the Division Game and the Mirror Person condition are the excluded categories.

Experiment 1 Instructions

Authors' Note: Brackets [] denote places in the instructions where text differed across experimental manipulations

Introduction

In this study, you will earn tokens. These tokens are converted into cents at a rate of 1 token = 1 cent.

You will play the Division Game (DG) with one other player. The amount of tokens you earn depends on your decisions, the decisions of the other participant, and chance.

In the DG, you will receive a 10 token endowment that you will put into a common pot that you share with the other player. The money in the pot will be doubled.

You and the other player will each make a proposal to divide the pot.

[page break]

Division Game

You start the Division Game with an endowment of 10 tokens. The player you are matched with will also receive an endowment of 10 tokens.

Click the button below to contribute your endowment to a common pot. The other player will do the same. The money in the pot will be doubled.

[page break]

The computer has doubled the money so there are 40 tokens in the pot.

Now, you will make a proposal to allocate the pot. You can propose to:

a) Take all 40 tokens from the pot

b) Take 30 tokens from the pot, or

c) Take 20 tokens from the pot

After you and the other player each make a proposal, the computer will choose either you or the other player to be the Decider. If you are chosen to be the Decider, your proposal will be implemented. If the other player is chosen to be the Decider, their proposal is implemented.

Note that you learn about the other player's proposal only if they are chosen to be the Decider. Similarly, the other player learns about your proposal only if you are chosen to be the Decider.

Please answer the questions below. For each correct answer, you will receive 2 tokens. You will not receive any tokens for incorrect answers.

1. Your proposal will always be implemented.

- True
- False

2. The other player knows your proposal:
   - Always
   - Never
   - Only when you are chosen as the Decider

[page break]

As a reminder, there are 40 tokens in the pot. Make a proposal to allocate the pot.

- Take 40 tokens. (You get 40 tokens, they get 0 tokens)
- Take 30 tokens. (You get 30 tokens, they get 10 tokens)
- Take 20 tokens. (You get 20 tokens, they get 20 tokens)

[page break]

The computer is choosing the Decider…

[page break]

The computer chose the other player to be the Decider. Their proposal was implemented.

They chose to take [40 or 30 or 20] tokens. They will receive [40 or 30 or 20] tokens and you will receive [0 or 10 or 20] tokens.

As a result of their decision in the Division Game, [0 or 10 or 20] tokens have been added to your bonus payment.

[page break]

Policy Game

Now, you are going to play one last game. Any tokens that you earn in this game will be added to your previous earnings. The amount of tokens you earn depends on your decisions, the decisions of another participant, and chance.

You start the Policy Game with 10 tokens. You will make a decision whether to adopt a policy and another player, your partner, will also make a decision whether to adopt the policy. After you and your partner make a decision, <u>the computer will randomly choose one of your decisions to be implemented</u>.

If the policy is adopted:

(A) You and your partner will each pay 10 tokens.

(B) Your partner will end up with 30 tokens.

(C) You will end up with [10 or 20 or 30] tokens.

If the policy is not adopted:

(A) Your partner will end up with 10 tokens.

(B) You will end up with 10 tokens.

Before you make a decision on the policy, we will tell you about the Division Game behavior and earnings of your partner in this game.

1. Your partner in this game [was or was not] the other player in the Division Game.

2. They were the Decider in the Division Game.

3. In allocating the pot between themselves and [you or their partner] they took [40 or 30 or 20] from the 40 tokens in the common pot leaving [you or their partner] with [0 or 10 or 20] tokens.

As a reminder, in the Division Game, you were not the Decider and you received [0 or 10 or 20] tokens.

Please answer the questions below. For each correct answer, you will receive 2 tokens. You will not receive any tokens for incorrect answers.

1. How many tokens will you end up with if the policy is adopted?
   - 0 tokens
   - [10 or 20 or 30] tokens
   - 40 tokens
2. How many tokens will your partner end up with if the policy is adopted?
   - 10 tokens
   - 20 tokens
   - 30 tokens
3. How many tokens will you end up with if the policy is not adopted?
   - 10 tokens
   - 20 tokens
   - 30 tokens
4. How will the computer choose whether your policy choice is implemented?
   - The computer will randomly choose either your choice or your partner's choice to be implemented
   - The computer will always implement your choice
   - The computer will always implement your partner's choice
5. Your partner in this game [was or was not] your partner in the Division Game
   - True
   - False

[page break]

Please review the information below and then make your decision.

If the policy is adopted:

(A) You and your partner will each pay 10 tokens.

(B) Your partner will end up with 30 tokens.

(C) You will end up with [10 or 20 or 30] tokens.

If the policy is not adopted:

(A) Your partner will end up with 10 tokens.

(B) You will end up with 10 tokens.

As a reminder:

1. Your partner in this game [was or was not] the other player in the Division Game.

2. They were the Decider in the Division Game.

3. In allocating the pot between themselves and [you or their partner] they took [40 or 30 or 20] from the 40 tokens in the common pot leaving [you or their partner] with [0 or 10 or 20] tokens.

In the Division Game, you were not the Decider and you received [0 or 10 or 20] tokens.

Do you want to adopt this policy?

- Yes
- No

[page break]

Your vote has been recorded. After your partner has made their decision, the computer will randomly choose either your decision or their decision to be implemented. The tokens you receive from the Policy Game will be added to the tokens you received in the Division Game. This amount will be paid to you as a bonus payment for the study.

Instructions for the Computer Condition of Experiment 1

Introduction

In this study, you will earn tokens. These tokens are converted into cents at a rate of 1 token = 1 cent.

You will play the Division Game (DG). The amount of tokens you earn depends on chance. In the DG, there is a pot with 40 tokens in it.

The computer will randomly choose how much money you receive from the pot.

[page break]

The computer will randomly choose how many tokens you receive from the common pot. The computer will randomly choose between giving you 0 tokens, 10 tokens, 20 tokens, 30 tokens, and 40 tokens.

Please answer the questions below. For each correct answer, you will receive 2 tokens. You will not receive any tokens for incorrect answers.

1. How will the computer choose the amount of tokens that you receive?
   - The computer will always give you 0 tokens.
   - The computer will always give you 20 tokens.
   - The computer will randomly choose how many tokens you receive.
2. What is the maximum number tokens you can receive from the computer?
   - 20 tokens
   - 30 tokens
   - 40 tokens

[page break]

Authors Note: 30 and 40 tokens were given very low probability of occurring (.00005 each).

The computer chose that you will receive [0 or 10 or 20 or 30 or 40] tokens

As a result of the computer's decision in the DG, [0 or 10 or 20 or 30 or 40] tokens have been added to your bonus payment.

[page break]

Now, you are going to play one last game. Any tokens that you earn in this game will be added to your previous earnings. The amount of tokens you earn depends on your decisions, the decisions of another participant, and chance.

You start the Policy Game with 10 tokens. You will make a decision whether to adopt a policy and another player, your partner, will also make a decision whether to adopt the policy. After you and your partner make a decision, the computer will randomly choose one of your decisions to be implemented.

If the policy is adopted:

(A) You and your partner will each pay 10 tokens.

(B) Your partner will end up with 30 tokens.

(C) You will end up with [10 or 20 or 30] tokens.

If the policy is not adopted:

(A) Your partner will end up with 10 tokens.

(B) You will end up with 10 tokens.

Before you make a decision on the policy, we will tell you about the Division Game earnings of your partner in this game.

1. Your partner in this game received [40 or 30 or 20 or 10 or 0] tokens from the computer in the Division Game.

As a reminder, in the Division Game, you received [0 or 10 or 20 or 30 or 40] tokens.

1. How many tokens will you end up with if the policy is adopted?
    - 0 tokens
    - [10 or 20 or 30] tokens
    - 40 tokens
2. How many tokens will your partner end up with if the policy is adopted?
    - 10 tokens
    - 20 tokens
    - 30 tokens
3. How many tokens will you end up with if the policy <u>is not</u> adopted?
    - 10 tokens
    - 20 tokens
    - 30 tokens
4. How will the computer choose whether your policy choice is implemented?
    - The computer will randomly choose either your choice or your partner's choice to be implemented
    - The computer will always implement your choice
    - The computer will always implement your partner's choice
5. The computer is your partner in this game.
    - True
    - False

[page break]

Please review the information below and then make your decision.

If the policy is adopted:

(A) You and your partner will each pay 10 tokens.

(B) Your partner will end up with 30 tokens.

(C) You will end up with [10 or 20 or 30] tokens.

If the policy is not adopted:

(A) Your partner will end up with 10 tokens.

(B) You will end up with 10 tokens.

As a reminder:

1. Your partner in this game received [40 or 30 or 20 or 10 or 0] tokens from the computer in the Division Game.

As a reminder, in the Division Game, you received [0 or 10 or 20 or 30 or 40] tokens.

Do you want to adopt this policy?

- Yes
- No

[page break]

Your vote has been recorded. After your partner has made their decision, the computer will randomly choose either your decision or their decision to be implemented. The tokens you receive from the Policy Game will be added to the tokens you received in the Division Game. This amount will be paid to you as a bonus payment for the study.

Instructions for Experiment 2

Authors' Note: Brackets [] denote places in the instructions where text differed across experimental manipulations

On the next page, you will have 5 seconds to click as many times as you can. The number of times you click will be used to decide which group you are in for the remainder of the study.

You will receive 1 token for each 4 times that you click. We will round down to the nearest cent. You can earn a maximum of 25 tokens (100 clicks in 5 seconds).

These tokens are converted into cash at a rate of 1 token = 1 cent.

[page break]

Click!

[page break]

Counting clicks and assigning groups...

[page break]

You clicked (number of clicks) times in 5 seconds. You will receive (number) tokens as a bonus payment.

Because of the number of times you clicked, you have been assigned to Group A. Participants in Group A had a similar clicking pattern to you.

Participants who did not have a similar clicking pattern to you have been assigned to Group B, Group C, or Group D, depending on the number of times they clicked.

[page break]

Each group has at least two people in it. The table below shows two people from each group. As a reminder, these groups were formed based on the number of times people clicked.

As a reminder, you are in Group A.

Group A	**Group B**	**Group C**	**Group D**
Person 1	Person 2	Person 3	Person 4
Person 5	Person 6	Person 7	Person 8

To make sure you understand these instructions so far, we have three questions. Please answer them to the best of your ability.

1. Are you, in Group A, more like person 1, who is also in Group A, or like person 2 who is in Group B?
   - Person 1
   - Person 2

2. Is person 2, who is in Group B, more like person 3, who is in Group C, or person 6, who is also in Group B?
   - Person 3
   - Person 6
3. Is person 3, who is in Group C, more like person 4, who is in Group D, or person 7, who is also in Group C?
   - Person 4
   - Person 7

[page break]

Now, you will play the <u>Division Game</u> (DG) with a member of Group B. As a reminder you are a member of Group A. The amount of tokens you earn depends on your decisions, the decisions of the other participant, and chance.

In the DG, you will receive a 10 token endowment that you will put into a common pot that you share with the other player. The money in the pot will be doubled.

You and the other player will each make a proposal to divide the pot.

[page break]

The computer has doubled the money so there are 40 tokens in the pot.

Now, you will make a proposal to allocate the pot. You can propose to:

a) Take all 40 tokens from the pot, or

b) Take 20 tokens from the pot

After you and the other player each make a proposal, <u>the computer will choose either you or the other player to be the Decider</u>. If you are chosen to be the Decider, your proposal will be implemented. If the other player is chosen to be the Decider, their proposal is implemented.

Note that you learn about the other player's proposal <u>only if they are chosen to be the Decider.</u> Similarly, the other player learns about your proposal <u>only if you are chosen to be the Decider.</u>

To make sure that you understand these instructions, please answer the questions below. <u>For each correct answer, you will receive 2 tokens.</u> You will not receive any tokens for incorrect answers.

1. Your proposal will always be implemented.
   - True
   - False
2. The other player knows your proposal:
   - Always
   - Never
   - Only when you are chosen as the Decider

[page break]

As a reminder, there are 40 tokens in the pot. Make a proposal to allocate the pot.

- Take 40 tokens. (You get 40 tokens, they get 0 tokens)
- Take 20 tokens. (You get 20 tokens, they get 20 tokens)

[page break]

The computer chose the other player who is a member of Group B to be the Decider. Their proposal was implemented.

They chose to take [40 or 20] tokens. They will receive [40 or 20] tokens and you will receive [0 or 20] tokens.

As a result of their decision in the Division Game, [0 or 20] tokens have been added to your bonus payment.

[page break]

Policy Game

Now, you are going to play one last game. Any tokens that you earn in this game will be added to your previous earnings. The amount of tokens you earn depends on your decisions, the decisions of another participant, and chance.

You start the Policy Game with 10 tokens. You will make a decision whether to adopt a policy and another player, your partner, will also make a decision whether to adopt the policy. After you and your partner make a decision, <u>the computer will randomly choose one of your decisions to be implemented</u>.

If the policy is adopted:

(A) You and your partner will each pay 10 tokens.

(B) Your partner will end up with 30 tokens.

(C) You will end up with [10 or 20 or 30] tokens.

If the policy is not adopted:

(A) Your partner will end up with 10 tokens.

(B) You will end up with 10 tokens.

Before you make a decision on the policy, we will tell you about the Division Game behavior and earnings of your partner in this game.

1. Your partner in this game [<u>was</u> or <u>was not</u>] the other player in the Division Game.

2. Your partner in this game is a member of Group [B or C].

3. They were the Decider in the Division Game. [blank or Their partner in the Division Game was a member of Group D].

4. In allocating the pot between themselves and [you or their partner], they took [40 or 20] from the 40 tokens in the common pot leaving [you or their partner] with [0 or 20] tokens.

As a reminder, in the Division Game, you were not the Decider and you received [0 or 20] tokens.

Please answer the questions below. <u>For each correct answer, you will receive 2 tokens.</u> You will not receive any tokens for incorrect answers.

1. How many tokens will you end up with if the policy is adopted?
   - 0 tokens
   - [10 or 20 or 30] tokens
   - 40 tokens
2. How many tokens will your partner end up with if the policy is adopted?
   - 10 tokens
   - 20 tokens
   - 30 tokens
3. How many tokens will you end up with if the policy <u>is not</u> adopted?
   - 10 tokens
   - 20 tokens
   - 30 tokens
4. How will the computer choose whether your policy choice is implemented?
   - The computer will randomly choose either your choice or your partner's choice to be implemented.
   - The computer will always implement your choice.
   - The computer will always implement your partner's choice.
5. Your partner in this game [was or was not] your partner in the Division Game.
   - True
   - False
6. Your partner in this game is a member of Group [B or C].
   - True
   - False

[page break]

Please review the information below and then make your decision.

If the policy is adopted:

(A) You and your partner will each pay 10 tokens.

(B) Your partner will end up with 30 tokens.

(C) You will end up with [10 or 20 or 30] tokens.

If the policy is not adopted:

(A) Your partner will end up with 10 tokens.

(B) You will end up with 10 tokens.

As a reminder,

1. Your partner in this game [was or was not] the other player in the Division Game.

2. Your partner in this game is a member of Group [B or C].

3. They were the Decider in the Division Game. [blank or Their partner in the Division Game was a member of Group D].

4. In allocating the pot between themselves and [you or their partner], they took [40 or 20] from the 40 tokens in the common pot leaving [you or their partner] with [0 or 20] tokens.

In the Division Game, you were not the Decider and you received [0 or 20] tokens.

Do you want to adopt this policy?

- Yes
- No

[page break]

Your vote has been recorded. After your partner has made their decision, the computer will randomly choose either your decision or their decision to be implemented. The tokens you receive from the Policy Game will be added to the tokens you received in the Division Game and the clicking task. This amount will be paid to you as a bonus payment for the study.