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What Does "Clean" Really Mean? The Implicit Framing of Decontextualized Experiments

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Abstract

It is standard in experimental economics to use decontextualized designs where payoff structures are presented using neutral language. Here we show that cooperation in such a neutrally framed Prisoner's Dilemma is equivalent to a PD framed as contributing to a cooperative endeavour. Conversely, there is substantially less cooperation in a PD framed as a competition. We conclude that in a decontextualized context, our participants by default project a cooperative frame onto the payoff structure.

1. Introduction

Laboratory experiments are becoming an increasingly popular element of the economist's toolkit, as they help to solve for identification problems. When working with field data, reverse causality can often not be excluded, and omitted variables are a pervasive concern. Arguably, lab experiments get rid of both. When stripping the situation down to a set of options and associated payoffs, and randomly assigning participants to treatments where this payoff structure is varied, identification is straightforward. The treatment effect results from the experimental manipulation, not the other way round, and not from anything else.

As variation in payoff structures is at the heart of experimental economics, experiments are typically presented to participants in neutral language: the options and associated payoffs are objectively described, and the interaction is as de-contextualized as possible. This is because it is well known that 'framing effects', phrasing incidental to the payoff structure, can have dramatic effects on behaviour.[3] Neutral frames are therefore attractive, as they seem to offer a clean assessment of treatment effects by focusing participants on the payoff structure without biasing their choices.

However, when a neutrally framed payoff structure can be interpreted in multiple ways, participants must engage in sense making. It has been shown that participants achieve this by reasoning about the evidence, rather than an algebra-like process (Pennington and Hastie, 1988). Participants attempt at creating a narrative story from the information they receive (Pennington and Hastie, 1986, 1988, 1993). They construct a mental model (Johnson-Laird, 1983).

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[3] We can only sketch the rich framing literature (seminal papers include Deutsch, 1958; Tversky and Kahneman, 1981). In the context of social dilemmas, which are our focus, frames may trigger a norm (Dufwenberg et al., 2011), and affect beliefs (Ellingsen et al., 2012). Thus, given the right frame, participants may be willing to dissolve a social dilemma (Andreoni, 1995; Ellingsen et al., 2012; Fleishman, 1988; Park, 2000) and to contribute to a public good (Cookson, 2000; Cubitt et al., 2011; Rege and Telle, 2004; Sonnemans et al., 1998).

In strategic games, behavioural uncertainty strengthens the need for sense making. Most participants realize that many experimental participants do not behave like textbook agents. Yet they do not know the composition of the type space. The problem is exacerbated by conditional cooperation being the dominant preference (Fischbacher et al., 2001). This forces participants to even estimate types conditional on their own action.

If participants have to translate context-free incentive structures into more colourful stories to resolve uncertainty, this raises a fundamental question about the neutrally framed games so central in economics: What contexts do participants project onto such games? When left to their own devices, which types of stories do participants tell themselves?

Here we explore this issue in the context of social dilemmas. We ask how play in a decontextualized baseline Prisoner's Dilemma (PD) compares to PDs contextualized as cooperation among team members, or competition in a market. We find that play in the baseline is very similar to play under two different cooperative frames, whereas cooperation is substantially lower under the competitive frame. These results suggest that by default, our participants interpret social dilemma games through a cooperative lens.

2. Experimental Design

To compare the neutral frame with cooperative and competitive frames, we run an experiment using Amazon Mechanical Turk (for evidence of methodological validity, see Horton et al. (2011)) to recruit American participants. Commensurate with standard wages on Mechanical Turk, participants play a single one-shot simultaneous PD. For robustness, we randomize participants into one of the two following payoff matrices, where the benefit-to-cost ratio (b/c) of cooperation is varied[4]:

b/c=2.5	C	D
C	\$0.20, \$0.20	\$0.00, \$0.28
D	\$0.28, \$0.00	\$0.08, \$0.08

b/c=1.25	C	D
C	\$0.20, \$0.20	\$0.00, \$0.36
D	\$0.36, \$0.00	\$0.16, \$0.16

Before the PD, comprehension is assessed by asking participants which choice by them and by their partner maximizes their earnings and their partner's earnings. Measures of beliefs, risk preferences, personality and demographics were included after the PD, but not analysed here due to space constraints.

Within each payoff specification, we have four experimental conditions, which differ only in their framing. The *Baseline* is presented using neutral language. In the *Contribution* treatment, participants are told they are on a team with the other player. In the *Protection* treatment participants are told they can jointly protect themselves against possible losses. In the *Competition* treatment, participants are told they are competing with the other player setting prices in a market. Thus we vary both the cooperative versus competitive framing and the gain versus loss framing.

[4] The b/c=1.25 condition was included to reduce the overall level of cooperation compared to b/c=2.5, excluding possible ceiling effects.

Using the *b/c*=2.5 (*b/c*=1.25) payoff specification, in the *Baseline* we have 101 (99) independent observations, in *Contribution* 103 (102), in *Protection* 99 (101), in *Competition* 103 (101). Participants on average earned $0.16 ($0.18) in the PD, plus a $0.50 showup fee. For further details about the design, we refer to the appendix.

3. Results

As Figure 1 shows, we find a pronounced effect of treatment on choices. Across both payoff specifications, cooperation is substantially less likely in the *Competition* frame compared to the *Baseline* (Chi^2 test: *b/c*=2.5, N=204, p=0.011; *b/c*=1.25, N=200, p=0.034). Conversely, cooperation is equally likely in the *Contribution* frame and the *Baseline* for both specifications (Chi^2 test: *b/c*=2.5, N=204, p=0.815; *b/c*=1.25, N=201, p=0.436). [5] The effect of the *Protection* frame varies by specification: when cooperation is cheap (and common), there is no significant difference from *Baseline* (Chi^2 test: *b/c*=2.5, N=200, p=0.68); but when cooperation is expensive (and less common), the *Protection* frame decreases cooperation relative to *Baseline* (Chi^2 test: *b/c*=1.25, N=200, p=0.034). Thus it seems that the loss framing of the *Protection* frame makes subjects more sensitive to the reduction in others' cooperation at *b/c*=1.25.

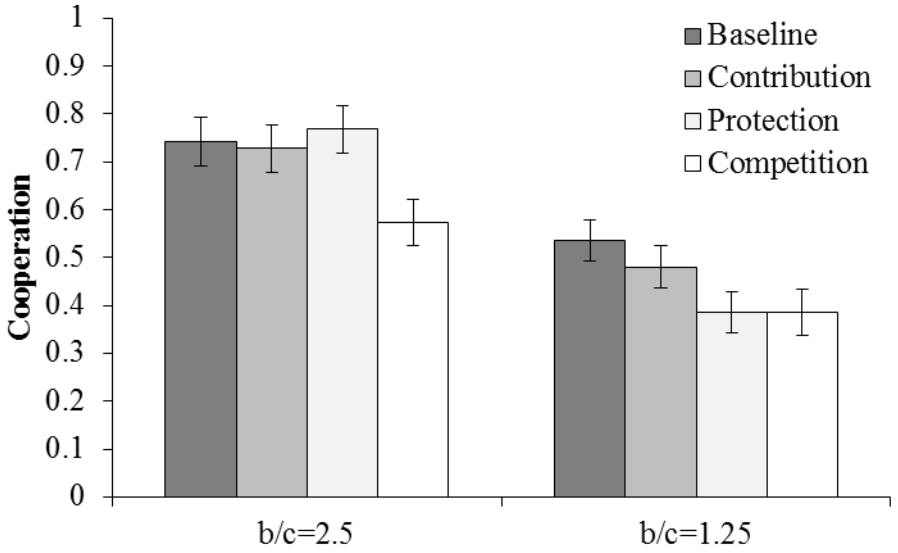

Figure 1. Mean cooperative choices.
Shown as fraction of the population

Model 2 in Table 1 confirms that the effects of the *Competition* and *Contribution* frames do not differ across payoff specifications, whereas the *Protection* frame results in less cooperation when *b/c*=1.25.[6] Models 3 and 4 show that the treatment effects are robust to controlling for comprehension of the payoff structure.[7]

[5] Assuming normality, using a two-sided t-test, a power of .8, for each treatment comparison and payoff specification our sample would have been big enough to find an effect of standardized size .39.
[6] Evaluating the net coefficient of *Protection* at b/c=1.25 shows a significant negative effect (p=0.035).
[7] When excluding the 39.3% of participants who failed at least one comprehension question, we continue to find evidence that the default frame is cooperative. There is significantly less cooperation in *Competition* relative to *Baseline* (Chi^2 test: b/c=2.5: p=0.007; b/c=1.25, p=0.019), and no significant difference between Baseline and the two cooperative frames, with the exception of the *Contribution* frame at b/c=1.25, where there is marginally less cooperation compared to *Baseline* (Chi^2 test vs *Baseline*: b/c=2.5: *Contribution* p=0.415, *Protection* p=0.517; b/c=1.25: *Contribution* p=0.090, *Protection* p=0.134).

	(1)	(2)	(3)	(4)
Contribution	-0.157	-0.0741	-0.125	-0.0452
	(0.214)	(0.318)	(0.216)	(0.322)
Protection	-0.281	0.136	-0.308	0.120
	(0.210)	(0.329)	(0.216)	(0.333)
Competition	-0.702***	-0.766**	-0.733***	-0.798***
	(0.215)	(0.303)	(0.219)	(0.309)
b/c=1.25	-1.089***	-0.918***	-1.106***	-0.931***
	(0.149)	(0.304)	(0.151)	(0.313)
Contribution X b/c=1.25		-0.146		-0.139
		(0.425)		(0.431)
Protection X b/c=1.25		-0.741*		-0.763*
		(0.437)		(0.446)
Competition X b/c=1.25		0.161		0.161
		(0.417)		(0.425)
Failed Comprehension			0.668***	0.673***
			(0.156)	(0.156)
Constant	1.157***	1.059***	0.914***	0.813***
	(0.177)	(0.228)	(0.186)	(0.237)
Observations	809	809	809	809

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1. Treatment Effects on Cooperation
Logistic regressions, robust standard errors in parenthesis.

4. Discussion

Here we have found that cooperation levels in a neutrally framed PD are equivalent to a PD contextualized as contributing to a cooperative team endeavour. This suggests that our participants, when faced with a decontextualized game, project onto it scenarios which are oriented towards gains from cooperation.[8] These findings relate to work on the cognitive basis of cooperation in social dilemmas. Our work is consistent with recent evidence that automatic, intuitive responses tend to favour cooperation: time pressure or priming of intuition increases cooperation in public goods games (Rand et al., 2012; Rand and Kraft-Todd, 2013; Rand et al., 2013b), cognitive load increases giving in zero-sum allocation games (Cornelissen et al., 2011; Roch et al., 2000; Schulz et al., In press), and impairing the function of the right lateral prefrontal cortex, a brain region associated with deliberation and control, increases giving in a unilateral money transfer, while amplifying this region decreases giving (Ruff, Ugazio, & Fehr, 2013).[9] To explain this predisposition towards cooperation, the Social Heuristics Hypothesis has been proposed (Rand et al., 2013b): strategies that are advantageous in daily life become internalized as defaults, and tend to get overgeneralized into less representative situations (such as one-shot anonymous laboratory games).

[8] It is of course possible that heavier or more emotionally-laden cooperative frames might still increase cooperation relative to the *Baseline*. Yet along with this, heavier frames would likely also increase the difference between the *Baseline* and competitive frames.
[9] Other studies have found no effect of intuition on promoting cooperation, but no studies have found a significant negative association between intuition and cooperation. See (Rand et al., 2013a; Tinghög et al., 2013) for further discussion.

Our results suggest that there is no such thing as decontextualized interaction, at least in the context of the Prisoner's Dilemma: when no context is given in experiments, participants are forced to supply their own frame. Among our participants, that default frame is cooperation. More generally, our results suggest that there may be no such thing as a 'clean' decontextualized setup described only by a payoff structure of the games. This finding has broader implications for experimental economics. The effect of seemingly neutral manipulations might result from the fact that the manipulation triggers a specific frame in participants' minds. Experimentalists beware: participants may frame your experiments for you!

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Appendix

Baseline

Instructions

Welcome to this HIT. This HIT has several parts. We will tell you about later parts after you have completed earlier parts.

For your participation in this HIT, you receive 50 cents. You also can earn a bonus as described on the following pages.

How much of a bonus depends on your own decisions and also on the decision of an anonymous other MTurk participant with whom you are paired.

You will be told about the outcome of all parts of the HIT at the time your bonus is paid.

This is the first part of the hit.

You are together with another, anonymous participant. How much money you earn depends on your own choice, and on the choice of the other participant.

Each of you has two choices:

A: Gives 20 cents to the other person

B: Gives 8 cents to yourself

If you both choose A, you each earn 20 cents and are better off than if you both choose B (in which case you both earn 8 cents). But if you choose B while the other person chooses A, you earn 28 cents while they earn nothing.

The other person is REAL and will really make a decision. Once you have each made your decisions, neither of you will ever be able to affect each others' bonuses in later parts of the HIT.

Now we will ask several questions to make sure you understand how the payoffs are determined.

YOU MUST ANSWER THESE QUESTIONS CORRECTLY TO RECEIVE A BONUS!

Which action by YOU gives YOU a higher bonus?

- A
- B

Which action by YOU gives the OTHER PLAYER a higher bonus?

- A
- B

Which action by the OTHER PLAYER gives YOU a higher bonus?

- A
- B

Which action by the OTHER PLAYER gives the OTHER PLAYER a higher bonus?

- A
- B

What is your choice?

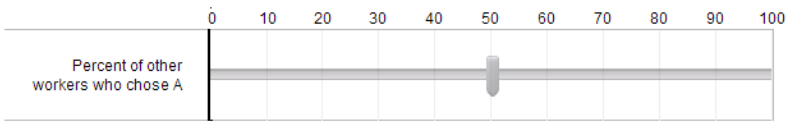
- A: Gives 20 cents to the other person
- B: Gives 8 cents to yourself

This is the second part of the hit.

You will now guess what percent of the other participants chose A.

You can earn up to an additional 10 cents depending on the accuracy of your guess. For every 10% by which your guess differs from the actual answer, you lose 1 cent from your additional 10 cent payment. Thus you have an incentive to be as accurate as possible when making your guess.

What is your guess?



Contribute

Together with another anonymous participant you are forming a team. How much money you earn depends on whether the team successfully coordinates.

Each of you has two choices:

Contribute: Gives 20 cents to the other person
Do not contribute: Gives 8 cents to yourself

If you both contribute, you each earn 20 cents and are better off than if you both do not contribute (in which case you both earn 8 cents). Yet there is a risk. If you are the only one to contribute, you bear the costs of the project alone and earn nothing, while your partner receives the entire benefit of 20 cents. You may prevent this by not contributing yourself. This gives you a safe outcome of 8 cents, and it gives you 28 cents if your partner chooses to contribute (although then your partner would receive nothing if he/she contributes).

The other person is REAL and will really make a decision. Once you have each made your decisions, neither of you will ever be able to affect each others' bonuses in later parts of the HIT.

Protect

Together with another anonymous participant you are forming a team. How much money you earn depends on whether the team successfully protects itself against damage.

Each of you has two choices:

Invest in protection: Gives 20 cents to the other person
Do not invest in protection: Gives 8 cents to yourself

If you both invest in protection, you each earn 20 cents and are better off than if you both do not invest in protection (in which case you both earn 8 cents). Yet there is a risk. If you are the only one to invest, you become the sole target of the damage, and earn nothing, while your partner receives the entire benefit of 20 cents. You may preempt this by not investing yourself. This gives you a safe outcome of 8 cents, and it gives you 28 cents if your partner chooses to invest (although then your partner would receive nothing if he/she invests).

The other person is REAL and will really make a decision. Once you have each made your decisions, neither of you will ever be able to affect each others' bonuses in later parts of the HIT.

Compete

You are competing with another anonymous participant in a market. Your income depends on the prices both of you set.

Each of you has two choices:

Set a high price: Gives 20 cents to the other person
Set a low price: Gives 8 cents to yourself

If you both set a high price, you each earn 20 cents and are better off than if you both set a low price (in which case you both earn 8 cents). But if you undercut your competitor by setting a low price while they set a high price, you get all the business and earn 28 cents while they earn nothing. Similarly, if your competitor sets a low price while you set a high price, you receive nothing with your competitors earns 28 cents.

The other person is REAL and will really make a decision. Once you have each made your decisions, neither of you will ever be able to affect each others' bonuses in later parts of the HIT.