

Ethnic Diversity and Cooperation in the Provision of Public Goods

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Problem Statement

What is the contribution of heterogeneity (in ascriptive and non-ascriptive traits) in explaining outcomes?

Two key strands of research (one from the Empirics of Growth, the other from the literature on identity in Social Psychology) that says that heterogeneity matters.

Example 1 *Cross-country growth regressions that attribute the lack of economic growth in many African countries to this phenomenon. (Easterly and Levine, 1997; Englebert, 1997; Collier, 1998; Rodrik, 1999; Collier and Gunning, 1999; Masters and MacMillan, 1999.)*

Example 2 *Experiments from Social Psychology that shows that when the composition of groups is more diverse, subjects are less likely to cooperate. (see the work of Tajfel (1971); Sherif (1961)).*

Little agreement on the mechanisms through which diversity matters, or even the direction in which it will affect outcomes.

Mechanism 1 *Heterogeneity undermines group cohesion, thereby raising the transactions costs of bargaining either directly because of diverse preferences, or indirectly through competitive rent seeking, thereby making it difficult to reach consensus on the type and quality of public goods provision.*

See for example Easterly and Levine (1997), Rodrik (1999), Masters and MacMillan (1999), Alesina and Drazen (1991), Alesina and Spoloare (1994).

Mechanism 2 *Heterogeneity, say in incomes, facilitates greater cooperation since the less well endowed median voter votes in favour of a greater provision of the public good.*

E.g., Alesina and Drazen (1991).

Our Objective

- To test the salience of individual and group heterogeneity in predicting cooperation in a collective action problem, specifically individual contributions to a public good. We use an experimental approach combined with survey data.
- How does the public goods game work? This is an n -person iterated PD game.
- What is the game theoretic prediction?

$$\Pi_i = (y_i - g_i) + 0.5 \sum_j g_j$$

for each round, where $0 \leq g_i \leq y$ and 0.5 is the marginal per capita return (MPCR) from public good contributions

Thus, the dominant strategy is not to contribute anything. whereas

the social optimum for the group is for everyone to contribute everything.

- What do we actually observe in experimental settings?
- Variants of the game (communication, costly punishment, differential show-up fees and endowments)
- Mixed evidence on the role of income and wealth heterogeneity, but few of these studies are based on field-experiments. Only Cardenas (2003) and Burns and Visser (2006) have explored real-world settings and show opposite findings.
- Other experimental evidence on racial identity is scarce.

Experimental Design

- 420 first year economics students were recruited via a web sign-up form where they indicated their availability
- Subjects randomly assigned to the different treatment groups
- We ran three treatments (All Black, Mixed, All White), with and without communication. In the communication treatment, participants were given two minutes at the end of each round to talk to members of their group.

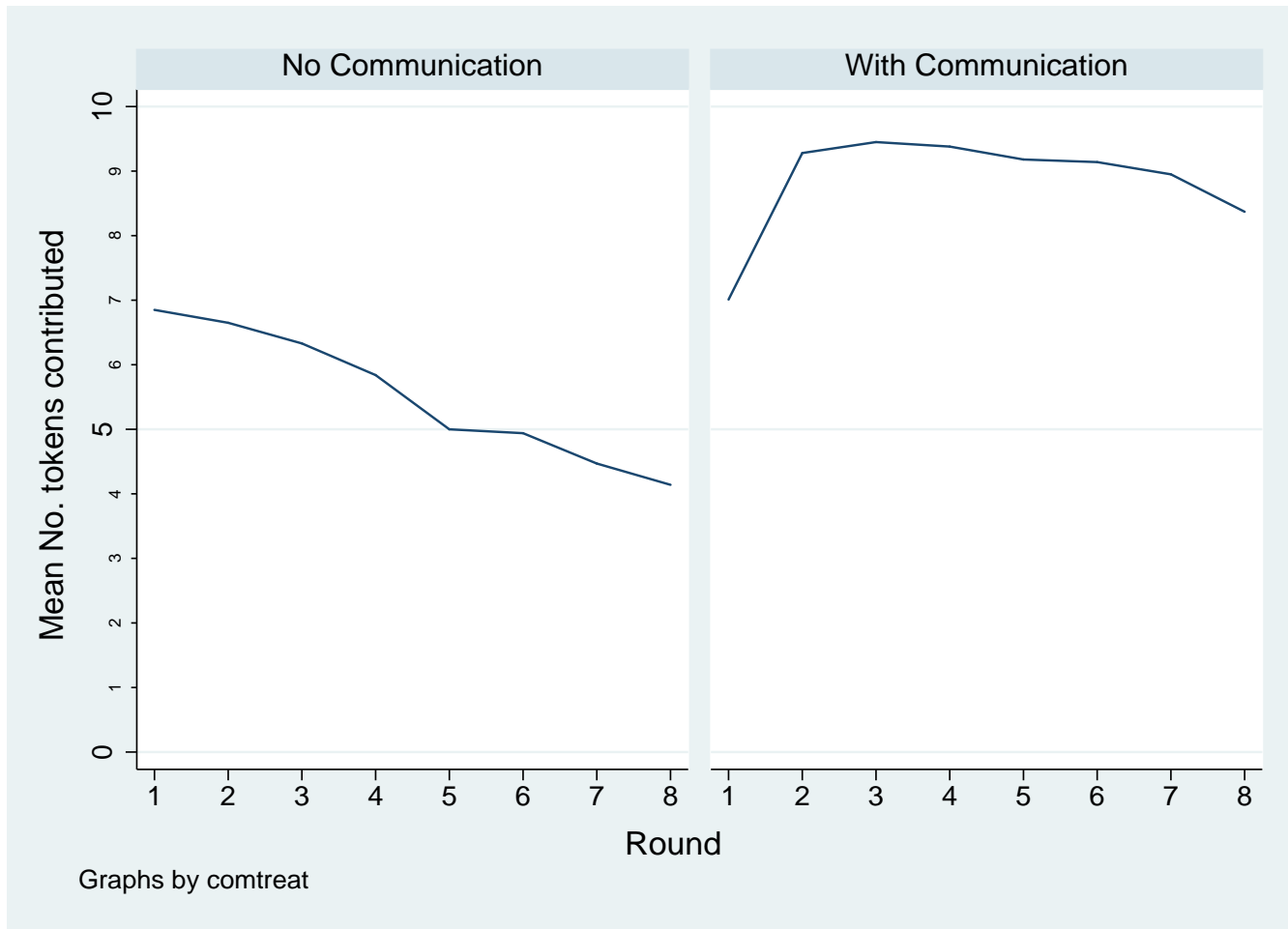
- Since students were seated in a circle in the same room and entered together, they were able to directly observe the race and gender of their group members.
- Once everyone in the group understood the game, the experimenter asked all participants to turn their chairs to face outwards from their group, so that each participant had their back to the group. This was done to ensure anonymity and privacy when individuals were making their decisions.
- Offers recorded on personal record sheet and handed in to experimenter who entered data, computed public “earnings”, and announced this to the whole group
- The communication treatment was a little different.
- The sessions lasted 45 minutes on average, with participants earning on average R97.49.

Estimation Strategy

- Pooled OLS and HLM models
- First level of clustering arises from the fact that participants are nested within groups, and thus, the correlation in outcomes for individuals is likely to be stronger within groups than across groups.
- Second level of clustering arises because multiple observations over round are nested within individuals.
- Key problem is that independence of observations is likely to be violated owing to the interdependence of observations within the same cluster, be it within groups or individuals.

Table 1: Sample statistics

Variable	<u>All</u>		<u>Black</u>		<u>White</u>	
	Mean	SD.	Mean	SD	Mean	SD
White	0.47	0.50	0.00	0.00	1.00	0.00
Female	0.44	0.50	0.50	0.50	0.37	0.48
South African citizen	0.73	0.45	0.73	0.44	0.72	0.45
Applied for financial aid	0.30	0.46	0.46	0.50	0.11	0.32
Three closest friends are same sex	0.60	0.49	0.64	0.48	0.56	0.50
Days till cash collection	2.57	2.96	2.07	2.22	3.15	3.54
Self classified family as poor	0.04		0.06		0.01	
Whites have the best opportunities	0.22		0.35		0.07	
Blacks have the best opportunities	0.53		0.39		0.70	
Most people can generally be trusted	0.32	0.47	0.28	0.45	0.37	0.48
Most people will take advantage of you.	0.53	0.50	0.71	0.45	0.33	0.47
<i>n</i>	420		222		198	



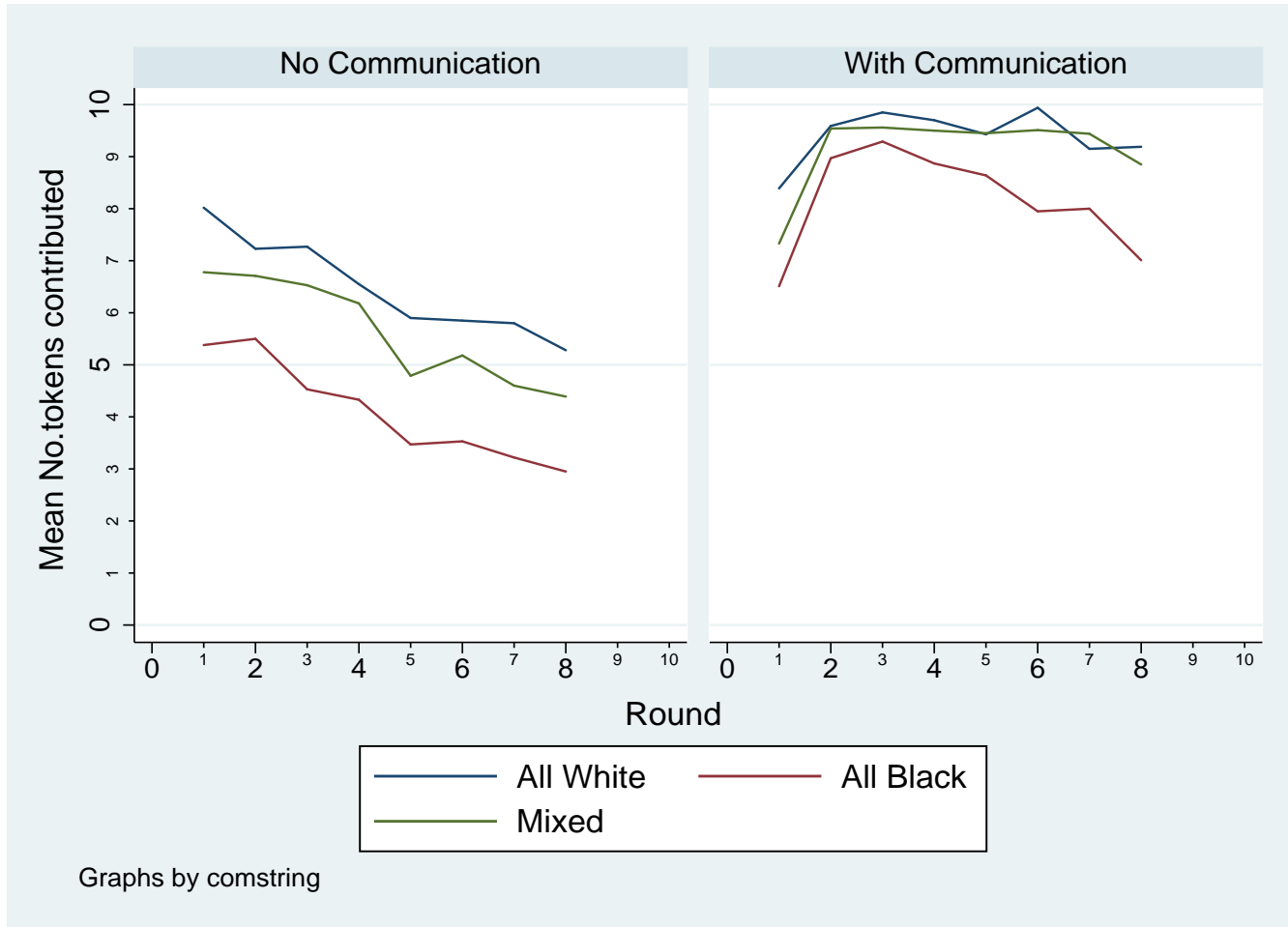


Table 2: Predicting Contributions to the Public Pool (Group Level)

Variable	No Talk	With Talk
Round	-0.38 (0.03)	0.03 (0.03)
All Black group	-2.37 (0.61)	-1.25 (0.43)
Mixed race group	-0.84 (0.56)	-0.26 (0.43)
Constant	8.21 (0.46)	9.27 (0.37)
<i>n</i>	280.00	280.00
Wald	167.00	11.03
χ^2	137.62	46.98
Number of groups	35.00	35.00
Ho: All Black=Mixed race	7.47	6.49

Table 3: Summary Statistics on Institutional Parameters (Group Level)

Descriptive	All White	All Black	Mixed
Fraction who trust	0.33 (0.16)	0.28 (0.18)	0.35 (0.18)
Ethnolinguistic diversity in group	0.31 (0.28)	0.90 (0.08)	0.83 (0.07)
Fraction who collect earnings within a day	0.44 (0.25)	0.52 (0.24)	0.56 (0.27)
Fraction who applied for financial aid	0.12 (0.12)	0.43 (0.20)	0.31 (0.17)
Fraction self-classified family as poor	0.04 (0.07)	0.24 (0.19)	0.19 (0.17)

Table 4: Predicting Contributions: Institutional Effects (Group Level)

Variable	<u>No Talk</u>		<u>Talk</u>	
	Same	All	Same	All
Round	-0.38 (0.04)	-0.38 (0.03)	-0.02 (0.05)	0.03 (0.03)
Fraction in group who trust	3.71 (1.58)	4.25 (1.36)	3.80 (1.11)	2.45 (0.85)
Ethnolinguistic diversity in group	-1.66 (0.82)	-2.07 (0.83)	-1.71 (0.79)	-1.30 (0.66)
Fraction who applied for financial aid	-2.69 (1.62)	0.07 (1.33)	-0.15 (1.11)	-0.16 (0.85)
Constant	7.41 (0.78)	7.24 (0.75)	8.82 (0.61)	8.91 (0.58)
<i>n</i>	160.00	280.00	176.00	280.00
χ^2	52.05	124.95	19.52	42.91
Number of groups	20.00	35.00	22.00	35.00

Table 5: Predicting Contributions: Institutional Effects (Individual Level)

Variable	<u>No Talk</u>		<u>Talk</u>	
	Same	All	Same	All
Round	-0.39 (0.04)	-0.38 (0.03)	-0.02 (0.03)	0.03 (0.02)
Individual is trusting	0.68 (0.39)	0.66 (0.30)	0.55 (0.22)	0.50 (0.19)
Ethnolinguistic diversity in group	-2.70 (0.78)	-1.97 (0.77)	-1.98 (0.75)	-1.30 (0.66)
Individual applied for financial aid	0.02 (0.48)	-0.74 (0.33)	0.25 (0.21)	-0.13 (0.20)
Constant	8.51 (0.60)	8.58 (0.62)	9.81 (0.56)	9.53 (0.52)
n	944.00	1648.00	1056.00	1680.00
χ^2	223.07	456.60	116.13	223.95
Number of groups	20.00	35.00	22.00	35.00

Table 6: Mean Communication Levels by Round

Sample	Individual Frequency	Individual Length	Length of Intervention	Group Total	Silence Length
All	0.85	6.07	3.59	26.79	3.12
Black students	1.06	7.24	4.08	33.55	3.22
White students	0.6	4.46	2.97	17.55	2.98
All White groups	0.48	3.07	2.06	14.6	2.29
All Black groups	1.39	9.35	5.04	40.16	2.94
Mixed race groups	0.64	4.62	3.2	20.89	3.76
Blacks in mixed race groups	0.51	3.21	2.17	20.89	3.76
Whites in mixed race groups	0.77	6.03	4.23	20.89	3.76

Table 7: Predicting Contributions to the Public Pool (Person Level)

Variable	No Talk	With Talk
Round	-0.38 (0.03)	0.03 (0.02)
All Black group	-2.37 (0.61)	-1.25 (0.43)
White in mixed race group	0.11 (0.59)	0.00 (0.45)
Black in mixed race group	-1.8 (0.59)	-0.51 (0.45)
Constant	8.21 (0.45)	9.27 (0.35)
<i>n</i>	1680	1680
All Black=Black in mixed	0.95	3.19
White in mixed=Black in mixed	23.67	3.37

Summary of Group-Level Results

Result 1 *Offers in All Black groups are significantly lower than offers in other groups*

Result 2 *Contributions to the public good are increasing in the level of trust in a group*

Result 3 *Contributions to the public good are declining in the extent of ethnolinguistic diversity in the group.*

Result 4 *Socio-economic status has a negative effect on average contributions to the public pool*

Result 5 *Observable racial identity may convey information about extensive heterogeneity as opposed to homogeneity, especially where race is highly correlated with diversity in other dimensions.*

Result 6 *In same race groups, communication appears to allow individuals to verify heterogeneity.*

Result 7 *Participants in Mixed Race groups, specifically Black participants, only differ in their contribution behaviour relative to participants in same race groups when communication is allowed.*

Summary of Results on Communication

Result 1 *The number of communication interventions is affected by the race of the individual and the racial composition of their group*

Result 2 *The amount of time spent on communication varies according to the race of the individual and the racial composition of the group*

Result 3 *Individual contributions to the public good are increasing in the time they spend communicating with other group members*

Result 4 *Communication impacts individual contributions positively only when a large number of group members participate in the communication process*

Other Issues

Endogenous Trust? Trust (post-game question) is not driven by the game

Measurement of Trust: Behavioural vs survey measure

Real-World Group Effects: if individuals' real-world social networks prime them to behave in certain ways, these effects could be non-linear in other ways. We are in the process of studying such possibilities, using additional network data.

Making more of socio-economic behavioural measure

Table 8: Fraction of Individuals who Contribute Zero

Round	<u>No Communication</u>				<u>Communication</u>			
	White	Black	Mixed	Total	White	Black	Mixed	Total
1	0.03 (0.18)	0.05 (0.22)	0.06 (0.23)	0.05 (0.21)	0.04 (0.19)	0.04 (0.19)	0.08 (0.27)	0.05 (0.22)
2	0.07 (0.25)	0.12 (0.32)	0.02 (0.15)	0.06 (0.24)	0.02 (0.14)	0.04 (0.19)	0.03 (0.16)	0.03 (0.17)
8	0.3 (0.46)	0.33 (0.48)	0.28 (0.45)	0.3 (0.46)	0.06 (0.23)	0.22 (0.42)	0.09 (0.29)	0.13 (0.34)
Total	0.16 (0.37)	0.19 (0.39)	0.13 (0.34)	0.15 (0.36)	0.03 (0.16)	0.07 (0.26)	0.04 (0.21)	0.05 (0.22)

Table 9: Fraction of Individuals who Contribute All Ten Tokens

Round	No Talk				Talk			
	White	Black	Mixed	Total	White	Black	Mixed	Total
1	0.53	0.13	0.38	0.35	0.69	0.32	0.50	0.48
	(0.50)	(0.34)	(0.49)	(0.48)	(0.47)	(0.47)	(0.50)	(0.50)
2	0.45	0.15	0.29	0.30	0.91	0.77	0.88	0.85
	(0.50)	(0.36)	(0.46)	(0.46)	(0.29)	(0.42)	(0.32)	(0.36)
8	0.32	0.02	0.21	0.19	0.91	0.56	0.87	0.77
	(0.47)	(0.13)	(0.41)	(0.39)	(0.29)	(0.50)	(0.34)	(0.42)
Total	0.39	0.07	0.26	0.24	0.89	0.66	0.85	0.79
	(0.49)	(0.26)	(0.44)	(0.43)	(0.31)	(0.47)	(0.35)	(0.41)