Organizational Behavior and Human Decision Processes 123 (2014) 9–22

Contents lists available at ScienceDirect

Organizational Behavior and Human Decision Processes

journal homepage: www.elsevier.com/locate/obhdp

# Effect of inequality on cooperation: Heterogeneity and hegemony in public goods dilemma

Jane M.Y. Fung, Wing-tung Au *

*The Chinese University of Hong Kong, Hong Kong Special Administrative Region*

ARTICLE INFO

*Article history:*
Received 29 November 2010
Accepted 15 October 2013
Available online 26 November 2013
Accepted by Madan Pillutla

*Keywords:*
Public good
Heterogeneity
Hegemony
Inequality
Self-efficacy

ABSTRACT

We conducted two studies to explain inconsistent findings on the effect of resource inequality based on two properties of heterogeneity: (a) level of inequality and (b) asymmetry of resource distribution. We confirmed that symmetrically heterogeneous groups cooperated less than homogeneous groups did. We also found that larger resource inequality led to less cooperation. More importantly, the effect of inequality was different among groups with different distributions of resources – cooperation declined in groups with a symmetrical distribution of resources but did not decline in groups with a hegemonic distribution. Hegemonic distribution also affected psychological states as resource inequality changed. High endowment members reported higher self-efficacy when distribution was hegemonic than symmetric. However, they also reported more fear of being a sucker in hegemonic groups.



## Introduction

Theoretical models and experimental studies that examine the impact of unequal resources on public goods dilemma (PGD) are aplenty. Nevertheless, their findings do not converge. Some researchers found that heterogeneous groups, in which members have endowments that are different from each other, cooperate less than homogeneous groups, in which members have equal amounts of endowment (e.g., Aquino, Steisel, & Kay, 1992; Cherry, Kroll, & Shogren, 2005). Others argue the opposite and state that heterogeneity fosters cooperation (e.g., Bergstrom, Blume, & Varian, 1986; Chan, Mestelman, Moir, & Muller, 1996). Yet, some suggest that cooperation is invariant across different levels of inequality (e.g., Levati, Sutter, & Van Der Heijden, 2007; Warr, 1983). In this study, we propose that endowment inequality alone is not enough to explain or predict cooperation. Asymmetry of endowment distribution is another property that drives cooperation. In two experiments, we examine the effects of endowment inequality and asymmetry of distribution on cooperation in PGD and discuss the underlying psychological processes.

### *Homogeneity vs. heterogeneity*

PGD studies typically focused on homogeneous groups in which endowments are equally distributed (Van Lange, Liebrand, Messick, & Wilke, 1992; Yamagishi & Sato, 1986). In these homogenous groups, every member in a group has (a) the same amount of endowment, (b) the same impact on the PG for each unit of endowment they contribute, and (c) they are rewarded by the same payoff function. In recent years there has been an increasing focus on heterogeneous groups that endowments are different among members (e.g., Buckley & Croson, 2006; Cress & Kimmerle, 2008; Isaac & Walker, 1988; Marwell & Ames, 1979; Rapoport, 1988; Rapoport, Bornstein, & Erev, 1989; Van Dijk & Grodzka, 1992; Van Dijk & Wilke, 1994; Wit, Wilke, & Oppewal, 1992). In these heterogeneous groups, group members could differ in terms of their endowments (endowment asymmetry) or their rewards (interest asymmetry) (Van Dijik, Wilke, & Metman, 1999). In this study we focus on endowment asymmetry and compare among homogeneous groups and different types of heterogeneous groups. Marwell and Ames (1979, 1980) were the first to suggest that people cooperate less when resources are not equally distributed. Some economic theories, however, predict that inequality should either not affect cooperation (Warr, 1983) or foster cooperation (Bergstrom et al., 1986). In general, empirical findings do show that endowment heterogeneity affects cooperation. Social dilemma studies usually explain this effect by differences in self-efficacy, sense of responsibility, as well as fear and greed (see Kerr, 1983; Van Dijk & Grodzka, 1992; Van Dijk & Wilke, 1995; Wit et al., 1992).

### *Social identity of members in homogeneous and heterogeneous groups*

Differences in cooperation between homogeneous groups and heterogeneous groups could also be explained by members'

* Corresponding author. Address: Department of Psychology, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong Special Administrative Region. Fax: +852 2603 5019.
*E-mail address:* wintonau@cuhk.edu.hk (W.-t. Au).

0749-5978/$ - see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.obhdp.2013.10.010

identification with the group. The group engagement model proposed by Tyler and Blader (2003) compares the resource-based social exchange model (Thibaut & Kelley, 1959) and the identity-based social identity model (Hogg & Abrams, 1988) to understand why people engage and cooperate in groups. The resource-based model predicts that members' cooperation behaviors are shaped by material resources they receive from and the sanctioning risk they face in the group; the identity-based model argues that members' motivation to cooperate come from their identification with the group. The identity-based model is supported by empirical findings in work settings that employees with higher identification with their groups were found to be more willing to work on behalf of their groups and to follow rules and policies (Tyler & Blader, 2001). Similar evidence was also found in the society that taxpayers with greater identification with the nation were more likely to feel commitment to the tax system (Wenzel, 2007).

The process that drives the formation of social identity is developed through valence-sensitive social comparisons, in which people look for intragroup similarities and intergroup differences (Hogg, 2003). In particular, Hogg and Terry (2000) found that demographic homogeneity could strengthen organizational ingroup prototype, social attraction and identification. Along the same line, homogeneity of endowment among group members could accentuate perceived similarity among group members. They are then more likely to self-categorize themselves as in group members. Individuals with high group identity are more group-interest oriented and cooperate more (Tyler & Blader, 2003; Wenzel, 2007). This is consistent with the predictions and empirical findings of previous studies that homogeneous groups have higher cooperation rates than heterogeneous groups (Aquino et al., 1992; Cherry et al., 2005; Marwell & Ames, 1979, 1980).

Interestingly, there is evidence showing that heterogeneity does not necessarily decrease group contribution (Levati et al., 2007; Warr, 1983). Some studies even found an increase of cooperation (Bergstrom et al., 1986; Chan et al., 1996). With reference to the social identity theory, the inconsistent findings could be due to the different types of heterogeneous resource distribution in these studies that affect the self-categorization process of group members and as a result also affect their group identities. Specifically, we argue that there are two properties of heterogeneity: (1) level of inequality and (2) asymmetry of resource distribution. Both properties influence members' psychological factors such as self-efficacy and fear and cooperation behavior.

In the following sections, we will first analyze the inconsistent findings in previous studies from the perspectives of level of inequality and asymmetry of resource distribution. We will explain how they influence group cooperation and psychological factors of individual members. Then, we will present two studies to show differences in cooperation between the two types of heterogeneous group and the psychological differences among members of these groups.

### *Heterogeneity and asymmetry of resource distribution*

Heterogeneity was not consistently defined or operationalized in past studies. Heterogeneous groups were sometimes manipulated by endowment inequality and sometimes by endowment distribution asymmetry. Here we define heterogeneity based on two properties as illustrated in Fig. 1, i.e., (a) level of inequality and (b) asymmetry of endowment distribution. These two properties help us understand mixed findings on heterogeneity in past studies.

### *Level of Inequality*

Level of inequality is the variability of endowments in a group. When every member gets the same endowment, there is no endowment variability; the group is a homogeneous group (the top-most level in Fig. 1). We use the Gini Coefficient (GC), a summary statistic for describing the distribution of income and wealth (Atkinson, 1975), to represent the variability of endowments owned by group members. It is a zero-to-one index that is comparable across groups of any size with magnitude of resources measured in any scale.[1] A larger GC represents a larger inequality in the group. As shown in Fig. 1, GC is always zero for homogeneous groups, while GC ranges from anything larger than zero to one for heterogeneous groups.

In general, previous studies showed that large inequality undermined cooperation. According to Table 1 that describes the findings of these studies, cooperation rates of homogeneous groups were higher than those of heterogeneous groups that had relatively high levels of inequality represented by high GCs.[2] Specifically, heterogeneous groups in Cherry et al. (2005), i.e., [10, 20, 30, 40] (GC = .25), cooperated less than homogeneous groups (i.e., [10, 10, 10, 10], [20, 20, 20, 20], [30, 30, 30, 30], and [40, 40, 40, 40]). Along the same line, Aquino et al. (1992) showed that in a step-level PGD, high inequality groups, e.g., [70,000, 66,000, 14,000, 10,000] (GC = .36), cooperated less than low inequality groups, e.g., [41,000, 40,000, 40,000, 39,000] (GC = .01). They explained that in high inequality groups, high-endowment positions contributed less because they were deterred by being a sucker whereas low-endowment positions also contributed less because of their desire to free ride. These two studies gave strong support to Marwell and Ames's (1979) suggestion as well as our analyses on perceived group membership based on the identity-based social identity model (Hogg & Abrams, 1988) that heterogeneity undermines cooperation.

There were also empirical findings supporting Warr (1983) "no difference" prediction that heterogeneity did not affect cooperation. For example, the group cooperation rate of the heterogeneous groups in Levati et al. (2007), [20, 20, 30, 30] (GC = .07) and that of its corresponding homogeneous groups, [25, 25, 25, 25], were negligibly different. Similarly, Chan et al. (1996) also found that the contributions of their heterogeneous groups with relatively low inequality, [18, 18, 24] (GC = .07), did not deviate from their homogeneous groups (i.e., [20, 20, 20]). These findings illustrated that cooperation rates of heterogeneous groups with lower GCs did not differ significantly from those of homogeneous groups.

Interestingly, heterogeneous groups with relatively high inequality in Chan et al. (1996), [12, 12, 36] (GC = .27) and [9, 9, 42] (GC = .37), did not contribute less than homogeneous groups. Instead, heterogeneous groups contributed more, which concurred with Bergstrom et al.'s (1986) BBV model, but contradicted with the findings of Aquino et al. and Cherry et al. We reason that the contradiction could be due to the asymmetry of endowment distribution in Chan et al.'s study.

### *Asymmetry of resource distribution*

Inequality can be distributed symmetrically or asymmetrically (as depicted in the second level in Fig. 1). We use skewness to measure asymmetry. The skewness of a symmetrically heterogeneous group is zero, which means that the shape of the distribution is symmetric, e.g., [15, 30, 45] or [25, 30, 35]. The skewness of an

[1] There are many choices of summary statistics that can describe resource distribution of a group. Some other popular ones are range, variance, and logarithmic variance. Range is only sensitive to the two most extreme values of a distribution as it measures the distance between them and ignore what are in between. Variance and logarithmic variance measure the average distance between the mean and individuals' endowments. Variance has an obvious drawback of being scale dependent. Although logarithmic variance overcomes this problem, both variance measures are not sensitive to resource transfer from the rich to the poor (Cowell, 1995). We chose GC because it does not have the mentioned drawbacks.

[2] GC values are calculated with Wessa's (2010) online Gini Coefficient calculator.