

# Can Laboratory Experiments Test the Cultural Difference?

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## Abstract

In the study we conducted a meta-analysis of 24 results drawn from 18 papers in the Voluntary Contribution Mechanism public goods game held in two culturally distant regions, namely US and East Asia. We compared the last round contribution rate from the two regions for both 0.5-MPCR and 0.75-MPCR levels as well as the trend and each round's contribution rate specifically for the 0.75-MPCR level. No significant difference of the contribution rate related to previous comparisons was found. We suggested two factors might be responsible for this, one involving the subject pool, and the other involving the framing effect. By gathering data from other research, we bolstered the hypotheses regarding these suspects. In a final analysis, we concluded that testing cultural-dependent economic behaviors in laboratory experiments featured by a comparatively clean context might not be a promising approach; we also recommended possible approaches for further studies.

**Keywords:** cultural difference, public goods, VCM, meta-analysis

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## 1. Introduction

Decades of experimental economic research found that people indeed behaved variously, the phenomenon contradicting the traditional economics' assumption and prediction as a whole. When we endeavor to figure this controversy out, we to a great extent ascribe it to the context, environmentally or socially, where people live in. Given this thought, cultural element is one of core factors that shape this context.

Consider, for example, East Asia and the US, two regions that are physically and culturally distant. East Asia is a sub-region of Asia that can be defined in either geographical or cultural terms. Culturally, it embraces those societies that have long been part of the Chinese cultural sphere,

including heavy historical influence from the Classical Chinese language, Confucianism, Buddhism and Daoism. The influence is also displayed in the style of architecture, traditional music and instruments, holidays, festivals, etc. In terms of countries, East Asia consists of Mainland China, Hong Kong, Taiwan, Macau, North Korea, South Korea, Japan, and Mongolia. If taken the cultural element into account, this region also embraces Vietnamese society.

In the cultural dimension, several theories are raised to explain the difference between East Asia and the US.

#### (1) Collectivism vs. Individualism

Geert Hofstede (1991) proposed that cultures endow individuals with different principles that influence behavior. He argues that one dimension of national culture is measured along a continuum from “collectivism” to “individualism,” defining societies in which the interest of the group prevails over the interest of the individual as “collectivistic”, and those in which the interest of the individual prevails over the interest of the group as “individualistic”. Several other studies bolstered this argument (e.g. Triandis, 1989; Triandis, Bontempo, Villareal, Asai, & Lucca, 1988; Triandis, Leung, Villareal, & Clark, 1985; Markus & Kitayama, 1991).

East Asia is considered to be deeply influenced by collectivistic culture, whereas the US is considered an example of an individualistic culture. If group interests actually do prevail over individual interests, we could see more contribution, namely a higher contribution rate to the group account in the public goods game in East Asia.

#### (2) Holistic vs. Analytic

Nisbett et al (2001) found that East Asians to be holistic, attending to the entire field and assigning causality to it, making relatively little use of categories and formal logic, and relying on dialectical reasoning; Westerners, typically Americans, are more analytic, paying attention primarily to the object and the categories to which it belongs and using rules including formal logic to understand its behavior. And the authors suggested that the origin of differences could be traceable to markedly different social systems.

Under this concept, we could make the same prediction as the previous one that East Asian would contribute more to the group account in the public goods game, given their concern about the entire or holistic system, namely the group in the current situation.

Another issue concerning this study is the social dilemma of how to allocate the limited resource to either public sector or private sector. In economics, a public good is the good that is non-excludable as well as non-rival, meaning that consumption of the good by one individual does not reduce the amount of the good available for consumption by others, and also it is not possible to exclude individuals from the good's consumption.

Non-rivalness and non-excludability may cause problems for the production of such goods.

Specifically, they may lead to instances of market failure, where uncoordinated markets are unable to provide these goods in desired quantities, as some economists argued. These issues are known as public goods problems, and there is a good deal of debate and literature on how significant they are, and on what their solutions might be. From the grandest problem, like the global warming, to the least trivial matter, like building a swimming pool in a community, the dilemma is haunting us, since we have the greatest incentive to free ride but at the same time enjoy the benefits from them, the benefits from preventing the global warming and the relaxing experience from a swimming pool nearby alike. On the other hand, if nobody contributed a penny to the project, no one therefore would enjoy the benefit as a result.

An experimental game that produced variety of results along with a myriad of disputes in this regard is the public goods game. Given its miscellaneous settings, a simple design of it is as follows (John O. Ledyard, 1995): Four male undergraduates from a sociology course are brought to a room and seated at a table. They are each given an endowment of \$5. They are then told that each can choose to invest some or all of their \$5 in a group project. In particular, each will simultaneously and without discussion put an amount between \$0 and \$5 in an envelope. The experimenter will collect the “contributions,” total them up, double the amount and then divide this money among the group. The private benefit from the public good, in this case, is a half the total contribution which is what each receives from the group project. No one, except the experimenter, knows others’ contributions but all know the total. The procedure is implemented and the subjects are paid. The data collected, beyond the description of the experimental parameters, is simply the amount contributed by each individual. Supposing only one participant contributes all his money, namely \$5, into this public donation pool, while others contribute 0. By following this procedure, each participant except the donor would be better off, gaining \$7.5 combined with their previous \$5 endowment, whereas the donor would only be left with \$2.5.

On the ground of the economic/game-theoretic prediction, the one that assumes every individual is rational and selfish in order to achieve the best outcome for themselves regardless of others or the entire group, no rational individual would contribute any money to this public pool, fearing that other might reap them off by free riding, meaning that contributing nothing is the dominant strategy for each participant involving. However, the group would be best off in some sense (taking home \$10 each) if all contributed \$5. Each \$1 contributed yields \$1.50 to the others at no cost to them. From the point of view of this theory, individual self interest is at odds with group interest. Another theory, which is called the sociologic-psychological prediction, is that each subject will contribute something. Although it is hard to find precise statements, it is sometimes claimed that altruism, social norms or group identification will lead each to contribute \$5, the group optimal outcome. From the point of view, there is no conflict between individual and group interests.

The results drawn from a large body of studies so far reveal that neither hypothesis is right or non-perfect at least. Generally, total contributions can be expected to lie between \$8 and \$12, or 40% to 60% of the group optimum. The statement in Dawes and Thaler (1988) is “It is certainly true that there is a ‘free rider problem’ ...On the other hand, the strong free rider prediction, that suggested that individuals would contribute nothing, is clearly wrong .”

This simple example informs us that people, instead of being a rational agent, can not be entirely unfettered from the sociological or psychological influence. To simplify the problem, we would like to employ a typical mechanism in the sphere of public goods game, namely the Voluntary Contribution Mechanism (VCM, thereafter). In order to find sufficient data for the analysis, we apply the meta-analysis as the tool. Meta-analysis is a statistic analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings (Gene V. Glass, 1976).

Given the cultural difference illustrated in both regions and the susceptibility of the public goods game to the cultural influence, we therefore propose the hypothesis that behavior would significantly differs in above regions in the context of VCM public goods game.

## **2. Data collection**

The process of data collection for the meta-analysis could be quite tedious, which requires lots of reading and appropriate criteria for the selection. We first resorted to several literature reviews, then we followed the reference provided in order to gather a large body of papers associated with Voluntary Contribution Mechanism public goods game, and besides we consulted several scholars for their insights on this issue and whether they could offer the relevant literature and whether they were aware of any additional studies, in particular in another country. We also used the available search engines, like Google Scholar and several data base in the purpose of sufficient search of papers.

This procedure resulted in a long list of studies. For reasons of comparability and simplicity, we have chosen to restrict the analysis to results of the standard VCM public goods game. In experimental settings, the standard VCM games need to satisfy several criteria: the linear payoff function, the dominant strategy featured by contributing nothing, the efficient strategy featured by all participants contributing every endowment (these above two features could be guaranteed if the MPCR is less than one, meaning that this benefit generated from the group account by contributing one token could not overpass the benefit from leaving the one token in the private account.) and plus the experimental environment is under strict control, meaning that there is communication between each participant, and participants would not know each other's contribution amount to the group account. Due to the data in hand, we mainly focus on two levels of MPCR, namely 0.50 MPCR and 0.75 MPCR. This consideration is based on the sample size of the data, and the fact that different MPCR could significantly influence participants' contribution rate.

Restricting our database to studies that fit the above descriptions excluded a large number of studies in which subjects play some variation of the standard VCM public goods game. Despite of exclusion of these deviating studies, there remains variation in the precise designs of the experiments. This variation is related to the following aspects.

(1) In some studies, the MPCR is not precisely 0.5 or 0.75. For example, the study conducted by

Saijo (1995) was performed under the setting of 0.7 MPCR. However, based on the previous studies of MPCR influence, this minor deviation has no significant effect on participants' contribution rate. And hereby, we could still include results from these studies into our further analysis (We marked with an asterisk the studies entailed a minor deviation on the level of MPCR).

(2) Our selected studies included both partner condition and stranger condition. In some studies, authors found that under partner condition, the contribution rate was lower, whereas others found the opposite results. Plus, some authors concluded these conditions had an effect on the contribution rate based on their research. Therefore, in our analysis, we did not differentiate these mentioned conditions.

(3) In some studies, participants only played the game once, and in other studies they played the game following an infinitely repeated fashion, typically with 10 rounds. Theoretically speaking, the contribution rate of the last round of the infinitely repeated games is equivalent to the one in the one-shot game, given the same strategy the participants could apply. Thus, these data from respective condition is comparable. Specifically, in the MPCR 0.5 condition, we only accumulated the last round contribution rate of the infinitely repeated game and the contribution rate from the one-shot game, since we could not gather enough data from the studies of the infinitely repeated games.

The search procedure together with the selection criteria resulted in 18 papers. All the papers are bounded by the criteria of standard VCM public goods games. 14 papers are from the US, and 4 papers are from East Asia. Together 18 papers generated 15 results for the 0.5 MPCR condition with 12 from the US and 3 from East Asia; and 9 results for the 0.75 MPCR condition with 7 from the US and 2 from East Asia (several papers include more than one result as they present outcome from more than one independent group of participants.)

Table 1. Selected parameters for experiments included in the meta-analysis

Author(s)	Year	Period	Group	MPCR	Region
Andreoni	1988	10	5	0.5	US
Andreoni	1995a	10	5	0.5	US
Andreoni	1995b	10	5	0.5	US
Croson	1996	10	5	0.5	US
Keser et al	1996	25	4	0.5	US
Houser	2002	10	4	0.5	US
Anna	2001	10	4	0.5	US
Carpenter	2002	10	4	0.5	US
Carpenter	2005	1	4	0.5	US
Saijo	2004	1	4	0.5*	Japan
Mariah	2005	8	2	0.75	US
Isaac	1988b	10	4	0.75	US
Isaac	1994	10	4	0.75	US
Fisher	1995	10	4	0.75	US
Sell	1991	10	4	0.75	US
Saijo	2004	1	4	0.75*	Japan
Mariah	2005	8	2	0.75	China
Saijo	1995	10	7	0.75*	Japan

Note: \* Indicates a minor difference

### 3. Statistic results

We respectively ran analysis on the two levels of MPCR. Firstly, we compared the data generated from the 0.75-MPCR level. Since the data allowed us for a full analysis on each round, we depicted the trend of the contribution rate of the 10-round repeated games with the data from the US and East Asia.

Note that the trend, of the US and of East Asia alike, repeated previous results of a large body of research under the same setting and standard. The initial contribution rate was within the range of 50% and 55%. Then the rate decreased gradually, and closed around 25 % to 30 % at the last round (see Figure 1).

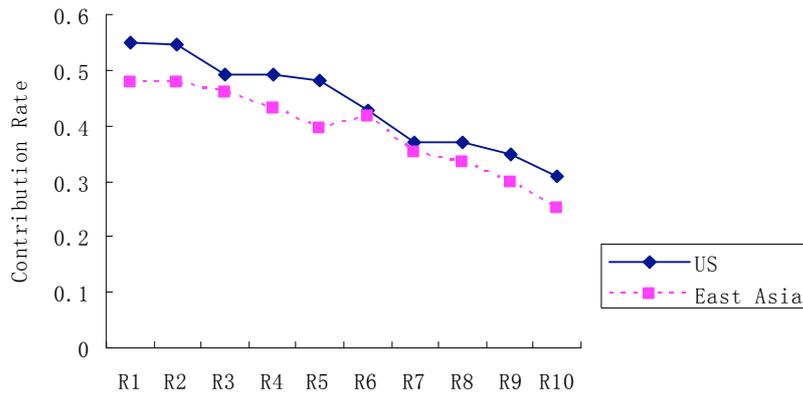


Figure 1. Average contribution for both regions

We applied the data into a series of statistic analysis, and found that they met the preconditions required by the t-test, including the independency of the each sample and the homogeneity of the variance suggested by the Levene statistic. Since we were not informed of whether the distribution of the population satisfied the normality assumption, we firstly supposed this assumption was guaranteed in order to run the t-test, then we also conducted Mann-Whitney U test, a non-parametric analysis, which was free from the above preconditions required by the t-test.

The result from the t-test revealed that there was no significant difference of the last round contribution between the US and East Asia [ $t=1.684$ ,  $p = .224$ ; 0.31 vs. 0.275]. In the Mann-Whitney U test, the result was repeated [ $U= 3$ ,  $p = .236$ ]. We further analyzed contribution rate of each round, still no significant results were manifested.

We also tested the last round's contribution rate accumulated from the 0.5-MPCR studies with Mann-Whitney test, given that these data did not meet the t-test's precondition. The result again maintained [ $U= 11$ ,  $p = .312$ ; 0.159 vs. 0.207].

#### 4. Discussion

The results were extremely surprising, given the obviously cultural influence on individuals' behavior. Based on the assumption that cultural influence could manifest itself on individuals' explicit behaviors, we could easily reason that if we compared the behavior, which was dependent on the culture, in two culturally different regions, and then we would see a difference regarding this particular behavior. Since the result did not support this assumption, several suggestions might be raised to explain it. A comparatively small sample size might be one of the reasons. Note that there were only 4 papers from East Asia. So it is possible that this small body of data could not represent the whole population of East Asia. However, the study with a larger sample of data in the context of Ultimatum Games from East Asia and other countries conducted by Oosterbeek et al (2004) still revealed that there was no difference of people's behavior from culturally different regions. In their study, they manipulated several cultural factors into numerical index, including

the individualism-mechanism dimension. They found no significant relations between individuals and the indexes.

According to the reasoning, could we conclude that the cultural difference does not affect people's behavior in the context of economic games? Not yet. Several studies indeed found the difference on behaviors of individuals living in different societies. Henrich and colleagues in their paper, entitled "Economic man" in cross-cultural perspective: behavioral experiments in 15 small-scale societies (2005). They found considerable variability across groups from a broad range of living styles, economic systems and social norms.

By comparing previous studies and the Henrich et al's study, we found two substantial differences: the subject pool and the context, namely the framing. In terms of the former, we notice that in previous studies, the participants were predominantly college students, of whom are economics major students. As students, we could simply find a globalization trend in today's education. Take an economics major student for example. No matter where he or she lives, the Economics 101 textbook would be by great chance the ones written by Paul Samuelson or G. Mankiw, then as he or she ascends the learning process in economics, he or she is highly possible to gain the same knowledge about economics under the same framework, namely the neoclassic. Besides, when it comes to the students' daily life, we would see the same picture, study during weekdays, hang out with friends at weekends, cram the head at the final exams and compete with each other academically and socially. Providing these above phenomena are true, we could argue that it is the subject pool, which are mainly composed of assimilated college students, that is responsible for the non-difference in this particular behavior.

Another difference involves the experimental context, in another word, the framing effect. The term was officially proposed by Kahneman et al (1979) as one component of prospect theory. In this theory, framing means the manner in which a rational choice problem has been presented. There are two kinds of framing, one is the verbal framing, featured by the verbal cues given in the descriptions of experiments, and the other is the social framing, which embraces a broad range of scenarios, such as interpersonal relationship, working environment etc.

Tversky and Kahneman (1981) demonstrated systematic reversals of preference when the same problem is presented in different ways, for example in the "Asian disease" problem. Participants were asked to "imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume the exact scientific estimates of the consequences of the programs are as follows."

The first group of participants was presented with a choice between two programs: (1) Program A: "200 people will be saved" (2) Program B: "there is a one-third probability that 600 people will be saved, and a two-thirds probability that no people will be saved" .72 percent of participants preferred program A (the remainder, 28 percent, opting for program B).

The second group of participants was presented with the choice between: (1) Program C: "400

people will die” (2) Program D: “there is a one-third probability that nobody will die, and a two-thirds probability that 600 people will die”. In this decision frame, 78 percent preferred program D, with the remaining 22 percent opting for program C.

However, programs A and C, and programs B and D, are effectively identical; a change in the decision frame between the two groups of participants produced a preference reversal, with the first group preferring program A/C and the second group preferring B/D.

In a typical economic experiment using certain economic game, the framing to a large extent is merely concerned about the verbal one. Moreover, in order to make sure that the experimental dependents are only manipulated by certain independents that we want to investigate, the experiments are normally under strict control therefore rendering them away from a real-world social framing. A typical verbal framing in an experiment is as follows (Goeree et al, 1999):

“In this experiment you will be asked to make a series of choices about how to allocate a set of tokens. You and the other subjects will be randomly assigned to groups, and you will not be told each others’ identities. In every choice you will be told how many people are in your group. In each choice you will have 25 tokens you wish to allocate. You must choose how many of these tokens you wish to keep and how many tokens you wish to invest. The amount of money that you earn depends on how many tokens you keep, how many tokens you invest, and how many tokens the others in your group invest.”

When it comes to cultural influence on behavior, we argue that the effect would not reveal itself unless the framing, in particular the social framing, reaches some baseline, meaning that the cultural influence is based on a real-world situation. As for the laboratory experiments, there is hardly any social framing, and even the mere verbal framing is artificial and clean, stimulating no connection with the real life situation, let alone to see a culturally influenced behavioral results.

## **5. Redirection**

Based on above reasoning, we generated two explanations: (1) the experimental environment is clean, ruling out the possibilities of real life connection; (2) the students are already assimilated by the similar education and increasing globalization. We also proposed several approaches to better clarify this issue regarding which hypothesis has more credits. The simplest one is to let college students play the similar economic games but with more real life framing, by manipulating the verbal framing. If significant difference is discovered, we might primarily conclude that the framing might play a vital role other than the student pool; if not, then the student pool might bias the results.

Although we could not find exact the same approach as we suggested, yet we found other evidence. A basic method to study the framing effect is to present the same problem with distinct frames to a common subject pool, and then compare the results for the framing effects. Many experiments on the effect of framing have been conducted in the context of a voluntary

contribution game. Elliott et al. (1998) conducted a two stage experiment in which the first stage frames the free riding problem in terms of autonomous business standards or teamwork and the second stage is a voluntary contribution game. They showed that cooperative work frames elicit more cooperation. In the dictator game, Eckel and Grossman (1996) found that subjects behave more generously toward a partner described as the Red Cross than a partner described as an anonymous student. In the ultimatum game, Hoffman et al. (1994) showed that changing the instructions so that participants were called buyers and sellers (i.e. adding a market frame) significantly reduces offers. Other related experiments include Willinger and Ziegelmeyer (1999), Park (2000), and Cookson (2000).

Although, these results do not offer direct evidence regarding our previous question, namely whether we could find the culturally influenced behavior by manipulating the verbal framing to be more realistic, they indeed demonstrated that the change even in the verbal framing could modify the results of people's behaviors.

Several other researches, on the other hand, shed insights on the subjects' bias by comparing the students' and non-students' behavior in a series of economic games. Gaechter (2004) found that students showed a lower bound of trust, whereas non-students both contributed more and had more trusting attitudes; Cardenas (2004) used the common pool resource game to investigate students' and non-students' cooperative behavior and found that the villagers cooperated significantly more than students in the baseline situation. Carpenter (2004) found that fishermen in Japan contributed more than students did in the Ultimatum Game. Moreover, in his 2005 paper, Carpenter compared US students and non-students in the Ultimatum Game and the Dictator Game respectively. The results revealed that Kansas students offer more in the UG, while in the DG, Kansas workers allocated more. These studies suggested that the student subject pool might lack representative in the entire population, although they did not render a direct answer towards the question whether the subject pool or the framing effect is responsible for the no-difference of behavioral results.

## **6. Conclusion and Future work**

The current study aiming to test the cultural influence on certain cultural-dependent economic behavior by using a meta-analysis found there was no difference, contradicting the initial predications. By reviewing a series of literatures, we suspected that two factors might be responsible for this matter, namely the subject pool and framing effect. Since there is no direct evidence regarding whether either of explanations or both have contributed to the no different results, we propose several approaches to further clarify the question. One way to fulfill this job is to introduce a more realistic experimental environment with students from culturally different regions. If significant difference is discovered, we might primarily conclude that the framing might play a vital role other than the student pool; if not, then the student pool might bias the results. Besides, in order to enhance the results, experiments with other economic games should be taken into account.

One certain conclusion so far is that the student pool lacks representativeness when it comes to the cultural-dependent behavior measurement in the entire population. Therefore, as a complement, future study on the cultural influence regarding economic behaviors could be conducted on the field-study base.

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