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DOES THE COSTLESS IDENTIFICATION OF CONTRIBUTORS AFFECT THE INTUITIVENESS OF PROSOCIAL BEHAVIOR?

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ABSTRACT

Introduction/ Main Objectives: This study investigates whether relaxing the assumption of the non-anonymity of participants in an experiment of a finitely repeated public-good game with randomly matched players affects the intuitiveness of prosocial behavior. **Background Problems**: Various studies show that, in general, participants of social dilemma game experiments tend to be intuitive in choosing prosocial behaviour, whereas non-cooperative behavior tends to be slow. Other studies show that experiments which induced the non-anonymity of participants promote prosocial behavior, however, these studies did not impose non-anonymity on the participants. **Novelty**: This study aims to fill the literature gap on whether introducing non-anonymity of participants in a social dilemma game experiment may affect the intuitiveness of prosocial behavior. **Research Methods**: This study used a laboratory experiment of finitely repeated public-good games with randomly matched players in each stage. The main difference between the control and the treatment groups lay in the anonymity of participants in the interaction, where participants in treatment group are exposed to the photo of their opponent. **Finding/Results**: The results show that relaxing the anonymity setting improved the participants' contributions to the public-good game; however, their prosocial behavior became less intuitive than non-cooperative behavior. **Conclusion**: This paper demonstrated an attempt to fill the gap in the literature between the intuitiveness of prosocial behaviour and the role of identity in prosocial behavior.

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INTRODUCTION

Cooperation plays a crucial role in human interactions. One question which has attracted the attention of many scholars for several decades is whether prosocial behavior is intuitive. Individuals tend to be quicker at making prosocial decisions, as opposed to antisocial decisions, whereas non-cooperative or antisocial behavior requires substantially more time to make. A decision is intuitive if the time required for an individual to decide is less than the median response time (MRT) of his/her group's response time. One approach to studying the phenomenon is by conducting experiments using economic games without any manipulation[1]. The other approach is to conduct them with some form of manipulation, in this case by limiting the time for the participants to make decisions[2].

In both approaches, the results of the experiments are mixed. The results from laboratory experiments using economic games without manipulation show that prosocial behavior tends to be intuitive (Brañas-Garza, Meloso and Miller, 2012, Cappelen *et al.*, 2016, Galloti and Grujic, 2018, Lotito, Migheli and Otona, 2013, Nielsen, Tyran, and Wengström, 2014, Nockur and Pfattheicher, 2020, Rubinstein, 2007, 2016, Yamagishi *et al.*, 2017). Piovesan and Wengström, (2009) conducted experiments in three countries involving 2,500 participants and their results do not support the hypothesis of the intuitiveness of prosocial behavior.

Results from experiments in social dilemma games with manipulation show that the MRT is shorter for deciding on prosocial behavior (Chen and Krajbich, 2018, Crosetto and Güth, 2021, Fromell, Nosenzo and Owens, 2020, Gärtner, 2018, Isler, *et al.*, 2021, Kvarven, *et al.*, 2020, Rand, Greene and Nowak, 2012, Rand and Kraft-Todd, 2014, Rand *et al.*, 2014). Nevertheless, some studies using a similar approach show conflicting evidence (Belloc, *et al.*, 2019, Broizina and Guilfoos, 2018, Kirchler, *et al.*, 2017, Lohse, Goeschl and Diederich, 2018, Merkel and Lohse, 2019, Tinghög, *et al.*, 2013).

The intuitiveness of prosocial behavior implies that human intuition tends to direct people's behavior in favor of decisions that benefit others, rather than only benefiting themselves with no benefit for the others. All the studies mentioned above have been conducted based on a setting where the participants were randomly matched anonymously. They did not know who their partners were, although they were supposed to interact with them in the experiment. In short, intuitive cooperative behavior has been analyzed within an anonymity setting.

In a real-life situation, however, complete anonymity may not necessarily occur in day-to-day interactions. Commonly, people have a prior relationship with others and this relationship may influence their current and future strategic decisions. Social relationship factors may be explained from various perspectives, including anthropology (Fiske, 1991), psychology (Bugental, 2000) as well as in experimental economics (Fehr and Schmidt, 1999, Fiddick and Cummins, 2007).

The canonical approach of economics suggests that individual behavior follows self-interest utility, thus group identity does not

[1] See, Brañas-Garza, Meloso and Miller, 2012, Capelen *et al.*, 2016, Galloti and Grujic, 2018, Lotito, Migheli and Otona, 2013, Nielsen, Tyran, and Wengström, 2014, Nockur and Pfattheicher, 2020, Piovesan and Wengström, 2009, Rubinstein, 2007, 2016, Yamagishi *et al.*, 2017, among others.

[2] See Belloc *et al.*, 2019, Broizina and Guilfoos,2018, Chen and Krajbich, 2018, Crosetto and Güth, 2021, Fromell, Nosenzo and Owens, 2020, Gärtner, 2018, Isler, *et al.*, 2021, Kirchler, *et al.*, 2017, Kvarven *et al.*, 2020, Lohse, Goeschl and Diederich, 2018, Merkel and Lohse, 2019, Rand, Greene and Nowak, 2012, Rand and Kraft-Todd, 2014, Rand *et al.*, 2014, Tinghog *et al.*, 2013, among others).

influence individual behavior. Akerlof and Kranton (2000, 2002, 2005) and Kranton (2016) argued that group identity plays a crucial role in economic activities. Several experimental studies have investigated the role of identity and the non-anonymity of individuals in prosocial behavior, when the individuals are exposed to social dilemma games (see Andreoni and Petrie, 2004, Charness, Rigotti and Rustichini, 2007, Chen and Chen, 2011, Croson, Marks, and Snyder, 2008, Eckel and Grossman, 2005, Goette, Huffman and Meier, 2006, Kreitmair, 2015, Rockmann dan Northcraft, 2008, Samek and Sheremeta, 2016, van Zant and Kray, 2014, among others).

Several studies show the improvement in prosocial behavior by individuals who were associated with the same identity, although the experiments have been conducted based on the anonymity of the participants (Chen and Chen, 2011, Lankau, Bicskei, and Bizer, 2012). The other studies were conducted by introducing a minimal cue to the participants and found that observing the opponents improved the prosocial behavior of the participants in the social dilemma games (Andreoni and Petrie, 2004, Croson, Marks, and Snyder, 2008, Kreitmair, 2015, Samek, and Sheremeta, 2016, van Zant and Kray, 2014).

Human behavior, in the context of social relationships, may imply a variety of ways, not only in scientific terms. Particularly in the public-good game (PGG), this scheme is commonly found in various interactions in social life. The PGG may explain interpersonal relationships both in micro and macro contexts. In the context of macroeconomics, one of the fields represented by the public-good game is taxation. In the context of microeconomics, the role of social capital during a natural disaster may be used as an example for the implementation of the PGG. During the COVID-19 pandemic, online-based social capital, such as SONJO (Sambatan Jogja) in Yogyakarta, Indonesia, flourished (Ghuzini, 2022, Nugroho and Siwage, 2021, Pradiptyo and Wigita, 2021). Even though the members of the online social capital group have coordinated and helped each other intensively for several years, they may not necessarily have known or met each other physically. Indeed, human interaction, as represented by the PGG, is not necessarily either anonymous nor does it provide complete information, but there are variations among both circumstances.

This study's aim is to investigate the role of information, in terms of facial recognition, in the intuitiveness of prosocial behavior using a laboratory experiment in a finitely repeated PGG with randomly matched players in each stage. The experiment is conducted without the use of manipulation. A literature survey and theoretical prediction will be discussed in Section 2. Section 3 discusses the experimental design. The discussion of the findings and concluding remarks will be presented in sections 4 and 5, respectively.

LITERATURE REVIEW

The problem of how individuals choose strategies in social dilemma games remains an endless puzzle. In this section, we will discuss the role of identity in prosocial behavior and the intuitiveness of prosocial behavior. The former (the role of identity) aims to analyze the role of the identity of the participants in the likelihood to contribute and the intensity of their contribution or prosocial behavior toward the social dilemma games. The latter (the intuitiveness of prosocial behavior) focuses on the speed at which individuals made decisions in social dilemma games.

1. Does Identity Matter when Playing Social Dilemma Games?

The canonical analysis in economics does not incorporate the identity of the economic agents as a factor which influences their behavior. Akerlof and Kranton (2000, 2002, 2005) pioneered the economic analysis of identity, which has implications for education, the labor supply, consumption, and work effort. Kranton (2016) evaluated the development of the economics of identity in several sectors.

The standard procedure for conducting experiments in economics is based on the approach that the interaction among the participants has been done in an anonymous fashion. Nevertheless, this approach may not represent day-to-day interactions, in which interactions are carried out without complete anonymity. Several studies using laboratory experiments relax the anonymity axiom and induce group identity for the participants (see Andreoni and Petrie, 2004, Charness, Rigotti and Rustichini, 2007, Chen and Chen, 2011, Chen and Li, 2009, Croson, Marks and Snyder, 2008, Eckel and Grossman, 2005, Goette, Huffman and Meier, 2006, Rockmann and Northcraft, 2008, Samek and Sheremeta, 2016, van Zant and Kray, 2014, among others).

Eckel and Grossman (2005) designed an experiment on common group identity and concluded that it induced a higher level of cooperation in the PGG. Goette, Huffman, and Meier (2006) reported a similar pattern in their experiment of prisoner's dilemma games, where the dominant strategy is to be a free rider all the time, or deviate from cooperation. Charness, Rigotti and Rustichini, (2007) conducted an experiment in the battle of the sexes and found that identity might improve coordination among the subjects.

The social identity that has been placed on the corner of cooperative behavior is not systematically stable. Chen and Li (2009) argued that social identity would increase the reciprocity among subjects in an experiment. They also reported that there is a tendency to make decisions based on social welfare maximizing choices, particularly when the subjects who shared common identity interacted to play the game. Inspired by this finding, Lankau, Bicskei, and Bizer (2012) investigated whether the individual preference to cooperate to provide the public good may be stable due to the institutional presence. The setting of their experiment accommodated characteristics of social identity by allowing the subjects to obtain background information of the other subjects in the experiment.

Chen and Chen (2011) reported that a common group identity might enhance coordination for a dominant equilibrium payoff in an experiment using the minimum effort game, if that common group identity is salient. To create such a salient condition, the subjects were allowed to communicate with their partners to solve a group task by matching a list of paintings with the painters. In the case that the subjects did coordinate to help one another in this phase, it was predicted that they might behave in a strikingly equivalent way in the minimum effort coordination game.

In real-life situations, however, social identity information may not necessarily be available for people whenever they interact with other individuals. Interactions are often done in a face-to-face context, usually a minimal one like the interaction between buyers and sellers in a market or during the time spent waiting for traffic lights to change. On this occasion, the amount of information exchanged about the other individual(s) identity is minimal. In relation to this context, several studies show that this type of interaction promotes a positive social attitude such as honesty (e.g. Citera *et al*. 2005, Rockmann and Northcraft, 2008, Swaab *et al.* 2012, van Zant and Kray, 2014) and coordination (Andreoni and Petrie, 2004, Charness, Rigotti, and Rustichini, 2007, Chen and Li, 2009, Chen and Chen, 2011, Kreitmair, 2015), which is against the results of previous experiments based upon an anonymous context. Even with a minimalistic interaction, van Zant and Kray (2014) found that a face-to-face interaction promotes honest behavior among the participants. Walther (1992, 1995) argued that these prosocial behaviors are affected by the presence of auditory and visual cues of the partner, which are transmitted as social information to the other person. This type of interaction is also considered more efficient in the bargaining context, relative to a computer terminal communication (Roth and Murninghan, 1982).

Visual cues are important as a type of information since visual anonymity generates a depersonalization impression of the partner (van Zant and Kray, 2014). Andreoni and Petrie (2004) conducted a public-good experiment and compared how group contributions are affected by the amount of identity information exposed to each member. Each subject plays several rounds within a group before switching to another group. They found that revealing the photos of all the members within the group in each experiment had a significant effect on each member's contribution. In another study, minimal context interaction was found to affect promoting contributions using a silent identification (Bohnet and Frey, 1999). Nevertheless, there is the possibility of a conditional retaliation effect that explains why people tend to cooperate in a repeated game, due to their expectations of future material rewards (Fehr and Gatcher, 2000; Fischbacher and Gatcher, 2010; Chaudhuri, 2011).

2. Thinking Fast and Prosocial Behavior

Another conjecture that attracts the attention of many scholars is that prosocial behavior tends to be intuitive. Rubinstein (2007, 2016) found that the MRT of the participants in choosing the prosocial or cooperative strategies in several social dilemma games is significantly shorter than that of the antisocial behavior. Several laboratory experiments on the PGG confirm this finding: The subjects' MRT of prosocial behavior tends to be shorter than that of antisocial behavior (Lotito, Migheli and Otona, 2013, Nielsen and Wengström, 2014). Similar findings have been found for experiments on prisoners' dilemmas (Galloti, and Grujic, 2019), the dictator game (Cappelen, et al., 2016, Yamagishi, et al., 2017), the ultimatum game (UG) and the Yes or No game (YNG) (Brañas-Garza, Meloso, and Miller, 2017). Data from experiments on a large scale, with the sample being the adult population of Denmark, have been used by Cappelen, et al., (2016) and Nielsen and Wengström, (2014) and the results support the intuitiveness of prosocial behavior.

Despite the overwhelming evidence above, a study by Piovesan and Wengström, (2009), using data from an experiment employing a modified dictator game, found that the participants tended to choose strategies which would maximize their own payoffs. The study also found that the median response time of private payoffs to maximize choice tended to be shorter than the time taken to maximize the social preference choice. A study by Brañas-Garza, Meloso, and Miller, (2017) showed that the response time varies in different games. This study found that the MRT of the UG tends to be longer than that of the YNG. It should be noted that the UG tends to be risky, whereas the YNG tend to have no risks, which implies that the results of Brañas-Garza, Meloso, and Miller,

(2017) show there is a positive correlation between strategic risk and introspection.

It should be noted that all the studies above used economic games without manipulation. Similar studies, which use manipulation in terms of pressure created by the short time allowed to make decisions, found the intuitiveness of prosocial behavior (Chen and Krajbich, 2018, Crosetto and Güth, 2021, Fromell, Nosenzo and Owens, 2020, Gärtner, 2018, Isler, *et al*., 2021, Kvarven et al., 2020, Rand, Greene and Nowak, 2012, Rand and Kraft-Todd, 2014, Rand et al., 2014). Tinghög et al., (2013) conducted an experiment in three countries, involving 2,500 subjects, which examined the method used by Rand, Greene and Nowak (2012).

In contrast to the previous study, Tinghög *et al*., (2013) reported that the findings of experiments in three countries did not support the hypothesis that prosocial behavior is intuitive. Furthermore, Tinghög *et al*., (2013) pointed out some bias in the Rand, Greene and Nowak (2012) study, which excluded subjects who failed to make decisions within the time windows set by the researchers. Other experiments with time pressure as a manipulation that do not support the hypothesis of the intuitiveness of prosocial behavior have been conducted by Belloc et al., (2019), Broizina and Guilfoos, (2018), Kirchler, *et al*., (2017), Lohse, Goeschl and Diederich, (2018), and Merkel and Lohse, (2019).

To this point, the knowledge of how people interacted with open identity information is still limited. This is the gap in the PGG experiment that this paper fills. Identity is defined by revealed subject information and visual cues are examined to show whether such a treatment may cut the response time and induce the likelihood of cooperation in this setting.

3. Theoretical Prediction

The traditional PGG consists of N players and a finite timespan. Each player has an equal initial endowment E. Each one simultaneously decides how much of his/her endowment to allocate as a contribution for the public good, and the amount that they keep for themselves. PU_a and PR_a denote the contribution to the public good and the amount kept by player a, respectively. To satisfy the budget constraint of player a, $PU_a + PR_a = E$. The utility or payoff of player i is $u_i(PR_i, PU)$, where PU is the total amount of public good provided by N players; $PU = \sum_{k=1}^{N} PU_k$. The utility function u is defined as:

$$u_i(PR_i, PU) = E + \frac{\gamma \sum_{k=1}^{N} PU_k}{N} \quad \text{(eq.1)}$$

The term γ is the rate of return of the public good relative to the private good, also known in the literature as the marginal per capita return to public consumption (MPCR). We set the value of γ to be greater than one but less than N to reflect value generation from public good investments. Player s's maximization problem is given as follows:

$$\max_{PU_I, PR_i} u_i(PR_i, PU) = E + \frac{\gamma \sum_{k=1}^{N} PU_k}{N} - PU_i \quad \text{(eq.2)}$$

subject to $PU_i + PR_i = E$, $PU_i \geq 0$, $PR_i \geq 0$

To simplify things, we assume a design where $N = 2$ for each round, while each participant will only have a set of two strategies for each round, a low contribution (C_L) and high contribution (C_H) strategy, where $0 \leq C_L < C_H < E$ for all the rounds. The amount of C_L for the first and second participant is identical, so is C_H. Under this design, the following table demonstrates the payoff matrix for both players.

Table 1: The Payoff Matrix of Finitely Repeated Public Good Game

	Player B (C_L)	Player B (C_H)
Player A (C_L)	$E + \frac{\gamma}{2}(C_L + C_L) - C_L$, $E + \frac{\gamma}{2}(C_L + C_L) - C_L$	$E + \frac{\gamma}{2}(C_H + C_L) - C_L$, $E + \frac{\gamma}{2}(C_H + C_L) - C_H$
Player A (C_H)	$E + \frac{\gamma}{2}(C_H + C_L) - C_H$, $E + \frac{\gamma}{2}(C_H + C_L) - C_L$	$E + \frac{\gamma}{2}(C_H + C_H) - C_H$, $E + \frac{\gamma}{2}(C_H + C_H) - C_H$

Under this payoff matrix, for values where $1 < \gamma < 2$, making low contributions would be a strictly dominant strategy for both players. Thus, the Nash equilibrium would be for both players to make a low contribution, which is contrary to the Pareto efficient allocation of both contributing a lot. If the public-good game above is played repeatedly for a finite number of periods, only sub-game perfect equilibrium can be reached by playing the Nash equilibrium in every round.

EXPERIMENTAL DESIGN

We recruited participants for a pooled sample from undergraduate students of the Faculty of Economics and Business, Gadjah Mada University, Indonesia. There were 159 subjects registered for the pooled sample. In this sample pool, three batches of 2^{nd}, 3^{rd} and 4^{th} year students were recruited. We did not include 1^{st} year students in our sampling frame as they may not know good enough their peers and their seniors.

In order to eliminate the participation bias, of the 159 subjects in the pooled sample, two-thirds of the subjects (108 individuals) were chosen at random to participate in the experiment. In order to be registered as a pooled subject, each individual had to fill out a consent form (see Appendix A). Of the 108 participants, 54 participants (50%) were randomly assigned to the control group and the rest were assigned to the treatment group. The experiment's instructions were given to all the participants twice: When they were informed that they had been chosen to be in the pooled sample, and again when they attended the experiment (see Appendix B). Due to laboratory limitations, we limited the sub-group size to 18 persons in every experiment's session. In total, we had six sub-groups, namely three control and three treatment sub-groups, each with 18 participants.

The sampling frame was used to ensure that all the participants, particularly in the treatment group, had some level of acquittance when their identities (name and photos) were exposed to the other players during the experiment. All the participants were required to fill out an online form containing their identity and a full face photograph (see Appendix C).

Essentially, the overall design of this experiment consisted of the PGG experiment with treatment and control groups. The main difference between the control and the treatment groups lay in the anonymity aspect of the interaction between the players. While interaction in the control group was kept anonymous, players in the treatment group did have access to the photos and names of their respective partners during each session of play. The photo was shown for 60 seconds along with the decision-making strategies (see Appendix C).

Prior to the experiment, all the participants were given an instruction sheet, and a pre-recorded PowerPoint presentation on how the game should be played and how their payment would be determined (see Appendix B). A practice session consisting of three rounds of the game was conducted to ensure the participants knew how to play the game during the experiment.

We ensured some level of acquittance among the subjects by limiting the participants to students in the 2nd, 3rd and 4th years of the Faculty of Economics and Business, at Gadjah Mada University; the experiment was conducted prior to the COVID-19 pandemic. After the experiment, all the participants of the treatment group had to fill out the post-experiment questionnaire in order to identify their level of acquaintance with their opponents (see Appendix D).

Every player had to go through 17 distinctive rounds against all the other players within his/her group, but without meeting the same opponent twice. Each player in every group was assigned to another, using round-robin rules, to ensure that each player would always have a match in each round. Using these matching rules, there were 153 unique interactions among all 18 participants in each group. In each round, the player and his/her partner received an endowment (E) of Rp 60,000 (US$4.20[3]) and they had to decide how much they would contribute to the public-good fund.

The available strategies for each game were developed by a strategy set which was randomly selected from the deciles of an endowment. In other words, the players had a strategy set that consisted of contributions equal to zero and multiplication factors of Rp 6,000 (0, 6,000, 12,000, … 54,000, 60,000)[4]. For every round played, two different numbers out of these 11 strategies in the set were randomly assigned as the low contribution (L) and high contribution (H) strategies in that particular round; therefore $C_L < C_H$ at all times. In each round, they had to choose one of the two strategy options, either (L) or (H). While the subjects in the control group had an anonymous interaction, subjects in the treatment group did have access to their partner's photo and name in each round (see Appendix C). At the end of each round, every player could see the result of their strategy choice, and the computer recorded the outcome in each round so that each player had access to his/her history of playing the game.

The payoff for player i for each round followed this function:

$$\pi_i^1 = E_i - C_i + \gamma\left(C_i + C_j\right) + \mu \qquad \text{(eg. 3)}$$

Where E_i denoted the endowment of player i, C_i was the contribution of player i and C_j was the contribution of player i's partner during a particular round. The value of parameter MPCR (γ) was set at a constant (0.7) for all the groups. The table below shows an example of a strategy set faced by the players in each round. The payoffs in this table were developed based on the payoff's function and parameters (Table 2).

There were three possible interactions from this strategy set: either the Nash equilibrium [N] (L,L), miscoordination outcomes [M] (L,H or H,L) or the Pareto optimum [P] (H,H). In every game, each player was fully aware of his/her outcome possibilities as well as that of his/her partner. In this example, [N](0,0) would be the dominant strategy, and a unique pure Nash equilibrium as well. This reflected the nature of the PGG where free riding was the dominant strategy. In the case when a PGG was conducted between two players, the payoff matrix would have identical equilibrium, as if it were in a prisoner's dilemma game. All the possible payoffs in this experiment exhibited this structure with a unique pure Nash equilibrium at (L, L) and the Pareto optimum at (H, H). This payoff matrix also showed the Pareto optimum [P](12,000, 12,000) to be the most dominant

[3] The exchange rate was US$1 = Rp14,285.

[4] i.e. [0, US$ 0.42, US$ 0.84, …, US$ 3.78, US$ 4.20]

Table 2: Example of Payoffs of the Game

		Player j	
		0 (L)	12000 (H)
Player i	0 (L)	**60,000**, 60,000	**68,400**, 56,400
	12,000 (H)	**56,400**, 68,400	**64,800**, 64,800

strategy, assuming there was no coordination among participants within the decision-making process.

This study examined three aspects, namely choice of strategy, time taken to choose, and the likelihood of coordination. The first focused on the comparison of the strategies chosen by the respected control and treatment groups. The second investigated the significant difference in the length of time required by each group to decide. The third analyzed the extent to which the treatment given may improve the likelihood of coordination. In detail, such nuisance variables as personal acquaintance, physical appeal, and individual impression were controlled through the post-questionnaires. The intuitiveness of the decision was based solely on the time spent by the participant in choosing his/her strategy.

The design of the experiment only focused on the time spent by the participants to make decisions and their prosocial behavior. Table 2 shows the transformation of a more cognitive demanding public-good game into a simple 2x2 game. This experimental design did not incorporate manipulation in terms of time pressure when making decisions, as in the literature on the social heuristic hypothesis or HSS (see Chen and Krajbich, 2018, Crosetto and Güth, 2021, Fromell, Nosenzo and Owens, 2020, Gärtner, 2018, Isler, *et al*., 2021, Kvarven, *et al*., 2020, Rand, Greene and Nowak, 2012, Rand and Kraft-Todd, 2014, Rand *et al*., 2014, among others). Indeed this setting may be seen as one of the caveats of this study, however, the result could provide the underlying response of individuals when they played the public-good game in a non-anonymous setting.

As previous studies suggest that the availability of visual cues of the partner improve coordination, the first hypothesis was **H1: Subjects in the treatment group (photos and names) would be more likely to choose the high contribution strategy (H) over the low contribution (L) than the subjects in the control group (anonymous interaction).** This hypothesis was tested by using a non-parametric independent T-test, also known as the Mann-Whitney test, with individuals as the unit of analysis.

The second hypothesis to be tested was **H2: Interactions in the treatment group would result in more Pareto optimum combinations than in the control group**, which was tested by comparing the proportion of Pareto optimum interactions between the two major groups ($P_T > P_C$). Lastly, **H3: Cooperation is more intuitive in the treatment group than in the control group.**

So far, the literature has shown that cooperation is one of the human intuitive traits in anonymous conditions (see Brañas-Garza, Meloso and Miller, 2012, Cappelen *et al*., 2016, Galloti and Grujic, 2018, Lotito, Migheli and Otona, 2013, Nielsen, Tyran, and Wengström, 2014, Nockur and Pfattheicher, 2020, Rubinstein, 2007, 2016, Yamagishi *et al*., 2017, among others), as well as how social identity promotes cooperation (see Andreoni and Petrie, 2004, Charness, Rigotti and Rustichini, 2007, Chen and Chen, 2011, Chen and Li, 2009, Croson, Marks and Snyder, 2008, Eckel and Grossman, 2005, Goette, Huffman and Meier, 2006, Rockmann and Northcraft, 2008, Samek and Sheremeta, 2016, van Zant and Kray, 2014, among others). Given these propositions, we compared how intuitive cooperation differed between an anonymity and visual identity context. To observe the intuitiveness, we also recorded the amount of time, in increments of one second, required by everyone before settling on a strategy, (L) or (H). A more intuitive choice meant that an individual, on average, required less time to decide. In testing this hypothesis, we compared the time required by each participant in the control and the treatment groups to choose a strategy, (L) or (H). Alternatively, using interactions as a unit of analysis, we compared the amount of time required for each type of interaction [N, M, or P] between the control and the treatment groups, to find the time differences.

At the end of the experiment, each participant had to choose a number between 1 and 17 randomly. Each number represented the round of the game they played in the experiment. When each number was chosen, the respective game was revealed, and the subject received a financial reward according to the outcome of the game. For the treatment groups, a post-questionnaire was presented after all the rounds had finished. As shown in Appendix D, it consisted of questions related to the individual acquaintance level of each player toward the other player that he/she just had played against. These post-questionnaires were aimed at observing the relationship or perception of each subject toward his/her partner. In this case, we inspected an additional explanatory factor that might affect the cooperative behavior with their partner.

RESULTS AND DISCUSSION

The experiment was conducted at the computer laboratory of the Faculty of Economics and Business, Gadjah Mada University, Indonesia. In this experiment, there were three sub-control and three sub-treatment groups, each sub-group consisted of 18 players. The total number of players came to 108 individuals. This resulted in a total of 1,818 unique interactions among the participants, from both points of view, which became the unit of analysis used within this paper. Based on the computerized randomization of the sample, we allocated the sample to six sub-groups. The gender composition of each sub-group can be seen in the Table 3 below.

To begin with, we compared the strategy choices made and the time spent on decision-making by the participants in each sub-group. Since the strategy options only consisted of two (which were high [H, 1] or low [L, 0]), we treated this variable as a binary one, thus the average value of the strategy option was translated to become the proportion of samples that chose the high [H] strategy.

H1: Subjects in the treatment group (photos and names) would be more likely to choose a high contribution strategy (H) over a low contribution (L) than the subjects in the control groups (anonymous interaction).

Table 3. Sample Gender Distribution

	Treatment 1	Treatment 2	Treatment 3	Control 1	Control 2	Control 3	Total
Female	12	9	12	9	9	7	58
Male	6	9	6	9	9	10	49
Total	18	18	18	18	18	17	107*

*Note: *) The total samples were 108 participants, but in the last session, a participant could not attend the experiment and the person could not be replaced at that time.*

Figure 1: Comparison of MRT between Treatment and Control Groups

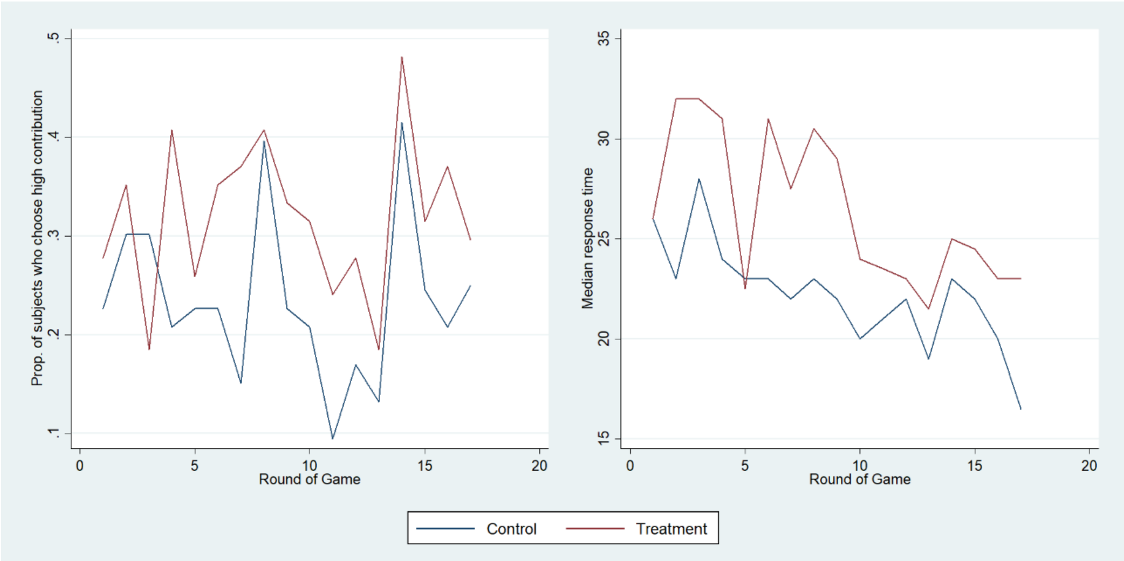

Figure 1 shows that the proportion of the sample that chose the high [H] strategy was consistently higher in the treatment group, in comparison to the control group, with the exception being the third round. Statistical significance was shown between the two-median values, with 0.319 for the treatment group and 0.236 for the control group. This result supported the findings from previous studies on experiments in the PGG conducted by Andreoni and Petrie, (2004), Eckel and Grossman (2005), Chen and Li (2009), Lankau, Bicskei, and Bizer (2012) Kreitmair, (2015) and Samek and Sheremeta, (2016). This result implies that the first hypothesis (H1) is accepted. Distinguishing the gender of the players in the proportion test does not bring statistically different conclusions to the proportion that chose the [H] strategy.

Meanwhile, for the time spent decision-making between the two groups, there was evidence of a learning effect in both groups. Figure 1 shows there was a negative trend in the graph of the MRT as more rounds were played. The participants in the treatment group, overall, required more time to make decisions than their counterparts in the control group. The MRT of the participants in the control group was 23 seconds, while the treatment group recorded a median of 25 seconds (p value =0.0001)[5]. The results suggested that imposing a non-anonymity setting on the identity of the participants increased the likelihood of them choosing prosocial behavior; nevertheless it took longer for them to choose prosocial behavior. In other words, prosocial behavior, under a non-anonymity setting, may be chosen deliberately, rather than intuitively. Up to this point, the experiment had not incorporated the possibility of group identity or the possibility that the group identity may become more salient. Further experiments had to be conducted to investigate the impacts of this route.

H2: Interactions in the treatment groups would result in more Pareto optimum combinations than those in the control group.

In order to test the second hypothesis, we needed to codify the results into binary variables. The possible outcome for each interaction would be one out of three

[5]Tests on median has been done using Wilcoxon rank-sum procedure.

possibilities, namely the Pareto optimum, the Nash equilibrium or a miscoordination outcome. We codified the Pareto optimum outcome as one, while the Nash equilibrium and miscoordination outcomes were zero. Given that the outcomes in every round followed the PGG rule, the interaction was to be recorded as Pareto if both players chose a high [H] strategy. If one player chose low [L] while his/her opponent chose high [H], then it was to be classified as a miscoordination outcome. If both players chose low [L], then the result was the Nash equilibrium. Every interaction would be coded similarly, independent of the position of its player and opponent. The mean of this binary coding was also translated as the proportion of interactions that fell into the Pareto optimum condition. Again, to test the difference between the proportion of Pareto interactions between the two groups, we conducted a similar propensity test to the one used when testing the first hypothesis.

Table 4 shows that in the control group, out of 900 observations, only 7.24 percent were classified as Pareto optimum results, while in the treatment group this proportion was significantly higher as 11.5 percent of the 918 observations produced the Pareto outcome. In this case, the Pareto optimum's interactions were more likely to have happened in the non-anonymous interaction (treatment) group rather than in the control group.

H3: Cooperation is more intuitive in the treatment group than in the control group.

We tried to observe the intuitiveness of choice using the number of seconds required by the participants to choose an option as a proxy. A more intuitive option required a shorter amount of time before a decision was made. Comparing the results between the control and the treatment groups, in H1 testing we found out that, in general, the samples in the control group required less time to decide whether to contribute [H] or [L] than those in the treatment group. The next question was whether the choice of strategy made any contribution to this difference in the response time. To test this hypothesis, we conducted a median test across four sample categories, which was the interaction between the treatment groups and their choice of strategies.

Table 4. Proportion Test of Pareto-Resulting Interactions, Control vs Treatment

Group	Share of HI	St. Dev		
Control	0.0724	0.2593		
Treatment	0.1155	0.3198		
		SE	z-score	p-value
Δ (Treatment - Control)	-0.0431	0.0138	-3.1269	0.0018

Table 5. Median Test of Seconds Spent on Making [H] Contribution Decision

	Control L	Control H	Treatment L	Treatment H	Total
Lower than median	418	108	232	143	901
Column %	61.74%	52.17%	37.12%	48.81%	50.00%
Greater than median	259	99	393	150	901
Column %	38.26%	47.83%	62.88%	51.19%	50.00%
Total	677	207	625	293	1,802
Pearson chi2(3) =79.3748	p-value = 0.000				

Our test compared the proportion of samples who had spent more or less time making decisions against the median value of all the samples combined. In this result, we found a statistical difference across the four sample categories. Among the samples that chose the L strategy, a higher proportion of the samples from the control group spent a shorter period of time than the median of those in the treatment group. This was also true for those who choose the H strategy, which meant the differences among the four sample categories could be due to the treatment group alone. To control for the treatment group effect, we moved into a quantile regression framework.

We estimated the following equation:

$$MS_i = \beta_0 + \beta_1 TG_i + \beta_2 S_i + \beta_3 (TG_i \times S_i) + \gamma T + \delta G_i + \varepsilon \quad \text{(eq. 4)}$$

Where MS_i corresponds to the median of response time, TG_i for target group indicator (=1 for treatment group and 0 otherwise), S_i for strategy choice indicator (=1 for high and 0 otherwise), T indicates the round number and G_i represents gender. The term $TG_i \times S_i$ would capture the differences in the interaction between strategy choice and treatment assignment. This specification, however, may not entirely capture the unobservable individual characteristics that might affect the response time (i.e., some respondents may inherently take a longer time to make decisions due to issues with their eyesight, or familiarity with the instrument, etc.), while differences between each outcome scenario across rounds might also contribute to how long an individual takes to make a decision and further control for possible imbalances between our sample. To account for the individual-level effect, we constructed the *residual* seconds obtained after regressing the response time against the individual and round-specific fixed effect. This residual would capture any deviations in the response time that could not be attributed to round-specific or individual effects. Table 6 below represents the result of our estimation.

Table 6. Quantile Regression Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)
	Seconds			Residual of Seconds		
Strategy (=1 for high)	2	1.750	1.727	2.388**	2.176**	2.195**
	(1.62)	(1.44)	(1.40)	(2.89)	(2.96)	(2.97)
Treatment group (=1 for treatment)	4***	3.750***	3.636***	6.329***	6.331***	6.469***
	(4.63)	(4.41)	(4.18)	(10.99)	(12.32)	(12.45)
Strategy x Treatment group	-3	-1.500	-1.545	-5.364***	-5.233***	-5.102***
	(-1.81)	(-0.92)	(-0.93)	(-4.85)	(-5.31)	(-5.16)
Constant	22***	25.38***	25.27***	-4.224***	0.265	0.483
	(36.77)	(28.67)	(25.72)	(-10.58)	(0.49)	(0.82)
N	1,802	1,802	1,802	1,802	1,802	1,802
Round Number	No	Yes	Yes	No	Yes	Yes
Gender	No	No	Yes	No	No	Yes

t statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The results in Table 6 show that only the treatment assignment explained the differences in the MRT, while the strategy and interaction terms did not. Our findings initially suggested that exposure to the photos and names added more information to be processed by the participants but did not affect their choice of strategy. As we moved to the residuals of the seconds, however, we observed that the strategy choice, the treatment group and its interaction term were all related to the residual of the MRT.

A positive coefficient on the strategy meant that for all the samples on average, choosing the high strategy required 2.19 seconds more on the median compared to choosing the low strategy, which suggested that cooperation was generally less intuitive. This also applied to the treatment group's assignment, which meant that seeing the face of another player increased the median response time by 6.5 seconds. Choosing the high strategy, for those who were in the treatment group, however, required 5.1 seconds less than average, which suggested that cooperative behavior in the treatment group was relatively more intuitive, holding the other variables constant.

In addition to testing the three hypotheses, we also conducted a gender analysis. In general, there was no significant distinct behavior if we looked at the propensity of high [H] strategy choices and the median response time among the genders in both groups.

There was an interesting result, however, when we compared the response time of male and female subjects within the treatment groups. The median response time test suggested that the male subjects in the control group were significantly faster in their decision making than the females in the same group, while there was no significant difference in the treatment group between the two genders.

Figure 2: Comparison of the Response Time by Gender

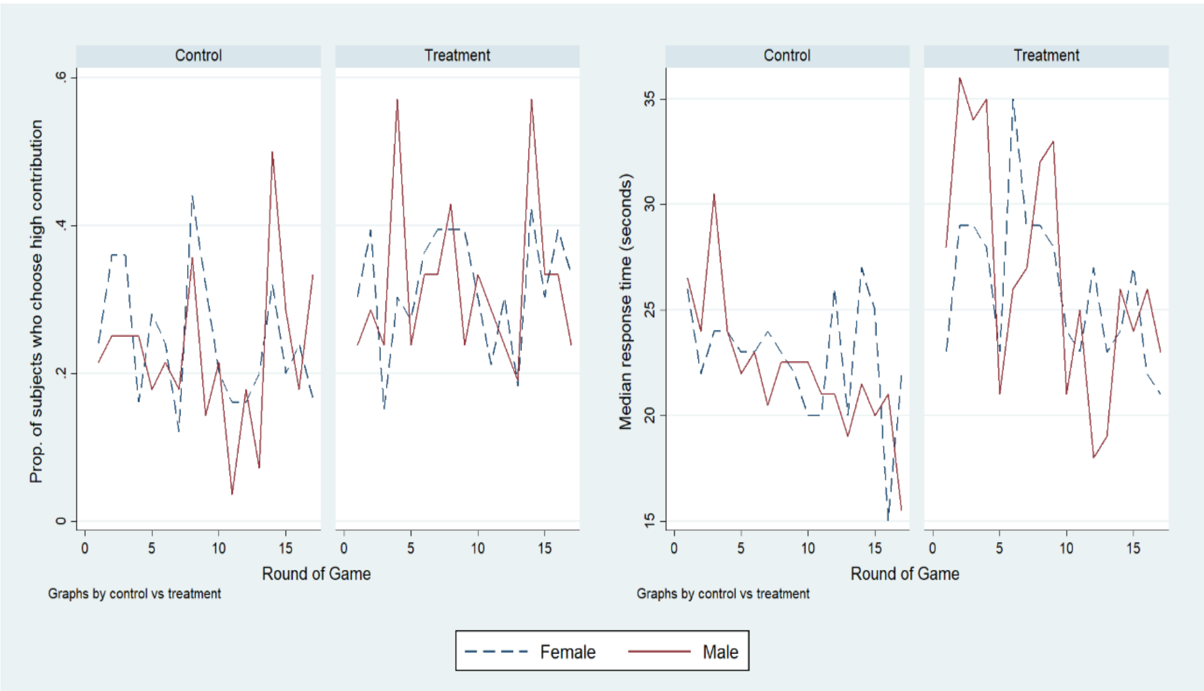

Table 7. Median Test of Response Time, Gender on Group

	Control Female	Control Male	Treatment Female	Treatment Male	Total
Lower than median	235	278	265	168	946
Column %	56.2%	59.7%	47.2%	47.1%	52.5%
Greater than median	183	188	296	189	856
Column %	43.8%	40.3%	52.8%	52.9%	47.5%
Total	418	466	561	357	1,802

Pearson chi2(3) = 22.3600Pr = 0.000

Table 8. Interaction Characteristics in the Treatment Group

Matching	Proportions of [H]	Std. Dev.	Mean of Seconds	Std. Dev.	Freq.
Male against Male	00.33	00.47	31.73	17.71	136
Male against Female	00.31	00.46	28.88	16.52	221
Female against Male	00.27	00.44	28.92	16.81	238
Female against Female	00.36	00.48	29.35	17.91	323
Average	0.32	0.47	29.48	17.27	

Further, we took a closer look at the gender matching data of the interactions. While this factor was observable in the records of both the control and treatment groups, obviously this information had no effect on subjects in the control group, since they were unable to know the gender of their opponents. The subjects in the treatment group, however, were exposed to this information, so the analysis of gender matching would be relevant. In the treatment group, male subjects had a higher likelihood of choosing the [H] strategy when they faced male counterparts than when they were assigned with females.

The same result also applied to females; however, the difference in proportion was much higher (9 percent); a 36 percent proportion of [H] while playing against fellow females and only 27 percent against males. From the two results, it appeared that subjects tended to be more contributive while playing against the same gender. The results also suggested that both genders spent more time on decision making when faced with the same gender compared to when interacting with the opposite gender. Given that they were also more cooperative toward the same gender, this result showed that in the treatment group, cooperation was less intuitive than defection.

CONCLUSION

Based on the results above, there are several points that should be noted. Firstly, knowing the identity of the opponent, even when based on the availability of minimal information, promotes cooperative behavior since people tend to contribute a higher number of resources. This is consistent with the findings in previous studies (Andreoni and Petrie, 2004, Eckel and Grossman, 2005, Chen and Li, 2009, Lankau, Bicskei, and Bizer 2012, Kreitmair, 2015, Samek and Sheremeta, 2016) that all suggest cooperative behavior flourishes more in a non-anonymous situation.

Although imposing a non-anonymity setting on the identity of the participants increases the likelihood of them choosing prosocial behavior, it takes a longer time for the participants in the treatment group to choose prosocial behavior. These findings suggest that prosocial behavior, under a non-anonymity setting, may be improved in terms of its intensity, however, it is based on deliberate rather than intuitive action.

Secondly, a higher likelihood of a cooperative strategy also leads to a higher chance of Pareto efficient outcomes. The Pareto optimum outcomes are more likely to happen in the non-anonymous interaction (treatment) group rather than in the anonymous interaction (control) group. Indeed, the samples exhibit different behavior between the anonymous and non-anonymous interaction conditions.

Thirdly, non-cooperative behavior is more intuitive than cooperation when people are not exposed to the identity of their opponent. Meanwhile, there is no difference in the time required between choosing cooperative and non-cooperative behavior in the treatment group, yet overall, the average time for making any decision is higher in the treatment group.

This study shows that imposing non-anonymity on participants increases the likelihood of them choosing prosocial behavior, but prosocial behavior tends to be considered as a deliberate action rather than an intuitive one. A further study should be conducted using a similar setting; however, the design of the experiment should allow the group identity to become salient.

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APPENDICES

Appendix A: Subject Consent Form[6]

I have volunteered to participate in this experiment.

I understand that the experiment requires my presence at the following time(s) and date(s):

I have the right to withdraw from the experiment at any time and forfeit any payments I may have earned from my participation.

I understand that the reports of this experiment will not identify me.

I understand that my participation in the experiment will not affect my academic standing at the university.

I understand that I can ask for a copy of this consent form and retain it.

Signed ___________________ Date_________________________

Name____________________ Phone________________________

Comment Form[7]

Experiment ___________________________

Date__________________________________

Name (optional) ____________________Subject ID (optional)______________

Please write down on this sheet any comments you may have about this experiment and your participation in it.

[6] Instructions are originally provided in Bahasa Indonesia during the conduct of experiment.

[7] Instructions are originally provided in Bahasa Indonesia during the conduct of experiment.

Appendix B: Experiment Instructions[8]

This is a simple contribution game. You will play against all the other participants, but only once against each participant. For each round, you and your partner will earn Rp 60,000 and have to decide how much you want to contribute. The total of your and your partner's contribution will be multiplied by 1.4 and evenly divided between the pair of you. For example, if both of you contribute Rp 50,000, the total contribution is Rp 100,000. When multiplied by 1.4 the total value of the contribution is Rp 140,000. Thus, you and your partner will receive Rp 70,000 each, given that both of you contributed Rp 50,000.

In each round, you and your partner will be faced with two contribution strategies, either a low amount or a high amount. These amounts are the same for you and your partner. An example of the strategies is shown below:

		Your Partner	
You		0	12,000
	0	**60,000**, 60,000	**68,400**, 56,400
	12,000	**56,400**, 68,400	**64,800**, 64,800

In this example, you and your partner may contribute 0 or Rp 12,000. If you both do not contribute, there is no value for the total contribution, thus you both receive nothing. If you contribute Rp 12,000 but your partner does not, eventually the Rp 16,800 (12,000 x 1.4) is still divided by two and both of you each receive Rp 8,400 in return, even though it is lower than your contribution. If both of you contribute Rp 12,000, the total amount is Rp 33,600 [(12,000 + 12,000) x 1.4)] which is divided equally between you as well, so both of you each receive Rp 16,800, which is more than your contribution.

The strategies that are available to you and your partner will be randomly different for each round. You have 60 seconds to make your decision. On the screen, you will have a table that tracks your decision history and results. After finishing all the rounds, you will be asked to fill out a questionnaire on the computer screen.

During the experiment, you are expected to:

1) Not have any form of communication with the other participants
2) Not use any electronic devices other than the computer that is assigned for you
3) Maintain a conducive atmosphere by minimalizing noise

[8] Instructions are originally provided in Bahasa Indonesia during the conduct of experiment.

Appendix C: Example of the Screen Display Faced by Participants of the Experiment

Screen Display of Choice of Strategies for the Control Group

[P1 - 2 ANA | Logout]

Skenario ke - 1

	Anda (P1)		
	Pilih Strategi >	A ◉	B ○
Pasangan Anda P2	A	60000, 60000	68400, 56400
	B	56400, 68400	64800, 64800

Konfirmasi

Screen Display of Choice of Strategies for the Treatment Group

[P1 - 2 ANA | Logout]

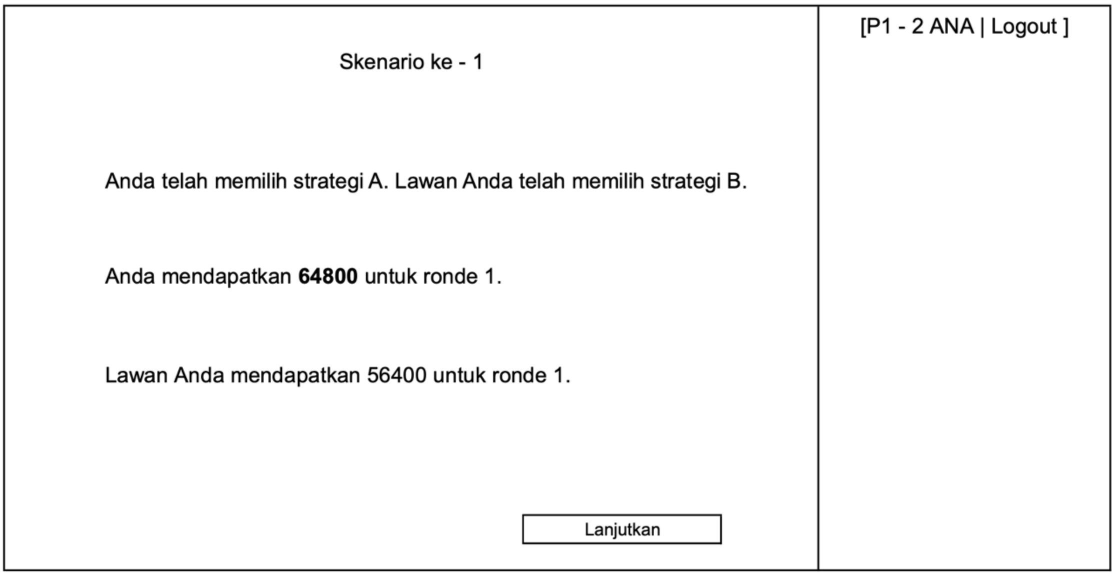
Lawan Anda:

Skenario ke - 1

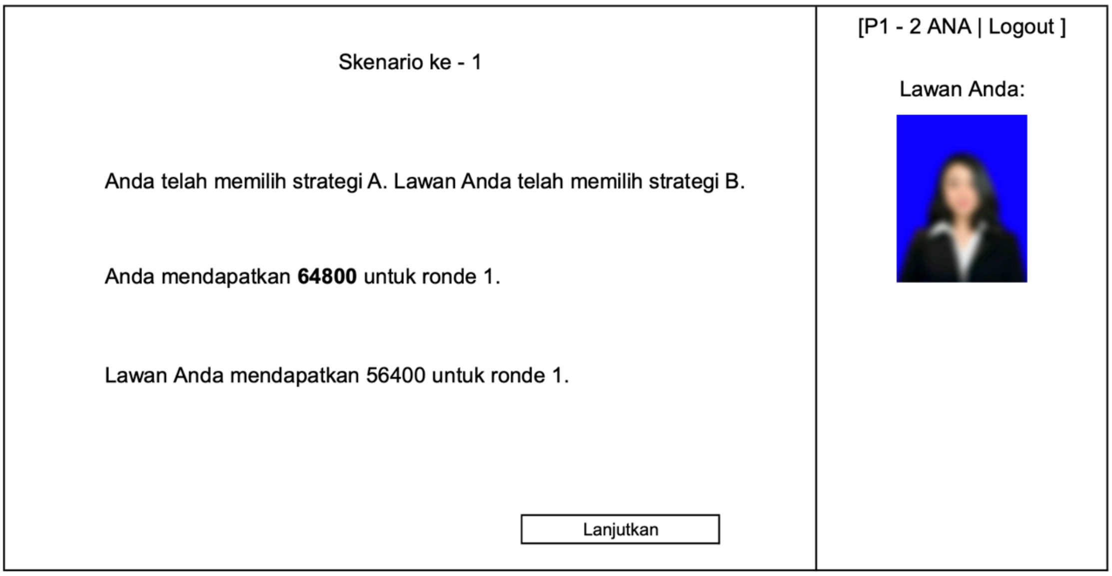
	Anda (P1)		
	Pilih Strategi >	A ◉	B ○
Pasangan Anda P2	A	60000, 60000	68400, 56400
	B	56400, 68400	64800, 64800

Konfirmasi

Screen Display of Outcomes of the Game in the Control Group



Screen Display of Outcomes of the Game in the Control Group



Appendix D: Post Experiment Questionnaire for Participants in the Treatment Group[9]

After the experiment, every participant in the treatment group has to fill out this questionnaire. Each of your opponents' photos was shown to you and they also have to fill out this questionnaire.

1. Do you know your pair X in person?
   (Yes)
   (No)
2. If your answer for number 1 is (Yes), how well do you know him/her?
   (1) Not well
   (2) Not really well
   (3) Well
   (4) Very well
3. If your answer for number 1 is (Yes), how easy is it to cooperate with your pair X in daily life?
   (1) Not easy
   (2) Not really easy
   (3) Easy
   (4) Very easy
4. If your answer for number 1 is (No), how good is your impression about your pair X?
   (1) Not good
   (2) Not really good
   (3) Good
   (4) Very good
5. Do you think that your pair X is physically appealing to you?
   (Yes)
   (No)
6. Do you think that your pair X is an altruistic person?
   (Yes)
   (No)

[9] Instructions are originally provided in Bahasa Indonesia during the conduct of experiment.