#### Research Report

# The good, the bad and the one who ignored the perks of being bad.

## Peter S. Riefer \* and Bradley C. Love

Department of Experimental Psychology, University College London, 26 Bedford Way, London WC1H 0AP, UK; E-Mail: b.love@ucl.ac.uk

\* Author to whom correspondence should be addressed;  
E-Mail: peter@peterriefer.net, Tel.: +44-7871-655-465; Fax: +44-2074-364-276.

## Abstract

People cooperate. 150 words.

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## Introduction

Throughout their lives, people depend on each other and offer their help while often expecting at least as much help from others in return. The cooperative behavior of individuals in groups has been studied in games which showed that many people behave conditionally cooperative, meaning that they contribute more when others contribute more and vice versa (i.e. tit-for-tat behavior) (Fischbacher & Gächter, 2006; Fischbacher, Gächter, & Fehr, 2001; B. S. Frey & Meier, 2004; Keser & Van Winden, 2000; Kocher, Cherry, Kroll, Netzer, & Sutter, 2008). Besides some free-riding individuals who try to exploit the work of others without contributing themselves, most people seek fairness and try to avoid inequity (Bellemare, Kröger, & Van Soest, 2008; Fehr & Schmidt, 1999, 2010). In many cases, fairness-seeking individuals would even give up some of their own endowment to diminish the earnings of others if they have been behaving unfairly in the eyes of the punisher (Brandt, Hauert, & Sigmund, 2003; Carpenter, 2007; Fehr & Gächter, 2002; Gardner & West, 2004). On the other hand, humans show a self-serving bias and expect others to contribute at least as much as they do and preferably more (Fischbacher et al., 2001). This mutual expectation within a group might create a slippery slope and has been held responsible for the decline of cooperation in groups over time, as conditional individuals reduce their cooperation in response to the reductions of others (Andreoni, 1995; Fischbacher et al., 2001; Neugebauer, Perote, Schmidt, & Loos, 2009).

In general, people watch others closely and compare themselves to lower performing individuals for self-enhancement or to better performing ones to seek guidance (Festinger, 1954; Taylor & Lobel, 1989). In a competitive context, observing better performing individuals can inspire people to improve and boost their own performance (Blanton, Buunk, Gibbons, & Kuyper, 1999; Huguet, Dumas, Monteil, & Genestoux, 2001). In a cooperative context, however, such upward comparisons to the top might impair the cooperative climate of a group (Buunk, Zurriaga, Peíró, Nauta, & Gosalvez, 2005). Jealousy impedes cooperation, but quite often, individuals envy others for their gains or feel happy for their failure (Takahashi et al., 2009). Studies observed that the understanding of group members in cooperation games was enhanced when players could see each other (Andreoni & Petrie, 2004) or when communication was possible (Isaac & Walker, 1988). In a study by (Neugebauer et al., 2009), cooperation was increased in a condition where players of a game did not get any information about earnings at all. Here, subjects over-estimated the input of their fellow group members and tit-for-tat players therefore contributed more than they would have if the actual contributions had been known. But so far, we fail to understand how willingness of others to contribute affects individuals’ willingness to cooperate separately from the profits of cooperation and defection.

In the present study, we examine whether cooperation can be enhanced when the perks of defection aren’t highlighted. We argue that cooperation should still increase, despite subjects’ knowledge of the number of defectors who enjoy free-riding benefits. This derives from the assumption that individuals will reduce upward comparisons if they do not observe the earnings of defecting individuals directly. Hence, increased cooperation would not be the result of an over-estimation of others’ contribution but the fact that subjects do not feel bad about doing the work for others. Our experiment furthermore looks at larger groups since such contributions are still scarce and evidence from large groups of unacquainted individuals could potentially have interesting implications for public policies.

## Method

### Participants

We recruited 212 subjects (85 female, mean age 31.7 years, SD age 9.3 years) on Amazon Mechanical Turk (MTurk) for an experiment that we started about two hours after we launched the advertisement on MTurk. We collected data in 14 sessions, where each session comprised a group of 12 to 18 players (M=15.1 players, SD=1.7). The groups were divided into two different information conditions resulting in seven groups for each condition respectively. 111 participants were assigned to the full information condition and 101 to the hidden information condition. Subjects received a $0.50 base payment and additionally $0.01 for every 30 points they collected in the game. On average, a participant received $2.02 (SD=$0.19) in total for approximately 15 to 20 minutes.

### Materials

In our game, a group of subjects is confronted with attacking zombies and each of the players decides individually whether to hide or fight in multiple repeated rounds. The outcome of this choice is determined by the actions of all players in the group.

As n(fighting) denotes the relative number of players who decided to fight in a certain round of the game, the resulting points are calculated as follows:

Points(fighting) = 80 × n(fighting)

Points(hiding) = 1.25 × Points(fighting)

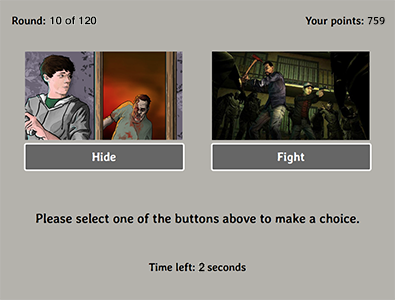
Hence, hiding always gave more points than fighting, but more players hiding also led to lower overall points.

The game was implemented using Node.js, which is a user-friendly JavaScript-based technology that efficiently coordinates requests between different users. A server-side game script collected the players’ choices and sent feedback after each round. The major advantages of Node.js are the accessibility through all common web browsers without the requirement for extensions, the straightforward implementation into JavaScript-based games and the efficient data exchange based on events (e.g. only on choice or feedback).

### Procedure

Subjects saw an advertisement on MTurk that explained they could register for a game that starts approximately two hours after the registration. During registration, subjects learned the rules of the game and had to answer three questions about the game correctly in order to participate. They were instructed that the game comprises 120 rounds in which they have to decide between hiding and fighting. Regarding the points system, subjects learned that hiding would be more profitable with fewer people, while fighting yields more points with more people. Each subject received a customized link to the game which was activated at the announced starting time. Participants logged into the game about five minutes earlier and had a chance to read the game instructions once more while waiting.

Figure 1. Participants had 2.5 seconds to make decide between hiding and fighting each round.



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| Figure 2. After 2.5 seconds for the choice, subjects saw a feedback screen for 4.5 seconds and went back to the choice screen after that. | | |
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| Fig. 2a | Full feedback condition |  | Fig. 2b | Hidden feedback condition  (after round 20) |

As the game commenced, subjects had 2.5 seconds to make a decision each round and were presented with feedback for 4.5 seconds after that. On the feedback screen, they could see their own decision and how many points they gained in this round. Furthermore, players were able to see how many people decided to hide and fight in that particular round. In the full feedback condition, subjects were presented with the points that both hiding and fighting players received (see fig. 2a). In the hidden feedback condition, people saw the full feedback for the first twenty trials. After that, they could only see the points associated with their own decision (e.g. only the points for hiding), but not the points for the alternative decision (see fig. 2b). Following the feedback, players went back to the choice screen again for the next round. The experiment ended with a questionnaire that included demographics and questions about the game.

## Results

### General

Overall, players fought 42.6% (SD=28.9%) of the time on average. Cooperation reduced slightly over time in both conditions. The correlation of trial number and cooperation is negative in the full condition if we include all trials, R=-.231, p<.05. For the hidden condition, this was the case after trial 20, where the points for other players were hidden, R=-.311, p<.01.

Figure 3. Relative number of players fighting divided into blocks of 20 trials. Error bars are standard errors.

Figure 3 illustrates how missing payment information for other players increased cooperation after the twentieth trial. The two conditions did not differ regarding the cooperation in the first twenty trials, where players were presented with identical feedback in both, t(19)=-.209, p>.05. However, in all further blocks after the twentieth trial, cooperation was significantly higher in the hidden than in the full condition, all t(19)>6.79, p<.001.

We checked whether subjects’ cooperativeness in the two experimental conditions differed due to confusion about the payoffs in the game. Players in the hidden condition did not see the points of the opponents that chose differently and therefore, the reward system might not have been as obvious to them. We therefore asked subjects in the post game questionnaire to imagine that in one round of the game, every player who fought received 40 points and to tell us how many points they think every hiding player received in that situation. Players in the hidden information condition actually gave a closer estimate to the correct number (i.e. 50 points) than players with full information, but the difference is not statistically significant, F(1,82)=.601, p>.05. This seems to support the view that there was no difference in how well the players in each condition understood the points-distribution of the game.

### Individual strategies

For each subject, we estimated logistic regressions using their choices from the twentieth trial to the last trial in order to examine conditional cooperation strategies. The dependent variable was probability of fighting and the two independent variables were whether the player fought in the previous trial and the relative number of other players fighting. For the latter, we used the actual number of the next trial as if people could make a perfect forecast, which approximates a subject who learns to predict others well over time (Ho, Wang, & Camerer, 2008). A constant was added to the model to capture willingness to fight that was independent of own previous actions or others’ behavior. We assessed significances by comparing model fits stepwise with and without respective variable. Table 1 shows the mean parameter estimates across subjects. Constant, number of others fighting and previous choice had significant impacts on people’s probability to fight. The Chi-Square values are also based on mean fit improvements.

Table 1. Mean estimates (SD in brackets) across subjects of the logistic regression predicting probability to fight

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| **Coefficient** | **Estimate** | **Chi-Square** | **p-value** | **% significant subjects** |
| Constant | -3.44 (3.95) | 9.14 | .003 | 68.9 |
| Number of others fighting | 3.72 (5.54) | 4.52 | .034 | 41.0 |
| Fighting previously | 1.59 (3.80) | 18.08 | <.001 | 87.7 |

Note: Estimate and Chi-Square values are averages over all subjects. P-value is based on average Chi-Square.

All three parameter estimates showed significant differences across our two experimental conditions. As seen in the comparison of cooperation frequencies, the estimates for the constant were higher in the hidden than the full information condition, F(1,209)=3.80, p=.052. This implies that besides others and own behavior, there was a constant attitude towards cooperation that separated the conditions. Furthermore, the impact of other players was stronger in the hidden than the full information condition, F(1,209)=3.58, p=.060. This suggests that subjects’ tit-for-tat attitude was more emphasized in the hidden condition. On the other hand, players seemed more self-focused in the full information condition. Compared to the hidden information condition, subjects with full information chose to fight more likely when they fought in the previous round, F(1,209)=8.45, p<.005. In sum, these comparisons of the parameter estimates indicate that in the full information condition, subjects were more focused on their own choices and repeating those. On the other hand, in the hidden information condition, players observed the actions of others more closely and decided to help when others were cooperating. Although players in the hidden condition seemed to be aware that the benefits of defection grew with the numbers of contributors, people rather supported than exploited larger groups of cooperators.

Fig. 5 | Mean parameter estimates across conditions

## Discussion

In summary, our results show that people who did not see the earnings they could have gotten from a different choice cooperated significantly more than those who knew this information. It appears as if people would have been able to calculate the points of an alternative action, but decided not to instead. Our model analysis shows that individuals focus more intensely on others and have stronger positive reciprocal strategies when the forgone payoffs are missing. On the other hand, if players can see the points that others earn, their strategies focus on producing repetitive and self-maximizing choices. Overall, these findings tell us that hiding forgone payoffs increases cooperation in groups by shifting people’s focus away from earnings toward reciprocity and fairness. If individuals are not exposed to information about the perks of shirking, they are less likely to engage in upward comparisons to the people who defect and instead focus more on reaching common group goals.

It is interesting that our subjects seemed to be fully aware of the fact that defection was more beneficial, as they could quite accurately name the points that someone would receive from free-riding. Still, individuals might have decided to cooperate in the name of the common good as the missing salience of the forgone payoff gave them the chance to ignore what they missed. People often try to avoid information that conflicts with their current behavior and hence search for evidence that supports their present views (D. Frey, 1986; Jonas, Schulz-Hardt, Frey, & Thelen, 2001; Nickerson, 1998). In our case, it is possible that missing information about the perks of defection gave people a chance to omit upward comparisons and cooperate without feeling bad about others outperforming them (Exline & Lobel, 1999; Wheeler & Miyake, 1992).

With some minor exceptions (e.g. Isaac, Walker, & Williams, 1994), research on large groups has so far been mostly based on simulations (e.g. Carpenter, 2007) or theoretical implications (e.g. Pecorino, 1999) due to the high experimental efforts of hosting numerous subjects at once. As we recruited and conducted our experiment online, we have been able to test larger groups with relatively little effort. Furthermore, the fact that the hidden information treatment showed an effect in a large and anonymously composed group can be particularly interesting for public policies. Even with such an anonymous group composition, people seem to focus more on reciprocal strategies and try to establish tit-for-tat rules with individuals who are complete strangers to them.

## Author contributions

P.R. was involved in all parts of this project and received input from B.L. for the design, analysis and write-up of the article.

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