



FlashReport

Preemptive strike: An experimental study of fear-based aggression

Dora Simunovic^a, Nobuhiro Mifune^b, Toshio Yamagishi^{c,*}^a Department of Behavioral Science, Hokkaido University, N10 W7 Kita-ku, Sapporo 060-0810, Japan^b Nobuhiro Mifune, School of Management, Kochi University of Technology, Tosa Yamada Cho, Kami-shi, Kochi-ken 782-8502, Japan^c Center for Evolutionary Cognitive Sciences, The University of Tokyo, 3-8-1 Komaba, Meguro-ku, Tokyo 153-8902, Japan

HIGHLIGHTS

- We found that 50% of the participants chose to use the preemptive attack option for no personal gain.
- The option was rarely used when the opponent did not have a capability of preemptive attack.
- Thus, the preemptive attack was fear-based, not involving the goal of hurting the opponent.
- The frequency of the option use was not affected by the minimal group membership of the opponent.

ARTICLE INFO

Article history:

Received 30 April 2013

Revised 28 July 2013

Available online 14 August 2013

Keywords:

Aggression

Group bias

Minimal group

Spite

ABSTRACT

The mere presence of a potential threat of attack was found to be sufficient to lead a significant proportion of participants to engage in preemptive attacks toward potential threats; this response occurred even without an incentive for either party to attack the other. We developed a new experimental game—the preemptive strike game (PSG)—to demonstrate this tendency for defensive aggression. We also found that the rate at which participants attacked an individual representing a potential threat was not influenced by their minimal group membership; participants were no less likely to preemptively attack a member of their own minimal group and no more likely to use aggression against members of another minimal group. These findings indicate a need to further examine the role that fear-based defensive aggression, rather than anger-based spiteful aggression, plays in inter-individual and inter-group conflict.

© 2013 The Authors. Published by Elsevier Inc. Open access under [CC BY license](http://creativecommons.org/licenses/by/3.0/).

Introduction

Following a 2002 speech at West Point, the administration of then-President George W. Bush adopted a new emphasis on pre-emption in their National Security Strategy, stating that “[t]he greater the threat, the greater the risk of inaction—and the more compelling the case for taking anticipatory action to defend ourselves” (The White House, 2002). The Bush doctrine was implemented the following year when the US invaded Iraq with the stated purpose of destroying the threat of mass destruction posed by the latter. In the wake of 9/11, a substantial majority of Americans supported this preemptive strike, despite the lack of clear reasons for a potential attack on the US (Eichenberg, Stoll, & Lebo, 2006). In the current study, we examined how likely people are to engage in this type of defensive aggression even in the absence of incentives for either party to attack the other. For this purpose, we designed the preemptive strike game (PSG), a two-person economic game in

which neither player has an incentive to attack the other, insofar as both players are rational and assume that the other is rational. In this game, each player is given an option to press a button before the other player presses it. Pressing the button involves some monetary cost. The player who presses the button first imposes monetary costs on the opponent, which are greater than those incurred by the player who presses the button. The gist of this game is that a first strike secures a player from enduring further aggression from his/her opponent. Once one of the players presses the button, the other player cannot retaliate by pressing the button in response. Reasons for engaging in a preemptive strike in this situation is a player's spiteful preference (Falk, Fehr, & Fischbacher, 2005) or a belief that the other party is irrational, stupid, confused, or has a spiteful preference (Andreoni, 1995; Schelling, 1980).

The primary goal of this study is to demonstrate that the mere presence of an interaction partner capable of attacking a given player is sufficient for the latter to engage in a preemptive attack. This goal was achieved in Study 1, which demonstrated that a substantial proportion of our participants engaged in a preemptive attack when their interaction partner had the capability to attack them, while they did not do so when their partner did not have such capability. The second goal of this study was to examine whether this type of defensive aggression would be aggravated in an inter-group situation, as opposed to a

* Corresponding author. Fax: +81 42 739 7221.

E-mail addresses: saveusmilkboy@gmail.com (D. Simunovic), n.mifune@gmail.com (N. Mifune), yamagishitoshio@gmail.com, tyamagish@aol.com (T. Yamagishi).

within-group situation. As a first step toward addressing the second issue, we conducted a minimal group experiment in Study 2 to see if group membership affected the frequency of the preemptive attack.

Previous research has found evidence that members of the in-group show greater spite toward the out-group than the in-group (Bernhard, Fischbacher, & Fehr, 2006); this has been observed even when the groups were formed on the basis of meaningless criteria and without any prior interaction or shared interests between the group members (called minimal groups; Tajfel, Billig, Bundy, & Flament, 1971). Given the standard interpretation of in-group bias in minimal group experiments, we expected relatively stronger spite-based behavior against out-group members than in-group members. Furthermore, previous research has found positive in-group bias and negative out-group bias in the judgment of members' personal qualities (Brewer, 1979; Hewstone, Rubin, & Willis, 2002). It is likely that this bias reduces an individual's anticipation of attack from in-group members and/or enhances fear of attack from out-group members, leading to the prediction that defensive aggression would be weaker when the opponent is an in-group member, rather than an out-group member.

An alternative interpretation of in-group bias in minimal group experiments from the interdependence theoretic perspective (Mifune, Hashimoto, & Yamagishi, 2010; Yamagishi & Mifune, 2008, 2009) predicts no group difference in spite-based aggression against the out-group. According to the proponents of the interdependence theoretic perspective, in-group bias represents a means of enhancing the player's reputation as a person deserving favors from members of his/her group. Yamagishi and colleagues (e.g., Horita & Yamagishi, 2010; Jin & Yamagishi, 1997; Kiyonari, 2002; Yamagishi & Mifune, 2008, 2009) conducted a series of experiments in which participants behaved more cooperatively or altruistically toward in-group members than out-group members when, and only when, they were identified by in-group members as members of the same group. In contrast, no group difference was observed when participants knew that their partners were in-group members who were, however, unaware of the participant's membership. These findings have been interpreted to show that stronger spite against the out-group is not the main motivational basis for the in-group bias observed in minimal group studies; rather, inter-group aggression is considered a by-product of in-group cooperation particularly in situations in which the latter requires negative side effects for the out-group (Halevy, Bornstein, & Sagiv, 2008). Since the PSG involves no in-group cooperation, there is no reason for participants to act in a manner that favors the in-group. This is also true for members of the out-group; thus, there is no reason to be afraid of an attack occurring as a result of in-group cooperation among members of the out-group. On this basis, there could be no fear-based in-group bias too. We tested the two alternative hypotheses mentioned above by using the PSG in which participants faced an in-group or out-group opponent.

Study 1: Bilateral and unilateral preemptive strike games

In the PSG used in our study, participants chose between two options: 1) press a red button displayed on the computer screens, or 2) take no action. Their decisions were made in real time and only once. If neither player pressed the red button during the allotted time (60 s), they both walked away with the highest possible payoff, JPY 1500. If one of the players pressed the button, he/she paid JPY 100, while the other player paid an even higher amount, JPY 1000, and lost his/her ability to press the button.

Insofar as the players in this game are rational maximizers of their own money, the only motive to press the button is self-defense against a potential threat of aggression from the opponent. However, it is possible for the players to be motivated by spite. In other words, participants may press the button to ensure their dominance over another person by harming the other player's relative standing in the game. In Study 1, we compared a unilateral condition of the PSG to the original (bilateral) game to demonstrate that the attacks occurring in the PSG were not motivated by spite. In the unilateral condition, the red button was presented

to only one of the two players, leaving the other player without the option to press the button. This manipulation rids the "powerful player" of a reason to anticipate an aggressive action from his/her opponent and, as a result, provides no reason for this player to act out of self-defense.

Procedure

Participants

Eighty-four students from Hokkaido University (34 female) participated in 16 experimental sessions, with eight participants per session. Thirty-two participants (13 female) took part in the bilateral PSG; 26 of these (11 female) took on the role of the decider, who was provided with the red button in the unilateral PSG, and 26 participants (10 female) took on the role of the predictor, who did not have any button and simply predicted the decider's choice. The predictors' data from the unilateral condition were not used for analysis. Because the nature of the experiment required an even number of participants, a confederate was used in cases of cancellation. The confederate's choice in the bilateral condition did not affect the matched participant's choice because his/her decisions were not revealed until the end of the game. The confederates were assigned the role of predictor in the unilateral condition.

PSG

The participant faced a computer surrounded by partitions that prevented others in the room from seeing him/her. Participants were told that they would be randomly paired with one other person from the room, who would remain unknown to them. The instructions also stated that the game would be played only once. After the participants completed a practice session following the instructions, the experimenter announced the beginning of the game. Participants were given a 5-second countdown before the 60-second game began. Feedback about the outcome of the game was given after expiry of the allocated time. We analyzed whether each participant pressed the red button, regardless of whether he/she did so before his/her partner did. In the case of both players pressing the button, payment was decided on the basis of who pressed the button first.

Hypothetical PSG

After completing the game, participants took part in an additional hypothetical experiment in which they were told to imagine a situation where they faced the same game. They were further informed that they would have an additional "blue" button. They could press the red button, the blue button, or neither. Pressing the red button had the same effect as in the real experiment. Pressing the blue button reduced both players' respective rewards by JPY 100 and disabled further attacks, without imposing the loss of JPY 1000 on the other player. If players only sought to defend themselves against a possible attack, they would opt for pressing the blue button.

Results

PSG

In the bilateral condition, 16 of the 32 participants (50%) pressed the red button, while only 1 of the 26 participants acting as deciders in the unilateral condition did so (Fig. 1). The difference between the conditions was statistically significant ($\chi^2[1, N = 58] = 14.57, p < .01$). All of the participants who pressed the red button in the bilateral condition did so within the first second of the game. This finding suggests that the participants who pressed the button did so with a clear understanding of the implications of their actions, as it would be logical to press the red button as quickly as possible. The sole attacker in the unilateral condition pressed the button 53.8 s into the game.

Hypothetical PSG

The results of the hypothetical experiment confirmed that the overwhelming majority of the participants who pressed the button

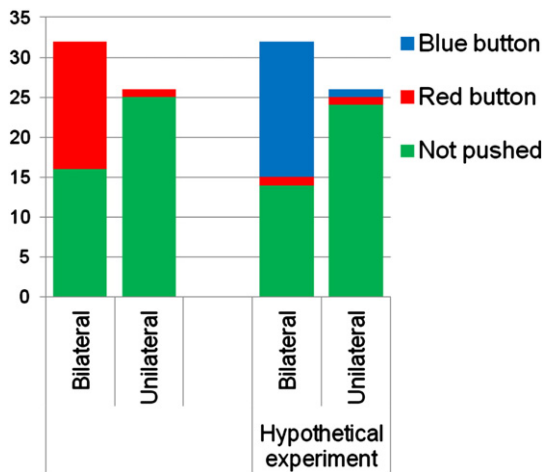


Fig. 1. The number of participants (by condition) who attacked or did not attack in Study 1 (left), and the number of decisions to press the red or blue button, or neither, in the hypothetical experiment in Study 1 (right).

(“attackers”) did so as a measure of self-defense, rather than spite. That is, 13 of the 16 attackers opted to press the blue button rather than the red button, while 2 opted to press neither button, and only 1 pressed the red button. Four of the sixteen non-attackers opted to press the blue button, and none of them opted to press the red button. These results suggest that only one participant in the real experiment pressed the red button out of spite, whereas the others did so as a means of self-defense.

Study 2: Minimal groups

We followed up Study 1 with a PSG in which participants were assigned to minimal groups.

Procedure

A total of 132 students took part in 14 experimental sessions, with 6 to 10 participants per session. They were first asked to participate in the picture preference task. They were shown 28 pairs of pictures by either Paul Klee or Wassily Kandinsky and asked to choose which picture they liked more in each pair. Participants were then assigned either to the Klee group or the Kandinsky group on the basis of their preferences for the two artists, and subsequently answered identity scales assessing the strength of in-group and out-group identification (Grieve & Hogg, 1999). They were then randomly assigned to either the in-group condition or the out-group condition, and played the PSG either with a member of the same group or the other group. As in Study 1, participants took part in an additional hypothetical experiment with the option of a blue button. A confederate was used in the case of a cancellation.

Results

Manipulation check

Participants' mean level of identification with the in-group ($M = 4.28$, $SD = 1.16$) was significantly stronger than that with the out-group ($M = 4.07$, $SD = 1.03$; $t(131) = 2.43$, $p < .05$). This result confirms that our minimal group manipulation was effective.

PSG

Of the 132 participants, 40 (30.3%) pressed the red button; there was no significant difference between the in-group and the out-group conditions ($\chi^2[1, N = 132] = .18$, $p = .67$), with 29% of the 73 participants in the in-group condition and 32% of the 59 participants in the out-group condition pressing the red button (Fig. 2). Of the 40 attackers,

37 did so within the first second of the game; an additional three attacked at 1.3, 2.1, and 4.7 s, respectively.

Hypothetical PSG

The results of the hypothetical experiment confirmed that the overwhelming majority of the attackers in the real experiment opted to press either the blue button (76% of the attackers in the in-group condition, 68% in the out-group condition) or neither button (14% in the in-group condition, 21% in the out-group condition). Only 2 of the 21 attackers in the in-group condition and 2 of the 19 attackers in the out-group condition pressed the red button. None of the non-attackers pressed the red button (Fig. 2).

Overall discussion

Intergroup aggression has traditionally been treated as a form of affective or predatory aggression, but defensive aggression, such as the preemptive attack in the current PSG study, does not fully correspond with either type of aggression (Berkowitz, 1993; McElliskem, 2004). The overwhelming majority of participants who acted aggressively (i.e., imposed harm on the other participant) in the current study did not desire to harm the opponent, as shown by the fact that most of them opted for the more benign blue button when this option was available. The act of a preemptive strike was thus found to be a means of self-defense, based on the fear of being attacked first. While fear has been traditionally linked to flight rather than fight (cf., Cannon, 1932), the finding that approximately half of the participants engaged in the preemptive strike option for no personal gain highlights the role that the “benign,” defensive form of aggression plays in inter-individual and inter-group conflict. In fact, defensive aggression can produce consequences as serious as those triggered by spiteful aggression, as exemplified by the role played by the support for the Bush Doctrine in swaying Americans toward supporting the Iraq War.

Although the current study found no group difference in defensive aggression insofar as minimal groups are concerned, the role of fear in instigating intergroup aggression has been demonstrated in earlier studies (Bar-Tal, 2001; De Dreu et al., 2010). Furthermore, it has been noted that the role played by fear, in addition to greed, in inter-group conflict is stronger in group-level decisions, as compared to individual decisions (Insko, Schopler, Hoyle, Dardis, & Graetz, 1990; Schopler et al., 1993; see Wildschut, Pinter, Vevea, Insko, & Schopler, 2003, for a review). This suggests that the fear of being attacked by an opponent could be stronger when the opponent is a group, rather than an

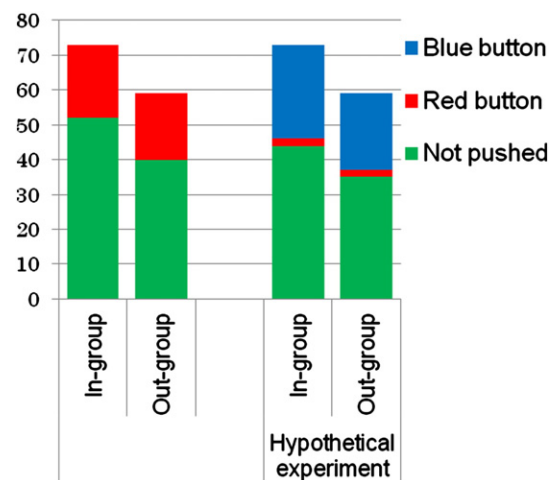


Fig. 2. The number of participants (by group condition) who attacked or did not attack in Study 2 (left), and the number of decisions to press the red or blue button, or neither, in the hypothetical experiment in Study 2 (right).

individual. Thus, it is possible that the preemptive strike in the PSG occurs more frequently in a group-level decision than in an individual decision. The absence of group bias in our study could be due to the fact that we studied the effect at the individual level, or that the PSG was played in a negative domain where in-group bias is known to be rare (Brewer, 1979; Mummendey & Otten, 1998). Therefore, in the future, it is important to study whether preemptive attacks against the out-group increase when the decision is made by the group, rather than the individual. The findings from the current study will serve as a baseline for evaluating the possible roles of additional factors, including the individual–group discontinuity effect, in future research.

Acknowledgments

The experiments reported in this paper were supported by a grant-in-aid for scientific research (#23223003), awarded to Toshio Yamagishi by the Japan Society for the Promotion of Science. We would like to thank Arisa Miura and Yang Li for their assistance in conducting the experiments.

References

- Andreoni, J. (1995). Cooperation in public-goods experiments: Kindness or confusion? *The American Economic Review*, 85, 891–904.
- Bar-Tal, D. (2001). Why does fear override hope in societies engulfed by intractable conflict, as it does in the Israeli society? *Political Psychology*, 22, 601–627.
- Berkowitz, L. (1993). *Aggression: Its Causes, Consequences, and Control*. New York: McGraw-Hill.
- Bernhard, H., Fischbacher, U., & Fehr, E. (2006). Parochial altruism in humans. *Nature*, 442, 912–915.
- Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive–motivational analysis. *Psychological Bulletin*, 86, 307–324.
- Cannon, W. B. (1932). *The Wisdom of the Body*. New York, NY: Norton.
- De Dreu, C. K. W., Greer, L. L., Handgraaf, M. J. J., Shalvi, S., van Kleef, G. A., Baas, M., et al. (2010). The neuropeptide oxytocin regulates parochial altruism in intergroup conflict among humans. *Science*, 328, 1408–1411.
- Eichenberg, R. C., Stoll, R. J., & Lebo, M. (2006). War president: The approval ratings of George W. Bush. *Journal of Conflict Resolution*, 50, 783–808.
- Falk, A., Fehr, E., & Fischbacher, U. (2005). Driving forces behind informal sanctions. *Econometrica*, 73, 2017–2030.
- Grieve, P., & Hogg, M.A. (1999). Subjective uncertainty and intergroup discrimination in the minimal group situation. *Personality and Social Psychology Bulletin*, 25, 926–940.
- Halevy, N., Bornstein, G., & Sagiv, L. (2008). “In-group love” and “out-group hate” as motives for individual participation in intergroup conflict: A new game paradigm. *Psychological Science*, 19, 405–411.
- Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology*, 53, 575–604.
- Horita, Y., & Yamagishi, T. (2010). Shudan wo kibanto shita gokeisei no tekio kibana [Adaptive foundations of group-based reciprocity]. *Shinrigaku Kenkyu: The Japanese Journal of Psychology*, 81, 114–122.
- Insko, C. A., Schopler, J., Hoyle, R. H., Dardis, G. J., & Graetz, K. A. (1990). Individual–group discontinuity as a function of fear and greed. *Journal of Personality and Social Psychology*, 58, 68–79.
- Jin, N., & Yamagishi, T. (1997). Shakaiteki jiremma ni okeru shudan kyoryoku hyurisuittoku no kouka [Group heuristics in social dilemma]. *Japanese Journal of Social Psychology*, 12, 190–198.
- Kiyonari, T. (2002). Ippan koukan sisutemu ni taisuru kitai: tozasareta goshusei no kitai ni kansuru jikken kenkyu [Expectations of a generalized exchange system and ingroup favoritism: An experimental study of bounded reciprocity]. *Shinrigaku Kenkyu: The Japanese Journal of Psychology*, 73, 1–9.
- McEllislem, J. E. (2004). Affective and predatory violence: A bimodal classification system of human aggression and violence. *Aggression and Violent Behavior*, 10, 1–30.
- Mifune, N., Hashimoto, H., & Yamagishi, T. (2010). Altruism toward in-group members as a reputation mechanism. *Evolution and Human Behavior*, 31, 109–117.
- Mummendey, A., & Otten, S. (1998). Positive–negative asymmetry in social discrimination. In W. Stroebe, & M. Hewstone (Eds.), *European Review of Social Psychology*, Vol. 9. (pp. 107–143) New York: Wiley.
- Schelling, T. C. (1980). *The Strategy of Conflict*. Cambridge, MA: Harvard University Press.
- Schopler, J., Insko, C. A., Graetz, K. A., Drigotas, S., Smith, V. A., & Dahl, K. (1993). Individual–group discontinuity: Further evidence for mediation by fear and greed. *Personality and Social Psychology Bulletin*, 19, 419–431.
- Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, 1, 149–178.
- The White House (2002). National Security Strategy of the United States. U.S. State Department, Washington, DC. <http://www.state.gov/documents/organization/63562.pdf>
- Wildschut, T., Pinter, B., Vevea, J. L., Insko, C. A., & Schopler, J. (2003). Beyond the group mind: A quantitative review of the interindividual–intergroup discontinuity effect. *Psychological Bulletin*, 129, 698–722.
- Yamagishi, T., & Mifune, N. (2008). Does shared group membership promote altruism? Fear, greed and reputation. *Rationality and Society*, 20, 5–30.
- Yamagishi, T., & Mifune, N. (2009). Social exchange and solidarity: In-group love or out-group hate? *Evolution and Human Behavior*, 30, 229–237.