Working Paper

विद्याविनियोगाद्विकासः
IIM
AHMEDABAD

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD

Triangle Effect and the Connotative Meaning of Trust in Prisoner's Dilemma

by

Sasi Misra
Amar Kalro

W P No. 257
Nov. 1978

Indian Institute of Management
Ahmedabad

Triangle Effect and the Connotative Meaning of Trust in Prisoner's Dilemma

Sasi Misra and Amar Kalro

Indian Institute of Management

Ahmedabad

Abstract

Two hundred and fortynine male postgraduate students of management played the Prisoner's Dilemma Game (Deutsch, 1960) and filled out a postgame questionnaire measuring attitude toward the "other player". Striking differences resulted between trusting and trustworthy subjects on the one hand and suspicious and untrustworthy subjects on the other with respect to different meanings given to the dimension of trust (cooperation) in the interaction. As predicted, trusting behaviour of the other player was given a positively evaluative meaning--good versus bad--by the trusting and trustworthy subjects and negatively dynamism meaning--weak versus strong--by the suspicious and untrustworthy subjects. The trusting players expected the typical other to make either trusting or suspicious moves, whereas the suspicious subjects expected the typical other to be uniformly suspicious, yielding a high Triangularity Index (Kelley and Stahelski, 1970). Most provocatively, while 51% of trusting subjects thought that the other player was a female, 81% from among the suspicious subjects though so. Some implications of the results in interpersonal and organizational situations are discussed.

Introduction

It is assumed that by studying behaviour in Prisoner's Dilemma Game (PDG), we learn something about how one person's perceptions of another determine his own strategies to respond either cooperatively or competitively. This paper reports some striking findings relating the behaviour of subjects in Prisoner's Dilemma to their perceptions of and beliefs about the other player. The impetus stemmed from certain empirical generalizations drawn by Kelley and Stahelski (1970) concerning the basis of cooperators' and competitors' beliefs about others.

Based on evidence derived from the extensive literature employing the PDG and similar mixed-motive games, Kelley and Stahelski have concluded that individuals with competitive orientations to social relationships believe the world to be composed homogeneously of competitive individuals. By contrast, those with cooperative orientation construe the world to be more heterogeneously composed of both competitive and cooperative people. The first purpose of our study was to test the cross-cultural generality of the heterogeneity of expectations by cooperators and homogeneity of expectations by competitors about others, by using the now familiar one-trial alternating play procedure with PDG (Deutsch, 1960)[1].

Kelley and Stahelski have represented the relationship between a person's own orientation in the game and his expectations about the other's orientation by a triangular plot (see Figure 1) termed the triangle hypothesis. The extent to which data conform to the triangle pattern is given by the triangularity index (TI), which can be computed by the following formula :

TI = (D - C) - |A - B|, where A, B , C and D refer to the percentage of subjects falling into various cells in terms of their own behaviour vis-a-vis their expectations of the typical other player (see Figure 2).

Insert Figures 1 and 2 about here

The index becomes larger the more D exceeds C and becomes smaller as there is any difference in either direction between A and B. The index is positive for a triangular pattern oriented in the expected direction. A perfect triangular pattern of the type expected would yield a TI of 100 (A = B = 50% and D = 100%). However, the triangularity indices computed for several Western studies reported by Kelley and Stahelski ranged from 28 to 71.

The triangle hypothesis is valid to the extent that the expectations of cooperative subjects are evenly distributed across the top row and the

expectations of competitive subjects pile up at the extreme right side of the bottom row. The implication of the triangle hypothesis is that while trusting Ss will expect the other to be either trustworthy or untrustworthy, most of the suspicious Ss will expect the other to be untrustworthy. Thus, our first hypothesis may be stated as follows :

Hypothesis 1. With respect to the relationship between a player's own choice and his expectation of the other's move, the expectations of trusting (cooperative) Ss about the "typical other" will be substantially more evenly distributed across the top row as compared with the expectations of the suspicious (competitive) Ss, yielding a highly positive triangularity index.

The second purpose of the study was to explore whether cooperators and competitors attach qualitatively different meanings to the behaviour of the other player. It was assumed that cooperators and competitors would differ with respect to their definitions of the same objective situation (in this case, a nonzero-sum situation). Consequently, there will be differences between the two types in perceiving and evaluating the "other player" (in this case the cooperator) in the situation.

Particularly, we expected to find systematic differences between trusting and trustworthy subjects (cooperative choices at both first and second position play) on the one hand and suspicious and untrustworthy

subjects (competitive choices at both positions) on the other in terms of their connotative meanings of cooperative behaviour. These differential indices might be sensitive to their different beliefs about others, as suggested by the triangle hypothesis.

Kelley et al (1970), in a transnational study of bargaining, found remarkable site differences with respect to the meanings given to the dimensions of cooperation versus competition which influenced negotiation outcomes and subsequent interactions. As measured by Semantic Differentials, at some sites this cooperation-competition dimension was given an "evaluative" meaning (E), i.e. good versus bad; at other sites it was given a "dynamism" meaning (D), i.e. weak and passive versus strong and active.

It is apparent from the structure of the game used in the present experiment that a trusting and trustworthy subject is concerned about joint welfare and is essentially egalitarian in orientation. This could lead him to treat the nonzero-sum game as a setting to demonstrate his basic honesty and fair-mindedness. Perhaps based on this premise, his move on the first trial is a trusting one. On the second trial, those who follow this by a trustworthy move in response to the other player's trusting move do so presumably because they feel it is wrong not to return the trust placed in them. Consequently, their assessment of the other person is more likely to be in evaluative terms such as moral, honest, peaceful, etc. This is also consistent with their opinion of themselves.

Conversely, the player whose first move is suspicious treats the nonzero-sum game setting as a zero-sum game in which he can demonstrate his superiority and one-upmanship by maximising his individual gain. On account of his egoistic and rivalrous orientation, his second move in response to the other player's trusting move is untrustworthy, because this maximises the difference between his pay-off and the other player's pay-off to his own advantage. Accordingly, he perceives the other player as a weakling and a coward; chicken for his plucking. Thus it is hypothesised.

Hypothesis 2. Ss who make trusting and trustworthy choices will rate the other trusting player high on the Evaluative (E) and low on the Dynamism (D) dimension as measured by Semantic Differentials. The reverse trend in ratings of the cooperator will be obtained for suspicious and untrustworthy (competitive) Ss.

Method

The subjects were 249 male postgraduate students of Management at the Indian Institute of Management, Ahmedabad[2]. Each S participated in a two-person, nonzero-sum PD game in which the amount of gains or losses incurred by each player in terms of imaginary money was a function of his move and that of the "other" player who, in fact, was fictional. The pay-off matrix was identical to the one reported by Deutsch (1960) except that the pay-offs were in rupees instead of dollars. The experiment was held

during one of the regular class sessions.

At the outset, the information from Figure 3 was presented and explained to the Ss. The E ascertained that the Ss fully understood all the possible outcomes of any combination of choices.

Insert Figure 3 about here

Following Deutsch's procedure, Ss were given no motivational orientation : cooperative, competitive or individualistic. They were allowed to assume whatever orientation they wished to assume vis-a-vis the other player. No subject knew the personal identity of the other player. Every subject was also told that the other player was not aware of his/her personal identity. The Ss participated in two trials. On the first, each S made his choice between Rows I and II, after first indicating what he expected the other player to choose (Column I or II).

On the second trial, each S, presumably playing with a different person from the first, was asked to indicate what he thought the other person expected him to choose. At this point, each S was provided with the choice presumably made by the other person (this always being the trusting or cooperative choice) in a similar game conducted earlier on a sample of similar graduate students and was asked to make his own choice.

Postgame attitude measures : After each S finally made his move, the E explained that he was conducting a study of first impressions in conjuction with the gaming study to learn more about how accurate people are in forming such impressions on the basis of rather limited information.

First, each S was asked to guess whether the other person was a male or a female, following which he answered the first impression questionnaire which consisted of seven adjective pairs on bipolar scales (the semantic differential). The adjective pairs used were identical to those used by Kelley et al, cited above. The connotative meanings of three pairs (dishonest-honest, hostile-peaceful, and immoral-moral) were Evaluative and the remaining four (passive-active, weak-strong, cowardly-brave, and foolish-wise) represented the Dynamism factor. The positive pole of the Evaluative factor was represented by honest, peaceful and moral and that of the Dynamism factor by active, strong, brave and wise. Scores on the three evaluative adjective pairs were summed up to form an index of evaluative definition (E) attributed to trust (cooperation) and composite scores on the four dynamism adjective pairs yielded the dynamism definition (D) of trust.

Upon completion of the questionnaire, subjects were debriefed and explained the purpose of the experiment.

Results

The data concerning the relationship between choices in the two positions (see Table 1) showed that Ss who made the "trusting" choice in the first position tended to be "trustworthy" in their second position choice; on the other hand Ss who were "suspicious" to begin with tended to be "untrustworthy" when they played the second time ($\chi^2 = 29.5$ $p < .001$). Although our results generally conform to the results of Deutsch in the American setting, the symmetry of the Ss behaviour in his two complementing roles vis-a-vis the other person is not as striking. Furthermore, the proportion of Ss making the "trusting" move in the first position was considerably smaller, which may have been influenced by the widely prevalent business ideal of "competition".

Insert Table 1 about here

Predicting sex of the other player

Most provocative here is the result that while 36 out of 70 (51%) "trusting" Ss thought that the other player was a female, 145 out of 177 (81%) "suspicious" Ss indicated that the other player was a female (see Table 1).

The Triangle Effect

Hypothesis 1 predicted that with respect to relationship between a player's own choice and his expectation of the other's move, the expectations

of "trusting" Ss about "typical other" would be more evenly distributed across the top row as compared with the expectations of the "suspicious" Ss. As discussed earlier, this would yield a highly positive Triangularity Index. The TI obtained for our data was 54 (see Table 2). This TI is satisfactorily high in relation to the TIs reported by Kelley and Stahelski for a number of studies conducted in the West. The indices for these studies ranged from 28 to 71.

Insert Table 2 about here

Trust and the connotative meaning of cooperation

It was hypothesized that Ss who made "trusting" and "trustworthy" choices would rate the "other player" high on Evaluative (E) factor and low on Dynamism (D) factor. The data did clearly bear out this prediction and the reverse trend was obtained in ratings of the other player by the "suspicious" and "untrustworthy" Ss. The difference was statistically significant ($F = 11.48$, df 3,247, $p < .001$; $F = 24.12$, df 3,245, $p < .001$ respectively).

Insert Table 3 about here

Discussion

The results of our study provide clear support for the triangle hypothesis and hypothesis pertaining to the connotative meaning of trust

attributed by the trusting and trustworthy subjects on the one hand and the suspicious and untrustworthy subjects on the other.

Comparing the expectations of trusting and suspicious subjects with respect to the typical other in the first position play, it is clear that the suspicious subjects indeed show a tendency to be blind towards the true variability and uniqueness of people and things. They are prone to have developed what Osgood (1961) has called the "two-valued orientation". They prefer to categorize things as polar opposites : you vs. me; union vs. management; we vs. they. The trusting subjects, on the other hand, tend to reflect greater heterogeneity in outlook with respect to their expectations about others.

Secondly, our results clearly show that in the estimation of the trusting and trustworthy subjects, the "trusting other" is one who is described as honest, peaceful and moral. In contrast, for the suspicious and untrustworthy subjects, the "trusting other" is one who is passive, weak, cowardly, and foolish. It is, therefore, not surprising that 81% of the suspicious subjects consider the fictional other person in the game as a female. It is entirely consistent with their traditional role expectation for females to be passive, weak, and dependent. It may be noted that our trusting subjects appear to be more "androgynous" (Bem, 1974) who will be more flexible and responsive to given situations and less affected by

role demands. In an earlier study, Wrightsman (1966) also found trusting Ss as having generally positive and altruistic attitudes towards human nature.

Despite the often levelled criticism that conclusions drawn from research with experimental games cannot be generalized to conflicts and cooperation occuring in real life settings, the PD game simulates the very important class of social interaction setting, which is relatively free from situational constraints of social roles and structure. It is, therefore, rich in person information and the response strategies of subjects in this interpersonal game reflect the orientations they tend to adopt in a wide variety of their social relationships. Our subjects being trained to become professional managers, do perform key roles and occupy, in good time, policy-making positions in competitive organizational settings. What attitudes and feelings are our competitive subjects likely to harbour toward a woman in executive position whose formal role may require her to be assertive and directive, which is different from what our subjects expect her to be? How are these people likely to perceive the union point of view across the negotiation table? The detrimental consequences of having managers performing certain categories of functions, such as, personnel and industrial relations, whose beliefs about people are like those of our competitors' are too obvious to elaborate further.

Footnotes

1. It is assumed that the reader is familiar with the structure of this nonzero-sum matrix game in which both players have a simultaneous and independent choice between a "cooperative" and a "non-cooperative" alternative. The crucial feature of such a game is that one player can gain the most by choosing to be non-cooperative when the other chooses to be cooperative; he loses most when the reverse is true. However, for each player mutual cooperation is a better strategy than mutual noncooperation. Since a true PD game is a one-play game without repetition, a player's strategy reflects his trus t in the other player.

2. In fact, 260 Ss participated in the experiment, out of which nine were females and two were foreign students. These 11 Ss were dropped from statistical analysis as the data-base was deemed meagre. However, it may be noted that all nine females made suspicious choice in the first trial and four out of nine made trustworthy choice in the second trial.

3. All p values are two-tailed.

References

Bem, Sandra L., Sex role adaptation: one consequence of psychological androgyny. Journal of Personality and Social Psychology, 1975, 31, 634-643.

Deutsch, M. Trust, trustworthiness, and the F scale. Journal of Abnormal and Social Psychology, 1960, 61, 138-140.

Kelley, H.H., & Stahelski, A.J., Social interaction basis of cooperators' and competitors' beliefs about others. Journal of Personality and Social Psychology, 1970, 16, 86-91.

Kelley, H.H., Shure, G.H., Deutsch, M., Faucheux, C., Lanzetta, J.T., Moscovici, S., Nuttin, J.N., Jr., & Rabbie, J.M., A comparative experimental study of negotiation behaviour. Journal of Personality and Social Psychology, 1970, 16, 411-438.

Osgood, C.E., An analysis of the cold war mentality. Journal of Social Issues, 1961, 17(3), 12-19.

Wrightsman, L.S., Personality and attitudinal correlates of trusting and trustworthy behaviours in a two-person game. Journal of Personality and Social Psychology, 1966, 4, 328-332.

Acknowledgment

This research was funded by a Seed Grant to the authors by the Indian Institute of Management, Ahmedabad.

Requests for reprints may be sent to Sasi Misra, Indian Institute of Management, Ahmedabad.

Table 1

Relationship Between Choices in the First and Second Positions

First Position Choice	Second Position Choice	
	Trustworthy (A)	Untrustworthy (B)
Trusting (X)	42	28
	(20)[a]	(16)
Suspicious (Y)	41	138
	(36)	(109)

[a] Figures in parentheses denote number of Ss in each cell who indicated that the other player was a female when playing in second position.

Table 2

Relationship Between Own Orientation and Expectation as to Other's Orientation

Self	Expectation - typical	
	Trusting	Suspicious
Trusting	41 (58.5%)	29 (41.5%)
Suspicious	26 (14.5%)	153 (85.5%)

T.I. = 54

Table 3

Means and Standard Deviations of Responses to Measures of Meaning of Trust/Cooperation

	Evaluative		Dynamism	
	M	SD	M	SD
Trusting/Trustworthy	18.33	2.62	12.43	5.26
Trusting/Untrustworthy	14.86	2.82	16.61	5.07
Suspicious/Trustworthy	16.93	2.15	16.23	4.58
Suspicious/Untrustworthy	15.62	3.28	19.49	4.74
F	11.48*		24.12*	

* df. 3,245 ; p <.001

Figure 1

The Triangle Hypothesis

Expectation as to Others' Orientations

		Trusting (Cooperative)			Suspicious (Competitive)	
	Trusting	X	X	X	X	X
Own			X	X	X	X
Orientation				X	X	X
	Suspicious				X	X
						X

Figure 2

		Expected typical	
		Cooperative	Competitive
Self	Cooperative	A	B
	Competitive	C	D

The values of A, B, C and D are in percentages.