Developments in Business Simulation & Experiential Exercises, Volume 13, 1986

RELATIONSHIPS BETWEEN TEAM COHESION DIMENSIONS AND BUSINESS GAME PERFORMANCE

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ABSTRACT

Numerous hypothesized relationships between student team cohesion and its antecedents were tested in a Business Policy course using a fairly complex computer- based business game. While a number of cohesion factors approached a significant relationship with team economic performance, the team's grade-point-average and aptitude homogeneity, the possession of an acknowledged leader with high grades and an economic orientation, and decision-time efficiency were most closely- related to group success.

INTRODUCTION

Team play or the group decision-making process has been a traditional part of the business gaining movement since its inception. Either because of a particular game's complexity, the realization that many real-world decisions are made in groups, or the need to integrate functional areas in a game's typical business policy course application, good teamwork or a highly cohesive decision-making work unit has been accepted as a requisite for both optimal learning and high game performance. As a learning experience this team aspect has been cited as an additional learning source over and above that provided by the simulation's model, a device for improving participation by creating a common experience-base for all players, and as a way of personalizing and making more relevant the knowledges derived from a course using a business game. While there has been a large number of investigations of both the substantive results of gaming exercises and the relationship between student aptitudes and achievement levels and game performance, little direct research has been conducted on the particular group processes that are associated with superior gaming performance. This paper reports an investigation into the role of team cohesiveness and its antecedents as they relate to the economic performance of student teams in a relatively complex business game.

LITERATURE REVIEW

Small Croup Literature on Cohesion

Croup cohesion has been described by Cartwright and Zander [3] as a feeling of togetherness or a sense of mutual attraction with a sacrifice of the self for the accomplishment of the group's objectives. This cohesiveness produces conformity, stability and behavior control within the group. As outlined by Shaw [32], cohesiveness has historically embraced three different meanings in the small group literature-- the intra- group attractiveness of its members, the group's morale or motivation level, and the basis or ease of coordinating the group's efforts. In the first historical meaning, attraction is based on the individual's similarity to the group's collective configuration with similarity being judged more In the social and/or personality realm than in the intellectual [13]. The social aspect is evidenced through the literature's use of sociometric measurements, mutual peer nominations or selections, and least/most preferred co-worker choices [32]; the personality aspect has been evidenced through research on the effects of homogeneity of needs such as needs for authority [30] or dominance [10;35].

Research into the positive or negative effects of intellectual diversity on cohesiveness has generated somewhat mixed results. Shaw [31] studied four-person teams solving problems in centralized versus decentralized decision structures with team homogeneity measured by the team's average deviation in SAT scores. Correlations between homogeneity and performance were non-significant and ranged from -.07 to .38. Alternatively, both Cold- man [12] and Laughlin, Branch and Johnson [21] respectively employing two and three-member teams of college students, found that performance improvements were the greatest for intellectually heterogeneous teams. These studies, however, investigated a team's productivity assuming that intellectual heterogeneity would be a source of team dissension and did not directly investigate the effects of heterogeneity on cohesiveness.

The effect of cohesiveness on team productivity has been more thoroughly researched. Highly cohesive groups appear to be able to set performance standards more easily [8] and they can offer a greater array of rewards to their members. Shaw and Shaw [33] found that cohesive groups of second grade students learned how to spell more quickly and that they additionally provided social and personal support to their members in the process. The high-cohesion groups were co-operative and friendly, praised each other often, and used a democratic form of behavior control. The low-cohesion groups were hostile and aggressive towards each other, were delighted when team-mates made mistakes, and employed an autocratic decision-making style over group affairs.

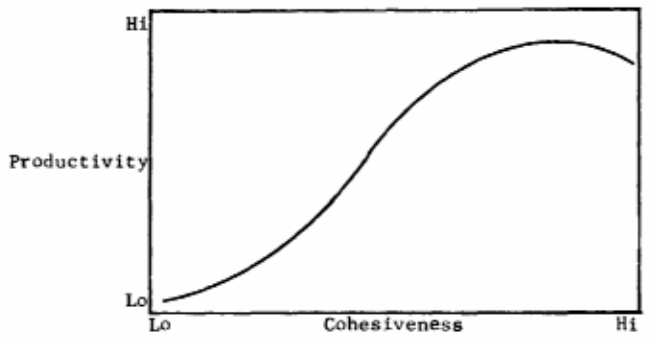
It has also been found that in industrial settings high cohesion allows groups to accomplish their goals more easily [29]. There is a question, however, about both the optimality and sources of the performance goals or norms set by various workgroups or teams. In newly- formed groups Bettenhausen and Murnighan [2] found that 5-person laboratory groups in a bidding exercise first used criteria from other contexts to guide their behavior. Over time, adjustments were made between their conceptions about the situation and the results they were obtaining. For groups whose norms and behaviors have already solidified both Myers [25] and Sherif [34] found that intergroup competition can serve as a general norm-raising tactic. But as observed by Couran [15, p. 15]

> …in some instances, cohesiveness actually interferes with the thoroughness of a group's analysis and examination of information. In addition, members of cohesive groups are often reluctant to respond honestly to one another's contributions or to make objective appraisals for fear of hurting feelings, wounding egos, or otherwise disrupting the group's rather fragile sense of solidarity.

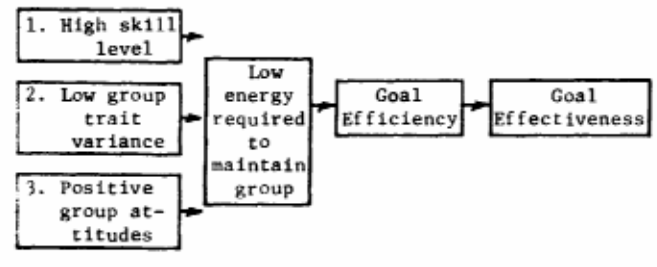
Accordingly, the relationship between cohesion and performance is not monotonic over the entire cohesion range as suggested by Fisher [9, p. 33] and illustrated in Figure 1. As shown, high cohesion increases productivity only up to a certain point beyond which it becomes dysfunctional and actually lowers the group's productivity but not to a lower point than that which would have existed without cohesion in the first place.

As was implied in the research of Shaw and Shaw [33],

FIGURE 1
PRODUCTIVITY AND COHESION RELATIONSHIP



effective workgroups embrace both task and social dimensions. Cohesiveness can facilitate both of these dimensions as task performance pressures can force groups to adopt high productivity norms as in Back [1] and Thibaut and Strickland [36] while social performance requires the self-administration of rewards within the group itself. Cattel's [4] syntality theory illustrates the interaction of these two dimensions:



In this case a high potential for cohesiveness exists because of the similarity of the group's attitudes, skills, and personality traits. Accordingly little overt energy needs to be expended on interpersonal activities so that the majority of the group's energies can be efficiently directed towards goal accomplishment.

Business Game Literature on Group Cohesion

A number of simulation-based studies have included the element of cohesiveness (or its proxy) as a variable associated with game performance. Non-positive influences were cited or demonstrated in two early studies. McKenney and Dill [23] reported that teams that had been retained from a prior human relations course (and were presumedly more socialized) did not outperform newly-formed teams from the same course when they later played a game in the Harvard MBA program. Deep, Bass and Vaughn [61 employed a similar methodology. Their experiment used one set of intact teams which had been trained via a T-group experience vs. another set of randomly-assigned teams on 9-11 member firms playing the Carnegie Tech Management Game. Although the intact teams experienced many of the superior T-group qualities of interpersonal dynamics in the form of contact ease, familiarity and mutual admiration, they did not outperform the randomly-assigned teams as had been hypothesized. Cohesion, which was defined as the degree to which participants would re-compose their team using their present personnel, was negatively related to forecasting accuracy, profit, stock price, and planning costs.

Another very recent group of studies has examined the effects of team self-selection (and presumed high player cohesion) on game results. The first study in this group by Norris and Niebuhr [26] used 2-5 member teams playing Model I of The Executive Came [17] for 10.0% grade credit. Self-selected teams did not obtain superior rates-of-return on equity (ROE) over instructor- assigned teams. Highly cohesive teams, when measured at the end of the game by a modified group cohesion scale originally created by Seashore [29], correlated R .52, $p<.05$ with ROE after controlling for the team's grade point average. In this case self-selection did not guarantee end-of-game cohesion or superior performance. Instead, the superior teams obtained an early agreement and commitment to their goals, interacted frequently, and possessed a competitive spirit. For the better teams true cohesion evolved over the 12 decision rounds employed in the simulation and was not a quality inherent with teams built merely on prior friendships and associations.

Another study in this group by Miesing and Preble [24] used very large 12-13 member teams playing The Management Game [22] in an MBA business policy course. Five of the six firms created for the simulation (n = 74) were self-selected although all firms ultimately demonstrated different levels of cohesion. Five factors were identified from a questionnaire administered at the game's mid-point regarding each team's group characteristics and processes. Although the factors cohesion, frustration, effort, expectations, and gregariousness were derived, only cohesion differed between the six teams studied. The two best-performing teams were the most cohesive while the last-ranked team was the least cohesive. As stated by the authors, "cohesive teams are better performers because they are able to satisfy the social needs of the team members while simultaneously demonstrating a shared commitment to the team task [24, p. 336]. Again, self-selection had no effect on either the team's cohesion or its performance.

The last study in this group by Hsu [18] used fourteen teams with a mean size of 4.5 members (range = 3 to 7) playing Tempomatic IV [27] for 12 decision rounds plus a trial run from equal starting positions in an evening Business Policy course. The first half of the class' roster was allowed to choose their own teammates while the roster's second half used teams that were randomly assigned by the instructor. Team performance was a weighted combination of seven economic output criteria counting for 60.0% of the course's grade. Twenty-seven variables were examined and it was generally hypothesized that self-selected, and supposedly more cohesive teams, would exhibit more positive playing behaviors and attitudes. Superior performance was not associated with self-selected teams and relatively few of the variables were significantly related to any of the two team selection criteria. The self-selected teams, however, featured better communications and felt that more time was needed for good decisions while the randomly-assigned teams misunderstood their initial goals. In this respect the self-selected teams may have featured superior working relationships to the other teams even though their performance was not significantly better.

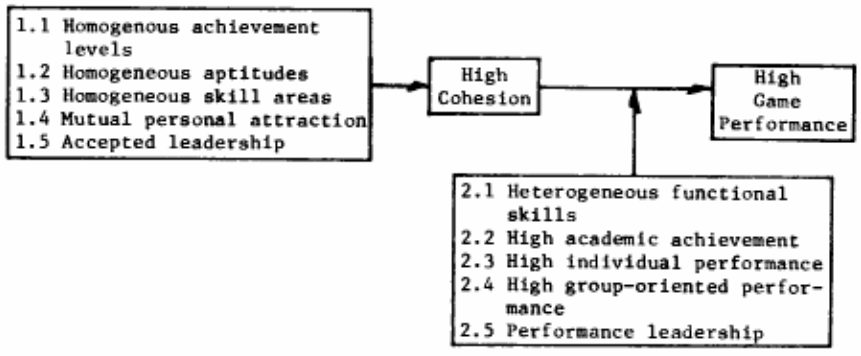
Another study situated in a Business Policy course was conducted by Gosenpud, Miesing and Milton [14]. Seniors on 2-5 member teams played The Executive Game [17] for two simulated years with game-related activities accounting for 35.0% of the course's grade. Four significant factors were related to game performance with high game performance defined as high ROE. Paraphrasing the authors, success was associated with cohesive teams that engaged in formal planning and generated clear and stable strategies [14, p. 163]. These findings regarding early unanimity of purpose and cohesion are similar to those of Norris and Niebuhr who coincidentally used the same game in the same type of course.

The last two studies reviewed here do not directly deal with cohesion but instead deal with team size as a factor that that has been associated with cohesion on a team's degree of homogeneity. A team's size has an effect on the pure "management" problems faced by a group and both Gentry [11] and Wolfe and Chacko [40] have studied these effects to some degree. In the Gentry study dissension (the opposite of cohesion) increased with increasing team size with dissension measured by the mean squared deviations in peer ratings assigned by the team's members to each other. Dissension was inconsistently related to team performance with performance related to the team's most talented member when determined by that member's grade on a course-related case assignment. The results of this study, however, may not be applicable to the Business Policy-based research already reviewed. The Gentry study employed LOGSIMX [7] in a Marketing Logistics course and the simulation is far more deterministic and functionally- limited than the general management games used at the Business Policy level. Accordingly, the lack of cohesion or integration of effort may not be a handicap or impediment to high game performance as is the case in the typical Business Policy game. The Wolfe and Chacko [40] study found that the larger teams, comprised of 3 or 4 members per firm in The Business Management Laboratory [19], performed better than single or two-member firms because they brought more personal experience and functional expertise to bear on the diverse problems presented by the game. The larger firms also appeared to be able to process more information as they purchased more outside reports than did the smaller firms.

HYPOTHESES

The literature just reviewed suggests a number of interesting hypotheses. Cohesion is clearly a factor in gaming performance and its initial or ending existence is not guaranteed through team self-selection techniques or prior associations no matter their length or depth. Additionally, high cohesion does not insure work group performance unless the group sets high goals for itself. Shortening yet elaborating Cattel's [4] linear model, the elements and their relationships shown in Figure 2 are posited. This model states that the factors that make for a highly cohesive business game team can frustrate the team's quest for optimal performance. A large-scale, top management-type game requires heterogeneous functional skills and this diversity could disrupt the homogeneity that makes a team initially cohesive. Also the team's similar skill levels or intellectual achievements, if set too low, could put the team at a competitive disadvantage if other teams possess high homogeneous achievements and aptitudes. Given a team's requisite quantities of variety and skills, however, it will still not perform optimally unless (1) it has strong and accepted performance-oriented leadership and, (2) all team members dedicate themselves to high performance.

FIGURE 2
COHESION AND HIGH GAME PERFORMANCE



Stated in a more formal fashion, the following major hypotheses were tested:

H_1: A team's cohesion is a combined function of its homogeneity of individual achievement levels, aptitudes and skills, participant mutual attraction and acceptable leadership.

H_2: High cohesion leads to high game performance when moderated by heterogeneous functional skills, high academic achievement, individual performance and group-oriented performance, and leadership which emphasizes high task output.

METHODOLOGY

Experimental Situation

The study's subjects (n = 76) were students in a senior-level Business Policy course playing Jensen and Cherrington's moderately-complex [39] The Business Management Laboratory [20] for 40.0% grade credit-- an amount of credit that Wolfe and Roberts [41] had found was optimal from both learning and time-equity perspectives. Students were randomly assigned to four- member teams participating in 10 decision rounds without a trial run. Game performance was based on economic criteria weighted in the following fashion:

1. Cumulative profits-- 55.0%
2. Rate-of-return on assets (ROA)-- 25.0%
3. Rate-of-return on equity (ROE)-- 20.0%

Full class periods were devoted to a pre-game orientation session, consultation for the first decision, and a game debriefing experience.

Tests and Measurements

Personal intellectual aptitudes and academic achievements were measured respectively by percentile SAT/ACT English, Mathematics, Social Science and Composite scores and grade-point averages for all University, Business College, and Major coursework. Although a wide

array of measurements were taken, game performance in The Business Management Laboratory has been most highly correlated with a student's Composite SAT/ACT and University GPA [38].

The sets of variables (and their literature-derived justifications) were measured in the following fashion:

1.1 Homogeneous achievement [12; 21] levels-- the team's mean squared deviation [11] in University CPAs

1.2 Homogeneous aptitudes [31]-- the team's mean squared deviation [11] in SAT/ACT percentile scores

1.3 Homogeneous skill areas [40]-- percent domination by one Major

1.4 Mutual personal attraction [13]-- percent of current team members identified as being held in high esteem [6]

1.5 Accepted leadership [l;36]-- ratification of the team's current leader

2.1 Heterogeneous functional skills [40]-- the number of different Majors on the team

2.2 High academic achievement [38]-- the team's mean GPA

2.3 High individual performance [11; 38; 40]-- highest GPA on team

2.4 High group-oriented [8;33] performance-- mean hours team worked on each decision

2.5 Performance leadership [l;36]-- the team leader's economic contribution score

Cohesion-- the degree to which each team's participants would re-construct their team using its present personnel [6]

Game performance-- the team's weighted ranked total profits, ROA and ROE

RESULTS

Each team was ranked on all fourteen variables (i.e. the ten independent variables X_1 through X_{10} and the four dependent variables Y_1 through Y_4). Spearman rank order correlation coefficients were computed as shown in Table 1. A number of significant relationships were found:

1. Homogeneous aptitudes (p = .025), accepted leadership (p = .044), high individual performance (p .082), and performance leadership (p .031) were positively correlated with ranked performance.

2. High academic achievement (p a .108) was positively correlated with ranked cohesion.

Cohesion exhibited a nearly-significant positive correlation with performance at the p .122 level. Interestingly, none of the independent variables were correlated with the dichotomized (Hi-Low) cohesion variable. One possible explanation for this finding could emanate from our causing the construct cohesion to be too broadly defined when dichotomized in the fashion done in this analysis.

One unexpected finding was associated with the reversed relationship (p = .068) between ranked performance and group effort. It must be remembered, however, that group effort was the mean of the team's individual reports of hours worked as a group during the semester. The original data exhibited considerable variance within teams and is somewhat suspect as to accuracy and honesty.

As can be seen in Table 1, five of the ten independent variables correlated at a significant level (in the predicted direction) with Hi-Low performance serving as the dependent variable. We have, then, moderate support for Hypothesis 2 with respect to the notion that such factors as homogeneous aptitudes, individual performance, and leadership contribute to successful performance in a game which replicates many of the decisions and their processes found in the business world.

DISCUSSION

Although the effective sample size was quite small (n = 19), a further exploratory analysis of the data was conducted to insure that the role of cohesion in business game performance was known as clearly as possible given the measures used in this study. A canonical discriminate analysis placed cohesion as a relatively low contributor to team performance. The following decreasing placements were obtained in that analysis: Leader contribution, High grade achiever, Team academic achievement, Heterogeneous aptitudes, Accepted leadership, Croup effort, Cohesion, Grade heterogeneity, Mutual attraction, Skill heterogeneity, and Dominant skill area.

While the raw number of students involved in the study was quite large, the placement of them on 4 to 5 member teams served to reduce the effective sample size to 19 firms. This study should be continued through the addition of more teams to determine if those variables currently approaching a significant relationship with cohesion (dominance of major, group CPA, and team performance) can indeed become significant. The study should also include additional or substitute measures of cohesion such as Seashore's [29] as altered by Norris and Niebuhr [26]. The measure used here, the reconstitution of a team with the same or different personnel, may have been deficient as it was only a simulated behavioral proxy of one dimension of a very complex construct labeled group cohesion.

CONCLUSION

Several hypothesized relationships between a group's cohesiveness and its economic productivity were tested and found to be moderately significant. Several theoretical antecedents of cohesion were also found to be nonsignificant. A team's performance in the business game employed here was related to the team's academic achievement and the presence of strong and economically-based leadership. The results found here should be tested further with a study using a larger set of 4 to 5 member teams as well as one employing additional measures of team cohesiveness.

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TABLE 1
SPEARMAN CORRELATION COEFFICIENTS

Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	Y1	Y2	Y3
Y4 Hi/Lo performance	.29	.39[b]	-.06	.26	.37[a]	-.10	.41[b]	.45[b]	-.35[a]	.53[c]	.28	.86[c]	.04
Y3 Hi/Lo cohesion	-.19	.09	.28	.08	-.14	-.10	.15	.02	.00	.08	.87[c]	.13	
Y2 Ranked performance	.15	.45[b]	-.01	.09	.40[b]	.04	.26	.33[a]	-.35[a]	.44[b]	.28		
Y1 Cohesion	-.15	.07	.24	.11	.00	-.02	.30[a]	.09	-.08	.01			
X10 Leader contribution	-.12	.43[b]	.18	-.07	.41[b]	-.34[a]	.22	.04	-.03				
X9 Group effort	-.31[a]	-.28	-.18	.17	-.07	.07	.10	-.11					
X8 High grade achiever	.73[c]	.26	-.08	.55[c]	.07	-.08	.63[c]						
X7 Academic achievement	.12	.23	.06	.49[b]	.18	.06							
X6 Skill heterogeniety	-.30[a]	-.08	-.75[c]	.11	-.12								
X5 Accepted leadership	-.07	.45[b]	-.03	.09									
X4 Mutual attraction	.27	.01	-.23										
X3 Dominant team skill	-.01	.21											
X2 Aptitude homogeneity	.02												
X1 Grade homogeneity	1.00												

[a] $p < .10$
[b] $p < .05$
[c] $p < .01$

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