

# Developments in Business Simulation & Experiential Exercises, Volume 11, 1984

## A FURTHER TEST OF THE GROUP FORMATION AND ITS IMPACTS IN A SIMULATED BUSINESS ENVIRONMENT

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### ABSTRACT

This research was a replicate of the study done earlier by Hsu and Eng on group formation in simulated business environment. It was carried out with the introduction of the control groups along with changes of certain group composition variables. The findings are substantially different from the findings uncovered in that earlier study. Behavior and attitudes displayed by the subjects of these studies are far apart under different gaming settings created by the two distinctive methods of group formation. The results of this study clearly suggest that caution should be exercised in the selection of method for group formation.

### INTRODUCTION

Ever since the incorporation of a first generation IBM computer into its business game course designed for a group of business executives by the American Management Association in the mid-50's [17], the use of computerized business simulation games as a teaching device has steadily gained in popularity. The establishment of the Association for Business Simulation and Experiential Learning (ABSEL), which happens to be the sponsor of this conference, is a very good example. The recognition of the use of business simulation games in lieu of a regular business policy course for accreditation by the American Assembly of Collegiate Schools of Business (AACSB), is another example.

Generally speaking, there are two ways of playing a game, be it business or otherwise. Games can be played by single-person teams or multiple-person teams. In the former case, administration of a game is a relatively easy matter, since only individuals are involved. In the case of the latter, where team work is a key factor for a group's success [3, 4, 10, [18] the situation is more complicated because various factors including group structure, such as homogeneity vs heterogeneity [13]; group composition, such as size [7, 8, 9, 12, 15], sex [11, 14], and race [5]; and group formation, such as self-selection vs assignment [11, 19], may come into play before the actual game starts. Normally, group formation is one of the first, if not the first, factors that comes to the mind of the game administrator during the planning stage of a game. Few studies on group formation in a simulated gaming environment in general, and in a simulated business gaming environment in particular, have been carried out. The lack of empirical study on the subject perhaps is a reflection of what Sarason [16] charged that "By and large, teachers do not think in terms of how a group can be organized and utilized so that it plays a role in relation to the issues and problems that confront the group..." (p. 190)

In an early study on group formation by Hsu and Eng [11] which attempted to distinguish members of self-selecting groups from members of instructor-assigned groups on the basis of interpersonal behavior, authors identified six important variables. They included lack of clear goals, change of goals if the game were replayed, equal participation, willingness to confront others, apathy towards the decision-making process, and reaction to criticisms. That study suffered from shortcomings. First, there was lack

of the control groups used in the experiment as far as the group formation is concerned. Moreover, students were randomly assigned to groups by the game instructor only after they failed to team up on the limit.

The purpose of this study was to replicate the work carried out in that study with the introduction of the control groups as well as minor changes on certain group composition variables in the design of the experiment.

### HYPOTHESES OF THE STUDY

Basically, all the hypotheses to be tested and stated below were developed in accordance with the findings of Hsu and Eng's work [11]:

- 1) Members of self-selecting groups would tend to have a more even membership participation than members of instructor-assigned groups;
- 2) Members of self-selecting groups would be more willing to confront with each other during the process of the decision-making than their counterparts from instructor-assigned groups;
- 3) A high tendency of showing unclear goals may be the case more often with members of self-selecting groups than with members of randomly-assigned groups;
- 4) Members of self-appointed groups may be more likely to a change of their team's goals if they were offered the opportunity to do so than members of randomly assigned groups;
- 5) Members of instructor-assigned groups are more inclined to exhibit high degree of apathy towards the decision-making process than their counterparts from self-appointed groups;
- 6) For those who are actively involved in the decision-making process, it is more likely to see that members of randomly-assigned groups are more receptive of negative comments made by their peers

### EXPERIMENTAL DESIGN

This study was composed of sixty-three business majors students who enrolled in upper course on business policy during the summer of 1993 at a large state university's evening division. Since the majority of the students were working on their undergraduate degrees on a part-time basis, while holding full-time jobs during the day, it may be worth noting the various attributes of the students in class. Altogether, there were 26 male and 37 female students. Their ages ranged from 21 to 52 with a mean of 29 years old. Except for three students who never had full-time jobs, the others had at least six months to as many as 25 years of work experience. The average years of work experience were 8.3.

The participants were divided into 14 companies with various group sizes ranging from three to seven. Companies one through seven were organized by the participants themselves whereas companies eight through fourteen were randomly assigned by the game instructor while also taking the following factors into consideration: major and sex. The last seven companies composed

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of thirty-one individuals were used as the control groups, while the first seven companies which had thirty-two individuals were treated as the experimental groups. Whether a participant belonged to one of the experimental groups or not depended upon the last name of the participant. Those whose last names started 4th A through L went to the experimental groups and those who belonged to the control groups were those whose first letter of the last name started with M through Z.

Part of the course requirements was to make 12 quarterly business decisions. All teams started from the same footing in Quarter 9 by taking it over presumably from the prior management. Before the making of the official decision for Quarter 9, each team was offered an opportunity to make a trial decision for Quarter 9, the results of which were not included in the final grade. This allowed them to get a first hand information about the game and to make common mistakes without any penalties enforced on them. The game portion of the class which was the 12 quarterly decisions, was further divided into two parts. The first part consisted of eight decisions, namely from Quarter 9 through Quarter 16, while the second part had four quarterly decisions. They each accounted for 35% and 25% of the final grade, respectively. While both parts were included in the calculation of the final grade, the first part, that is, the first eight decisions were designed to let students try out different options and get a better feel of the game, so that they would be ready for the final four quarters, which were the basis of the written analysis report and the oral presentation.

At the end of the summer session, a questionnaire was handed out to and completed anonymously by each of the students in class without any team collaborations. Information covered in the questionnaire included such things as group dynamics, group characteristics individual attributes and attitudes, etc.

### VARIABLES INCLUDED IN THE ANALYSIS

Upon the review of the completed survey instruments, it was decided that the following 27 variables on group dynamics and students' attitudes shown in Table 1 be included in the initial analysis.

A 7-point scale, 1 to 7, from no evidence to high evidence, for variables 1 through 8 was used. Variables 9 through 24 were also measured by a scale of 1 to 7, referring to a low negative to a high Positive response. The remaining three variables are all categorical in nature.

### RESULTS

Of the 27 variables on group dynamics and personal attitudes summarized in Table 1, 21 were eliminated after a first round of analysis based upon the results of crosstabulations and the correlational matrix. The remaining six variables shown in Table 2 were included in the multiple discriminant analysis as the independent variables. The dependent variable employed for the analysis was the group formation (ORG), a dichotomous variable. The discriminant analysis performed by the computer was the UCLA's BMPD7M subprogram on a stepwise fashion.

Table 1  
Group Dynamics and Attitudinal Variables

1)	Existence of team hostility or conflict (CONFL)
2)	Low commitment. or lack of goals (GOAL)
3)	Apathy towards the decision-making process (APTHY)
4)	Lack of innovation (INNO)
5)	Lack of risk taking (RISK)
6)	Poor team communication (COMM)
7)	Lack of trust among team members (TRUST)
8)	Misunderstanding of team goals (UNDRST)
9)	Equal team mentality (TEAM)
10)	Equal participation (EVEN)
11)	Equal receptions of all opinions (LISTN)
12)	Openness of team members (OPEN)
13)	Willingness to confront (CONFR)
14)	Reaction to criticism (CRIT)
15)	Individual's satisfaction with the team (SATIS)
16)	Individual's ability to guide and lead (LEAD)
17)	Individual's ability to grasp the problems (GRASP)
13)	Team acceptance of self (LIKED)
19)	Frequency of mediocre decisions made by team (MDEC)
23)	Ample time for making reasonable decisions (ENFIM)
21)	Frequency of using up class time (USEM)
22)	Individual's disagreement w/final decision(DISAGR)
23)	Agreeable with team goals (GOAL)
24)	Change of goals if the game were replayed (RPLW)
25)	Most frequently used approach in decisions (APPR)
23)	Division of labor (RESP)
27)	Emergence of dominant figure (DFIG)

One of the uses of the discrimination analysis technique is to develop a linear function based upon 1 limited number of variables, so that group members may be classified. One commonly accepted approach is to employ the standard-score coefficients or weights to determine the relative contribution of each variable so the discrimination.

It is evident from Table 2 that the variables with the largest negative coefficients are for COMM, poor team communication, (-0.95), and ENFIM, sufficient time for making reasonable decisions, (-0.70). The variables of UNDRST, misunderstanding of team goals, (0.64), LIKED, team acceptance of self, (0.61), CONFL, existence of team hostility or conflict, (0.43), and RPLAY, change of goals if the game were replayed, (0.40).

It should be noted, however, that only two variables, namely, UNDRST and LIKED, have high enough coefficients for both variables in the positive side, while the coefficients for both variables in the negative side are very high. Hence, it is reasonable to focus on these four variables with the highest absolute coefficients because they seem to contribute the most to the differentiation of the two types of groups.

The identification of these four variables are also confirmed by the results of the stepwise procedure except one, whose standard coefficient was the lowest among these four variables. The rejection of the variable, LIKED, is perhaps because of the existence of a relatively moderate correlation between this variable and UNDRST, which is -.31.

A significance test of the newly derived discriminant function based on the three variables was made to check whether

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significant differences between the two types of groups, self-selecting groups and instructor-assigned groups, could be substantiated. It was found that the test produced a chi-square value of 19.9 with 6 degrees of freedom, which is beyond any usual significance level, say, 0.05 or 0.01. Hence we may conclude that the newly derived discriminant function is highly significant to separating the types of groups.

TABLE 2  
The Discriminant Function Weights

Variable	Raw-score Weight	Standard-score Weight
COMM	-0.74	-0.95
ENFM	-0.44	-0.70
UNDRST	0.56	0.64
LIKED	0.64	0.61
CONFL	0.26	0.43
RPLAY	0.20	0.39
Eigenvalue	0.42699	

Once the estimation of the discriminant function is completed, it is then used to calculate the individual score for each observation in order to classify it into a group. The classification results displayed in Table 3 show that of the 34 students in instructor-assigned groups, 25, or 74 percent, were classified correctly. The remaining 9 students, or 26 percent, were regarded as misclassification. With respect to self-selecting groups, 18 out of 27, or 67 percent, were considered correct classification. Overall, the discriminant function based upon the three variables classified 71 percent of the total individuals, i. e., 43 out of 61, into the groups where they actually belonged.

TABLE 3  
Results of Classification and Jackknife-validation

Actual	Classification		Validation	
	Correct	Incorrect	Correct	Incorrect
Instructor-assigned	74% (25)	26% (9)	74% (25)	26% (9)
Self-selecting	67% (18)	33% (9)	63% (17)	37% (10)
TOTAL	71%	29%	69%	31%

The overall correct classification of 71 percent however, may have been upwardly biased as suggested by Frank, Massy & Morrison [6] because the same data set was used to both estimate the discriminant function and classify group memberships. To overcome this problem, a jackknife validation procedure of the computer program was requested and performed in order to reduce this potential upward bias in the group classification. The validation result indicated that the correct classification was indeed over-predicted by two percentage points. Nevertheless, this validation result of group classification, which was 69%, is still an impressive one compared to a random classification which is 50%.

### DISCUSSION AND SUMMARY

The results of the discriminant analysis identified three variables to be the good discriminators, two having negative coefficients and one with positive coefficients. Generally speaking, a large and positive standard weight would mean, in this case, a strong positive effect on the classification of a case to the instructor-assigned group, and vice versa. Therefore, by combining the three variables with the largest absolute values in weight together, a clear picture

begins to surface. That is, members of self-selecting groups tended to have better communication among group members (COMM), and were more likely to believe that there was not sufficient time to reach sound and reasonable decisions (ENFM). By contrast, members of Instructor-assigned groups are more inclined to misunderstand their teams' goals (UNDRST).

With the findings discussed above, we may conclude that the results of the current study should reject the hypotheses stated earlier in this paper altogether, which were developed on the basis of the findings of an earlier work done by Hsu and Eng. This total rejection was caused by the fact that none of the six important variables found in that research was identified in this study and was, in fact, a big surprise to learn. Therefore, the study suggests that behavior and attitudes displayed by the participants of these studies are rather far apart under different game settings created by two distinctive methods of group formation. The implications of this study thus suggest that cautions should be exercised in the selection of a method for group formation in future game playing situation in general and business game playing situation in particular.

While this study answered certain questions, it also created another one. That question is, "What was the real cause of the different attitudes and behavior exhibited in these studies?" Were they simply caused by coincidence? Or were they caused by the two distinctive methods of group formation alone? Or are they caused by the possibly combined force of different group formation methods and changes of the group composition, such as the use of different group sizes, and/or group structure, such factors as majors and sex. At any rate, this newly created question may be worth looking into in the future.

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