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GROUP COMPOSITION AND GROUPTHINK IN A BUSINESS GAME

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ABSTRACT

The upper echelon perspective suggests that group compositions are related to decisions and performances of firms. Groupthink theory suggests that groupthink symptoms make groups concurrence-seeking and committed to their decisions. This paper examines whether group composition and groupthink are related to decisions and performances of groups acting as firms in a business game. The results do not show any relations between compositions of groups, and decisions and performances. However, groupthink was apparent as groups were committed to their decisions. The members of the groups stated that they would use similar decisions if they were to play the game again, regardless of the performances of their firms. These results indicate that the selection of members of groups is of minor importance, but that decision making can be improved when the game is played.

INTRODUCTION

Groups are common entities as decision makers in business. For the purpose of facilitating analysis and decision making, boards of directors, top management teams, and committees are composed with care (Finkelstein & Hambrick, 1996). The groups try to find the best course of action and also to change it when needed. However, the groups may be subject to groupthink (Janis, 1972), which makes them unwilling to change their decisions. This paper examines whether group compositions and groupthink are related to decisions and performances of firms in a business game. The results are of interest for selection of members of groups and for decision making. The results are also of interest for teaching and learning when playing business games (Wolfe & Crookall, 1998; Washbush, & Gosen, 2001; Kayes, Kayes & Kolb, 2005).

Group composition is related to the upper echelon perspective of organizations. Hambrick and Mason (1984, p. 197) wrote "the theory states that organizational outcomes can be partially predicted from managerial backgrounds". The perspective suggests that observable traits of decision makers such as age, education, and group characteristics have an impact on strategic choices, and in turn on performances of firms. Studies have found relationships between group compositions and performances (Goll, Sambharya & Tucci, 2001). Other studies have explored the relationship between heterogeneity in groups (Murray, 1989; Hambrick, Cho & Chen, 1996), the best member of a group (Henry, 1995), and performance. However, West and Schwenk (1996) did not find any relationships between group compositions and performances. When Carpenter, Geletkanycz, and Sanders (2004) reviewed research on the upper echelon perspective they reached the same conclusion.

Groupthink (Janis, 1982, p. 9) is a term for "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action". Originally, groupthink is a model of how eight psychological symptoms of groupthink lead to seven symptoms of defective decision making, that lead in turn to poor decision quality (Janis, 1982; Park, 2000). The symptoms of groupthink all have in common that they contribute to forming and maintaining a consensus that the group and its decisions are reasonable, right, and likely to succeed against an external threat from people who are unreasonable, wrong, and likely to fail. In a groupthink situation, the members of the group are concurrence-seeking to what they believe to be the consensus of the group.

Street and Anthony (1997) argued that groups exhibiting groupthink symptoms are more likely to escalate commitment to a losing course of action than groups not exhibiting groupthink symptoms. Commitment (Salancik, 1977) is a behavior in a social context that is public, irrevocable, and volitional. The decision maker will justify decisions by the best available reasons that are acceptable in the setting. Having adopted these justifications, the decision maker will then champion them and engage in more of the behavior that those justifications imply. Persistence and escalation of commitment (Staw, 1981) occur when individuals continue or even increase investments in a failing course of action. Although groupthink has been interpreted in different ways and also been criticized, groupthink is commonly used and is also pervasive (Turner & Pratkanis, 1998).

HYPOTHESES

Two hypotheses are tested regarding groups. The first hypothesis is related to the upper echelon perspective of organizations and concerns group composition.

H1. Group compositions are related to decisions and performances.

The second hypothesis is about groupthink. Groupthink is here referred to as "commitment to decisions". The second hypothesis is:

H2. Groups are committed to their decisions regardless of their performance.

If the hypotheses about group composition and groupthink have general validity, they would apply in various environments. One such environment is a business game. Compared to business life, business games have the advantage of providing the same market conditions for all firms. In business life, market conditions may vary considerably for similar group compositions (Murray, 1989). Thus, differences in performances in business life may depend on other reasons than group compositions.

The idea of group composition in a business game is the following. The groups acting as firms in the game differ with respect to their compositions. Differences in compositions will have effects on their decisions, and in turn on their performances. That is, group compositions are related to decisions and performances in the game. When reviewing research on the relationship over 25 years, Faria (2001) found a number of articles reporting that this relationship exists. However, Edman and Andersson (1997) did not find that performances of the firms in a business game could be distinguished on the basis of the different group compositions. An alternative hypothesis generated was that regardless of their performance the groups in the game conformed to their initial decisions. This paper expands the earlier study and replicates a number of other studies with a different business game. It also adds to knowledge by analyzing relations between group compositions and decisions, and by using an additional measurement of performance.

If groups are subject to groupthink in a business game, they are committed to their decisions in the game regardless of their performance. Groups experiencing good performance would be expected to be committed to their decisions. However, groups experiencing poor performance would also be committed to their decisions. This means that members of the firms would like to make the same or similar decisions when asked what decisions they would make if they were to play the game again. Decisions stated after the game will then be related to decisions in the game, regardless of performances. So far, groupthink research has been focusing on the conditions fostering groupthink rather than the decisions themselves (Esser, 1998). This paper adds to knowledge about groupthink as it studies decisions.

To sum up, hypotheses about group composition and groupthink are tested with a business game. First, the method and the measurements are described, and then the results are presented and discussed.

METHOD

Participants. Altogether 1327 students played a business game. The students played the game during the second semester at a business school. It was mandatory for the students to play the game, as they played it for educational purposes as part of a course in managerial economics. Over a period of six years, 46 separate game sessions had 230 groups acting as firms. About 30 participants in each session were informally divided into five firms competing in the same market.

The business game. The business game is described in full detail in Edman and Stahl (2002). The business game is less complex than other business games (Gold & Pray, 2001; Gold, 2005). The business game deals with an oligopoly market where five firms compete by producing and selling similar, but not identical, storable products in the same market. The game has dynamic properties, where the following four state variables are carried over from one period to the next: machine capacity, stocks, balance in checking account, and cumulative advertising. Equity is calculated as the value of machine capacity and stocks plus the balance in the checking account. The cumulative advertising is not included in the equity. All firms start with the same amount of equity: cash in the checking account, but no machine capacities, no units in stocks and no cumulative advertising.

The firms have to decide upon the following four decision variables in each period as they produce to sell their products in the market: investments in machinery, production quantity, price, and advertising. One unit of machine capacity can produce one unit of the product in each period of the game. The costs of one unit of machinery and one produced unit are fixed.

The business game has the characteristics of an oligopoly market, where there is interdependence among decisions made by the firms. The demand for a firm's products is dependent not only on the price and the cumulative advertising of that firm, but also on the mean prices, and the mean cumulative advertising of the other firms competing in the same market. In this connection it should be mentioned that no random factors are involved in the game, not even with regard to the demand for the products. Thus, the state variables and the decisions of the firms completely determine the outcome. The game is symmetric as all firms face the same costs and demand for their products.

When the decisions are made, three outcome variables are calculated: interest rate, demand, and sales. If the balance in the checking account is negative, for example, due to outlays on investment, production, and advertising, the firms can borrow money. The interest rate depends on the size of the balance in the checking account and the equity of the firm.

The machines depreciate during each period, both physically and in accounting terms. Products not sold in one period go into stocks and can be sold in a subsequent period.

Cumulative advertising consists of advertising in a period, plus a part of the cumulative advertising from the previous period, plus a factor reflecting the advertising effect of sales in the previous period. The profit is the difference between the equity at the end of a period and the equity at the start of a period. If a firm has equity below zero, it goes into bankruptcy. The firm can then receive a monetary grant from the government that decreases its debt and thus increases its equity. The monetary grant is deducted with interest from the equity of the firm at the end of the game. A firm can, therefore, have negative equity at the end of the game.

Procedure. The duration of the game sessions, including briefing and debriefing, was between three and four hours. The game was presented in briefings of about 20 minutes. The participants were informed of the rules, a decision form, and the reports. A numerical example showed how to make decisions. The goal for the firms was to maximize the equity at the end of the game. The participants were informed that the game would be played with a test period and that the game would be restarted from "scratch" and played for 5 – 10 periods. After each period, the firms received information about the outcomes of their decisions, varied information about decisions, and performances of the other firms.

In three of the six years, the participants were asked in a questionnaire after the game what decisions they would make if they were to play the game again. Before the final results were presented at the debriefing, the participants individually answered the following question: "If you were to participate once more, what price and advertising would you decide in period 1? Price $ ____ Advertising $ ____". The participants were asked to fill in the number of their firm but not their names in the questionnaires.

MEASUREMENTS

The measurements consisted of variables for group compositions, decisions, and performances when the business game was played. The hypothesis about group composition (H1) was tested with the relations between group compositions, and decisions and performances in the game. The hypothesis about groupthink (H2) was tested with the relations between decisions in the first period of the game and decisions stated in the questionnaire after the game.

Group compositions were measured with group size, gender, age, grades, and score on an exam. The sizes of the groups varied between 4 – 8 members. About 38 % of the participants were females. The range of age of the participants was 18 – 46 years. The grades were from earlier schools used for admittance to the business school (range 2.7 – 5.1). The scores were from the exam at the end of the related course (range 22 – 200).

As mentioned above, the participants in each game session were informally divided into the groups. This means that the group compositions used to test the hypothesis were not arranged. Instead, different measurements were used for the group compositions. Some of these measurements proved to be related and the number of relations analyzed could be reduced (separate tests with groups each of the six years the game was played, with the different measurements of group variables and with Blau's index for heterogeneity gave similar results as presented in Table 2).

Gender diversity in the groups was measured with standard deviation of codes, 1 for females and 2 for males. Since gender diversity was in strong negative relation to mean values of gender codes of groups ($r(230) = -.58$, $p < .01$) the analysis can be reduced to gender diversity. Age, grades, and scores on the exam were measured with mean, maximum, and standard deviation of the values of the members in the groups. The mean measured the level of a group. The maximum value measured the best member in a group. The standard deviation measured diversity in the group. Table 1 shows a factor analysis reducing nine group variables to four group components. The factor analysis shows that the measurements for age, grade, and score on the exam were not strongly related, as they were separated into different components.

Compositions of groups were measured with the variables Size of group and Gender diversity, and with the four group components from the factor analysis: Age, Grade, Exam1 and Exam2.

Decisions of firms were measured with price and advertising in period 1 of the game (Price and Adv), the mean of price and advertising stated by the members in the same firm in the questionnaire after the game was played (Price/Q and Adv/Q), and the sum of absolute adjustments of price and advertising decisions between periods 1 – 6 (Price/A and Adv/A).

Performances of firms were measured with equity at the end of period 6 in the game (Equity) and with rankings of firms in the same game session were based on this equity (Equity/R; rank 1 for lowest equity, rank 5 for highest equity). Performance was also measured with percentage of best reply equity of firms (Equity/B). It measures the equity of a firm divided by the maximum equity the firm have could earned with respect to the decisions the other firms made in the same market (Edman, 2005).

RESULTS

The hypothesis about group composition was not supported. Table 2 shows that Size of group, Gender, Age, Grade, Exam 1, and Exam2 [1] – [6] were not related to decisions [7] – [12] and performances [13] – [15]. The only significant relation was between Exam2 (standard deviation of scores on exam) and price in period 1 and, but this relation was weak ([6] and [7]: $r(230) = .15$, $p < .05$).

Table 1: Mean and standard deviation, and factor analysis of group composition variables.

Group	Mean	SD	Component			
Variable			Age	Grade	Exam1	Exam2
Age/mean	22.02	.96	*.878*	-.146	.041	.009
Age/max	25.03	3.31	*.981*	-.051	-.013	.019
Age/std	1.92	1.29	*.959*	-.021	-.028	.019
Grade/mean	4.77	.17	-.126	*.959*	.055	.068
Grade/max	5.04	.07	-.015	.272	.241	.378
Grade/std	.31	.19	.060	*-.925*	-.023	.029
Exam/mean	132.02	17.16	-.027	.082	*.944*	-.245
Exam/max	166.81	19.48	.042	.004	*.842*	.447
Exam/std	30.32	11.80	.041	-.072	-.085	*.946*

Note: Extraction method: principal component analysis. Rotation: Varimax with Kaiser Normalization. Italicized numbers represent the variables that each factor is highly loaded on. Eigenvalues/percent of variance for Age, Grade Exam, and Examv were 2.842/32%, 1.946/21%, 1.510/17%, 1.239/14%, 1.142/10%, respectively.

The hypothesis about groupthink was supported, since decisions at the start of the game were related to the decisions stated in the questionnaire after the game. Table 2 shows that price and advertising in period 1 were related to mean price and advertising of members of the firms ([7] and [9]: r(125)= .67, $p < .00$; [8] and [10]: r(125) = .64, $p < .01$). The relations were similar if the firms with the highest equity in each market (rank 5) were excluded (r(100) = .65, $p = .00$; r(100) = .67, $p < .00$). Furthermore, the firms' decisions in period 1 were related to individual decisions stated after the game (r(697) = .49, $p < .01$; r(697) = .51, $p < .01$).

Adjustments of decisions were stronger related to decisions in period 1 than to performances of firms. The absolute adjustments of decisions were positively related to decisions in period 1 6 ([7] and [11]: r(230)= .31, $p < .01$; [8] and [12]: r(230)= .48, $p < .01$;), and the adjustments were negatively related to equity at the end of period 6 ([11] and [13]: r(230)= -.12, $p = .06$; [12] and [13]: r(230)= -.29, $p < .01$).

Decisions and performances were weakly related. For example, price in period 1 was positively related to equity at the end of period 6 ([7] and [13]: r(230) = .25, $p < .01$), while advertising was negatively related to equity ([8] and [13]: r(230) = -.19, $p < .01$).

DISCUSSION

Group compositions were not found to be related to decisions and performances in the business game. However, groups were committed to their decisions when they were asked what decisions they would use if they were to play the game again. Thus, the hypothesis about groupthink was supported, but not the hypothesis about group composition. This means that group compositions cannot predict decisions and performances in the game, but when the firms have made their initial decisions, the decisions they would

Table 2: Mean and standard deviation, and correlations for group composition, decisions and equity.

Variables	Mean	SD	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
[1] Size	5.77	1.40	–													
[2] Gender	.45	.21	-.04	–												
[3] Age	0	1	-.03	-.07	–											
[4] Grade	0	1	-.06	.14*	0	–										
[5] Exam1	0	1	.03	-.05	0	0	–									
[6] Exam2	0	1	.08	.07	0	0	0	–								
[7] Price	36.22	8.23	.00	.00	.03	.01	-.10	.15*	–							
[8] Adv	146.11	63.62	.08	.01	.04	-.07	.03	.08	.37**	–						
[9] Price/Q	2.57	2.16	-.13	.01	-.06	.13	.09	.05	.67**	.39**	–					
[10] Adv/Q	37.94	28.04	-.01	-.02	.00	-.14	.10	.07	.29**	.64**	.39**	–				
[11] Price/A	35.16	4.62	.02	-.06	-.05	.01	.00	.03	.31**	.21**	.38**	.36**	–			
[12] Adv/A	152.57	54.76	-.02	-.07	-.08	-.02	.05	-.04	.21**	.48**	.31**	.58**	.60**	–		
[13] Equity	443.37	233.40	-.05	.04	.01	.02	.01	.03	.25**	-.19**	.19*	-.36**	-.12	-.29**	–	
[14] Equity/R	3.00	1.42	-.06	-.05	-.06	-.05	.02	.09	.16*	.06	.15	-.07	-.20**	-.19**	.57**	–
[15] Equity/B	.47	.21	-.10	.03	-.01	.01	.04	.03	.18**	-.10	.10	-.30**	-.27**	-.30**	.84**	.67**

Note: The components from the factor analysis have all mean 0 and standard deviation 1, and the factors are orthogonal.
* < .05, ** <.01.

state in the questionnaire if they were to play the game can be predicted.

The results on group composition indicated that group composition does not always matter for decisions and performances. The non-findings in this study contradict some earlier findings (Faria, 2001). One explanation could be that group composition may matter depending on the complexity of a game. Another explanation could be the limited time available for decision making when this game was played. A third explanation could be that the groups were not specifically arranged to test the hypothesis. However, Sauaia and Umeda (2005) only found mixed evidence when arranging groups playing business games with respect to academic performance. It should also be pointed out that neither did the review on studies with upper echelon perspective find any relationships between group composition, and decisions and performances (Carpenter, Geletkanycz & Sanders, 2004).

Groupthink was apparent in the game. The participants failed to consider the decisions the best performing firms made in the game when stating their decisions in the questionnaire. Instead, after three hours of play, the participants recalled the initial decisions of their firms when answering what decisions they would make if they were to play the game again. Thus, the participants were committed to decisions similar to the initial decisions of their firms regardless of the performances of their firms. One explanation for this is that participants in firms with lower performance did not understand what decisions gave higher performance in the game. Another explanation is that the participants thought the other firms would make the decisions that gave the highest performance, and that they wanted to beat those decisions. If that was the case, then the participants should have learned that their decisions during the game did not perform better than the decisions that gave the highest performance.

Over 100 professionals in MBA courses who played the same business game were also found to be committed to their initial decisions. These graduate students played the game twice. The second time the students played the game, they were arranged into groups based on the decisions they stated in the questionnaire after the first time they played the game. The groups became similar to the groups playing the game the first time. The decisions the firms made in the first period the second time they played the game were similar to the decisions they made the first time they played it. Furthermore, performances the second time could be predicted fairly well based on the initial decisions the firms made the first time they played the game.

The results of this study are of interest for several reasons. First, the results show that the relation between composition of groups and performance does not generally apply. Second, group compositions were not related to the decisions made. There was no evidence that certain compositions of groups made, for example, more competitive decisions (lower prices or higher advertising). Third, informal divisions of participants into groups can be used as a method for group composition in this business game and possibly in some other games. Fourth, this is one of the first times groupthink, as commitment to decisions, has been studied with comparisons of decisions. Five, participants can learn about groupthink at debriefings by seeing relations between their initial decisions and the decisions they stated after the game.

Further research could study if the complexity of the business games and the time available for decision making have an effect on the relationship between group composition, and decisions and performance in games. It is of interest to measure groupthink with respect to decisions in other business games. Groupthink could be studied by monitoring the decision making processes in groups. Finally, decision making in the business game could be improved if the causes of groupthink can be determined and instructor intervention could be considered.

REFERENCES[1]

Carpenter, M., Geletkanycz, M. & Sanders, G. (2004). "Upper Echelons Research Revisited: Antecedents, Elements, and Consequences of Top Management Team Composition". *Journal of Management*, *30*, 749-778.

Edman J. & Andersson, P. (1997). "Information of the Firm: Group Composition". Paper presented at the International Conference on the Foundations & Applications of Utility, Risk and Decision Theory, in Mons, Belgium.

Edman J. & Ståhl, I. (2002) "The Anatomy of a Business Game". *SSE/EFI Working Paper Series in Business Administration*, The Economic Research Institute, Stockholm School of Economics, 2002:8.

Edman, J (2005). "A Comparison between Solutions and Decisions in a Business Game", *Developments in Business Simulation and Experiential Learning*, *32*, 110-116.

Esser, J. (1998). "Alive and Well after Twenty-five years: A Review of Groupthink Research". *Organizational Behavior and Human Decision Processes, 73***,** 116-141.

Faria, A. (2001). "The Changing Nature of Business Simulation/Gaming Research: a Brief History". *Simulation & Gaming*, *32*, 97-110.

Finkelstein, S. & Hambrick, D. (1996). *Strategic leadership: Top executives and their Effects on Organizations*. Minneapolis: West Publishing.

Gold, S. & Pray, T. (2001). "A Historical Review of Algorithm Development for Computerized Business Simulations", *Simulation and Gaming*, *32*, 66-84.

Gold, S. (2005). "System-dynamics-based Modeling of Business Simulation Algorithms". *Simulation and Gaming*, *36*, 66-84.

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Goll, I., Sambharya, R. & Tucci, L. (2001). "Top Management Team Composition, Corporate Ideology, and Firm Performance". *Management International Review*, *41*, 109-129.

Hambrick, D. & Mason, P. (1984). "Upper Echelons: The Organization as a Reflection of its Top Managers". *Academy of Management Review*, *9*, 193-206.

Hambrick, D., Cho, T. & Chen, M. (1996). "The Influence of Top Management Team Heterogeneity on Firms' Competitive Moves". *Administrative Science Quarterly*, *41*, 659-684.

Henry, R. (1995). "Improving Group Judgment Accuracy: Information Sharing and Determining the Best Member". *Organizational Behavior and Human Decision Processes, 62*, 190-197.

Janis, I. (1972). *Victims of Groupthink.* Boston: Houghton Mifflin.

Janis, I. (1982). *Groupthink: Psychological Studies of Policy Decisions and Fiascoes.* (2nd ed.). Boston: Houghton Mifflin.

Kayes, A., Kayes C. & Kolb D. (2005). "Experiential Learning in Teams". *Simulation & Gaming*, *36*, 330-354.

Murray, A. (1989). "Top Management Group Heterogeneity and Firm Performance". *Strategic Management Journal*, *10*, 125-141.

Park, W. (2000). "A Comprehensive Empirical Investigation of the Relationships among Variables of the Groupthink Model". *Journal of Organizational Behavior*, *21*, 873-889.

Sauaia, A. & Umeda, G. (2005). "Individual Achievement Does Not Guarantee Team Performance: an Evidence of Organizational Learning with Business Games". *Developments in Business Simulations and Experiential Learning*, *32*, 266-272.

Salancik, G. (1977). "Commitment and the Control of Organizational Behavior and Belief" in *New Directions in Organizational Behavior*. Eds. B. Staw and G. Salancik, 1-51. Malabar, Florida: Robert E. Krieger Publishing Company.

Staw, B. (1981). "The Escalation of Commitment to a Course of Action". *Academy of Management, 6*, 577-587.

Street, M. & Anthony, W. (1997). "A Conceptual Framework Establishing the Relationship between Groupthink and Escalating Commitment". *Small Group Research, 28*, 267-294.

Turner & Pratkanis, (1998). "Twenty-five Years of Groupthink Theory and Research: Lessons from the Evaluation of a Theory". *Organizational Behavior and Human Decision Processes*, *73*, 105-115.

Washbush, J. & Gosen, J. (2001). "An Exploration of Game-Derived Learning in Total Enterprise Simulations". *Simulation & Gaming*, *32*, 281-296.

West, C. & Schwenk, C. (1996). "Top Management Team Strategic Consensus, Demographic Homogeneity and Firm Performance: A Report of Resounding Non-findings". *Strategic Management Journal*, *17*, 571-576.

Wolfe, J. & Crookall, D. (1998). "Developing a Scientific Knowledge of Gaming/Simulation". *Simulation & Gaming*, *29*, 7-19.