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PERSISTENCE OF DECISIONS BY SIMULATION GAME PARTICIPANTS

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ABSTRACT

In a longitudinal simulation game competition, teams managing companies performing poorly during the early periods might be expected to change their decisions more than would teams managing better performing companies. There exist theories and empirical studies, though, suggesting that this may not be the case; even poorly performing teams may persist with their original ineffective strategies. The study reported here investigates this persistence for individual managers, rather than management teams.

INTRODUCTION

The core purpose of business simulation game participation is learning; learning which may be of many and varied types. Some types of learning are specific to the simulation game. For example, learning to manage the enterprise toward the performance criteria, e.g., profit or perhaps a scorecard of criteria, on which participants are to be evaluated. Other types of learning may be more general, for example delegating responsibility, dealing with uncertainty, conducting technical analyses, and so on.

Regarding the former type, learning may be directly manifested in actual enterprise performance. That is, as the competition progresses participants would be expected to achieve greater profit, and/or more efficiently managed inventory, and/or whatever are the operant criteria. (A competition "progressing" is in the context of a longitudinal competition for the present study, though the same expectations would apply to a series of independent competition episodes as well.) Gentry *et al.* (2006) analyzed such manifest performance improvement on several criteria as a function of participants' learning versus performance orientations.

Enterprise performance is a function of the decisions participants make. That function may be confounded by, say, synergistic or consistency or lagged or other such effects. Too, there may be additional determinants of company performance, most notably the decisions of competitors (Dickinson 2003). As to where lies responsibility for enterprise performance, Curren, Folkes, and Steckel (1992) tested several hypotheses regarding the attribution by decision makers of successful or unsuccessful performance to self, group, and environment using a simulation game research platform. Attribution notwithstanding, though, obviously it is the decisions made by participants that are controllable by them and those decisions are usually the sole means by which participants can determine the performance of their companies.

Indeed, at the heart of simulation gaming, among the numerous benefits commonly touted for business simulation games is that participants must live with the consequences of their decisions ("...Ralph Day, at the first ABSEL Conference, noted that one true advantage of simulation gaming in a pedagogical sense is that it is the only approach that makes students live with their decisions." [Gentry *et al.* 2006, p. 81]). Students must adapt their strategies in light of their experience that accumulates as a (longitudinal) game competition progresses.

Learning, then, may be reflected not only in the performance of the enterprise, but learning may also be reflected in decisions made by participants. (Complementing reflection in decisions, Lant and Montgomery [1987], using a simulation game, found that movement of aspiration level [i.e., self-reported unit sales goals] is directly related to performance.) Specific to the purpose of the present study, learning may be reflected in *changes* in decisions by participants over the course of a simulation competition.

BACKGROUND

As noted above, in a typical simulation competition usually the sole means by which participants can determine the performance of their companies is via the strategy decisions they make. In a longitudinal competition, where a company is performing poorly, there should be an impetus for the managers of the enterprise to alter their decisions. Perhaps counterintuitively, though, Edman (2006, p. 279) hypothesized that "Groups [i.e., simulation management teams] are committed to their decisions regardless of their performance." Edman's hypothesis was founded in the theory of groupthink. The theory of groupthink essentially posits that striving for unanimity or consensus among a group's members may override more objective appraisal of

alternative courses of action. (Janis 1982, p. 9) That is, where a change in course of action seems appropriate on an objective basis, that change may still not take place due to the dynamics of a management team.

The continuance of the same or similar decisions, i.e., the opposite of change, may be termed "persistence." A more dramatic related phenomenon is not just continuance, i.e., persistence, but an escalation of commitment. Outside of a team context, an individual decision maker, having justified decisions in some public context may "persist" in those decisions beyond the range of the justification (Salancik 1977; Staw 1981).

HYPOTHESES

Consider a longitudinal simulation game competition in which participants are evaluated, in part or completely, on the basis of their companies' performances. (It is recognized that evaluation might also include, for example, written planning reports, presentations, and so on.) Against the groupthink and persistence theories above, in such a competition where a company/participant is performing poorly, persistence would seem dysfunctional toward maximizing his or her evaluation.

Further, where students compete as individuals (as they did in the present study), as opposed to teams of managers, neither the group forces of groupthink nor public influences are present. In the matter of individual versus group decision making (though not with respect to persistence), using a simulation game Muhs and Justis (1981) found that contrary to their hypothesis, groups did not make more risky decisions than individuals when insignificant consequences were attached to the decisions. Their hypothesis that groups would make more conservative decisions than individuals when significant consequences were present was partially supported.

Poorly performing individual decision makers should be motivated to alter their decisions without the mitigating effects of groupthink or public influences. This quite basic premise was formally theorized by Cangelosi and Dill (1965). Based on their observations of participants in a simulation game competition, they theorized that adaptation, i.e., change, at the individual level of organizational learning was due, in part, to performance stress: "Performance stress is affected by outcomes of previous decisions..." (p. 200) Relatedly, March (1994, pp. 172-174), after studying both individual and group decision making, concluded that some of their characteristics may be similar. He advised, though, that there may also be important differences and that these potential differences should be the focus of further research (such as that reported here).

Students performing well might alter their decisions to distance themselves even farther from less well performing students. Nonetheless, comparatively, poorly performing decision makers have a more compelling motive for changing their decisions than do better performing decision makers. Further, subject to information availability, better performing participants may serve as a model for less well performing students, but not *vice versa*. In the present study, students could avail themselves of competitors' decisions through the purchase of marketing research reports.

The central hypothesis of this study, then, is:

H1: Decision makers performing relatively poorly during the early periods of a competition will change their strategy decisions in later periods more than will decision makers performing relatively well.

Support of this hypothesis would strengthen group-based theories, with individual decision makers not persisting providing a contrast to the persistence of group decision makers. Should the hypothesis not be supported, then new theories for individual persistence must be developed.

H1 focuses on strategy decisions made by game participants. A corollary hypothesis, founded on the same reasoning as H1, focuses on the outcomes of those strategy decisions, specifically the profit deriving from the decisions. Changing decision values *per se* (H1) has no necessary positive or negative effect on profit. However, by essentially the same reasoning as that for H1, decision makers performing poorly during the early periods may have learned what decision values are *not* effective and possibly have before them in the decision values of well performing decision makers a model for decision values that are effective.

H2: Decision makers performing relatively poorly during the early periods of a competition will increase their performance, i.e., profit, in later periods more than will decision makers performing relatively well.

H2 seems at odds with a general finding by Patz. "Several previous studies have shown consistent performance results in total enterprise simulations. That is, teams that lead at the end of the exercise tend to have led from the beginning and their lead grows as the decision series continues." (2006, p. 58) However, most of Patz's studies compared only first and last place companies (2006 being an exception) and all of the studies utilized management teams rather than individual managers. H2 suggests that the lead of decision makers performing well during the early periods of a competition will lessen, not grow, over the course of the competition.

The present research extends Edman (2006) in several respects. First, the present research investigates the persistence of decisions by individuals rather than groups. Second, a wider variety of decisions in a more complex simulation game is investigated. Third, change in performance is tested in addition to change in decisions.

DATA COLLECTION

The simulation game used for this research was *The Marketing Management Experience* (*MME*, Dickinson 2006). In a format common to several games, in the *MME* participants assume the role of marketing manager for a manufacturer of digital cameras. The cameras are both still and video and may be marketed in one or both of two regions, the regions being of different economic, demographic, and lifestyle characteristics. The two products and two regions, then, comprise four market segments with each segment having a dedicated decision-processing algorithm. Participants usually choose to market in all four segments, though that is not required. The decision mix for the *MME* comprises decisions specific to each segment (e.g., broadcast advertising), common to products (research and development), common to regions (e.g., retail store mix), and company-wide (e.g., co-operative advertising).

Most (29) of the strategy decisions are quantitative, being dollars, numbers of stores, numbers of salespeople, or a percent of sales. Some of the decisions are qualitative–advertising message type and type of sales promotion–and due to the difficulty of measuring "change" in these decisions, they are excluded from this study. Also, adding retail stores, increasing sales force size, and achieving a product quality improvement through research and development involve a one-period lag making such decisions for the final period of competition moot. The results reported here exclude these final period decision values.

In the *MME* companies are grouped into industries, with companies competing only against other companies in their industry. The competition for this study involved 76 companies grouped into 17 industries of either four or five companies each. The *MME* is a longitudinal game. As is common practice, a single initial trial period of competition was conducted. Results of that trial period were discarded and the competition then proceeded for nine periods. The sole evaluation criterion was cumulative earnings.

MEASURING CHANGE

The first hypothesis for this research (H1) concerns change in decision values, specifically that participants performing poorly in the early periods of the competition will exhibit greater change in their decisions than will participants performing well in the early periods. Though straightforward in concept, operationalizing change is problematic.

A basic issue is the number of periods to define early and late. Three variations were analyzed: Periods 1 through 4 versus Periods 5 through 9, Periods 1 through 5 versus Periods 6 through 9, and Periods 1 through 3 versus Periods 7 through 9.

A second parameter needing operational definition is poor versus good performing companies. Two definitions were analyzed: a median split on cumulative earnings for the early periods and the lowest earning 30 companies versus the highest earning 30 companies (i.e., excluding the middle earning 16 companies), again for the early periods.

As for change, for a given decision change might be defined as the mean value of the decision across the late periods minus the mean value across the early periods. Data are aggregated across simulation companies and change for some of them might be an increase and for other companies a decrease. Accordingly, the absolute value of this difference defines change. Alternatively, change might be defined on a period-to-period basis. For example, for a given decision, its value for Period 6 might be subtracted from its value for Period 7, its value for Period 7 might be subtracted from its value for Period 8, and its value for Period 8 might be subtracted from its value for Period 9. The mean of these (absolute) differences for the late periods (three differences for this example), then, would define change. Yet a third approach would reflect some single period change. Perhaps at some single period in the competition a participant effects a dramatic change in decision value and more or less maintains that new value for the remainder of the competition.

Period-to-period changes would seem to be more idiosyncratic and reflective of trial and error than mean values of early and late period decisions. The single-period change approach presents the problem of identifying the specific single period which would likely vary across participants. Thus, the first operationalization of change is adopted here.

All told, then, for changes in decision values six analyses (three early versus late period definitions times two divisions of company performance) were conducted.

For H1 for a given decision, for each company a change (late periods mean minus early periods mean) in decision value was calculated. This change became the dependent variable in a simple directional t-test of the mean change. Under research hypothesis H1, a greater mean was expected for poor performing companies than for good performing companies.

Change in profit (for H2) was similarly operationalized. That is, again, for each company a change (later periods mean profit minus early periods mean profit) in profit was calculated. As with decision values for H1, for H2 a simple directional t-test of the mean change was conducted with the expectation, under H2, that the mean change in profit for poor performing companies would be greater than the mean change in profit for good performing companies.

In the *MME* industries can and usually do grow at different rates. Thus, for example a given broadcast advertising expenditure in one industry may be relatively (to competitors) high and in a different industry relatively low. Too, differential growth is also reflected in profit, with a given level of profit being relatively high in one industry and relatively low in a different industry. All decision values (H1), then, and all profit values (H2) were standardized within industry across competition periods.

RESULTS

Results are presented here mainly for where the division of periods was the first four periods versus the last five periods and where poor versus good earning companies were defined on a median split on profit for the first four periods.

Of the 29 quantitative decisions analyzed, 25 (86.21%) differences between companies that performed poorly in the early periods and companies that performed well in the early periods were in the theorized direction. That is, the mean absolute *change* in decision values from the early to the late periods was greater for the poor performing companies than for the good performing companies. Of the differences, 16 (55.17%) were statistically significant (one-tail t-test, $p<.10$), where only three would be expected to be significant by change. The predominance of empirical evidence supports the theory (H1) that simulation participants who perform poorly at the start of a competition are more inclined to alter their decision values than are participants who perform well. Noting the high proportion of directionally theorized changes (86.21%) and the low power of the statistical tests due to subgroup sample sizes of no more than 38 observations, it may be that with larger sample sizes the statistical significance results would be even more conclusive.

Other combinations of divisions of periods (the first five versus the last four and the first three versus the last three) and divisions of poor versus good earning companies (30 lowest versus 30 highest) yielded similar findings. Descriptively, the instances where poor performing companies changed their decision values more than did good performing companies ranged from 22 to 26 of the 29 decisions. Inferentially, statistically significant ($p<.10$) differences ranged from 10 to 15.

The hypothesis (H2) that companies performing poorly during the early periods of a competition would increase their profit during the later periods more than would companies having good early-period performance was conclusively supported. As with analyses for H1, six different combinations of divisions of periods and divisions of poor versus good earning companies were analyzed. The mean change in profit for poor performing companies was significantly greater than the mean change in profit for good performing companies (one-tail t-test, $p<.001$) for each of the six combinations. Comparative changes in actual (not standardized) dollar profits were dramatic. Across the six combinations noted, the change between early and late period dollar profits for poor performing companies was between 60 and 148 percent greater than the change for good performing companies.

CONCLUSION

The hypothesis that decision makers performing relatively poorly during the early periods of a competition will change their strategy decisions in later periods more than will decision makers performing relatively well (H1) was generally supported. This was as theorized. The general result is contrary to the groupthink-based theory and findings reported by Edman (2006). The greater change in decision values in the present study also results in substantially greater increase in profit (H2).

Comparing the results of the two studies suggests that individual decision makers react to poor performance more rationally, i.e., with less dysfunctional persistence, than do decision makers acting in groups. This finding reinforces the phenomenon of groupthink. That is, groupthink is not but a collective of individuals' penchants to persist. Simulation gaming may serve as a very appropriate platform for encouraging management teams to not succumb to groupthink influences.

More generally, the findings of the present study suggest that participating in a simulation game is a meaningful experience for individual managers as they do, indeed, appear to react rationally to the performances of their companies.

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