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PERSONALITY TYPES AND TOTAL ENTERPRISE SIMULATION PERFORMANCE

Philip H. Anderson and Leigh Lawton
College of St. Thomas

ABSTRACT

Patz. (1990) presented evidence that total enterprise simulations are biased in favor of particular personality types. While the results of this study disagree with Patz's conclusion as to the particular personality that will perform best on a simulation, support was found for the position that a relationship does exist between personality and performance. The current study used individuals as simulation company managers to eliminate the problems of group effects existing in Patz's group-managed companies.

INTRODUCTION

The purpose of this study is to analyze the impact of personality type on performance in a simulation. This study tests hypotheses advanced by Patz (1990). Patz hypothesized, and his empirical findings supported the contention that some personality types would perform better on a total enterprise (TE) simulation than would other types. Based on his results, Patz questioned whether TE simulations are biased in favor of particular personality types. While Patz's hypotheses seemed plausible and his findings were interesting, his analysis was complicated by the fact his students participated in teams. As a consequence, Patz's assessment of the impact of personality on simulation performance was contaminated by the effects of group dynamics. The present study eliminates this problem by using individuals, rather than groups, in a total enterprise simulation. Consequently, this study provides a much more direct and a much stronger test of Patz's hypotheses.

Myers-Briggs Type Personality Theory

The Myers-Briggs Type Indicator (MBTI) instrument provides a profile of an individual's information processing and decision making preferences. A brief description of the MBTI follows. A more complete description can be found in Myers & McCauley (1985) or Patz (1990).

The MBTI instrument provides a measure of an individual's preferences on four dichotomous scales:

extraversion (E) versus introversion (I)
Sensing (S) versus Intuition (N)
Thinking (T) versus Feeling (F)
Judging (J) versus Perceiving (P)

Exhibit #1 provides a brief description of each of these scales as provided in Patz (1990). These four dichotomous dimensions translate into 16 basic personality types such as ENTJ or INFP. Each personality type has a dominant pattern for information processing and decision making indicated by the second and third letters in their personality type description, such as NT or NF.

Patz (1990) hypothesized that NT type dominant personalities would perform better on a simulation than other dominant personalities. He cites Myers and McCauley's (1985) description of NT types as preferring to make judgements pursuing a possibility that is a "technical, scientific, theoretical, or executive one, with the human element subordinated." According to Myers and McCauley, "NT's tend to be logical and ingenious. They are best in solving problems within their field of special interest, ..., the more intricate aspects of finance, or any sort of development or pioneering in technical or administrative areas" (Myers and McCauley, 1985, Chapter 4, page 35).

Patz argued that these characteristics of NT types match directly with those designed into total enterprise simulations. Success in TE simulations requires the application of the technical, scientific, and theoretical knowledge presented in the core curriculum of business programs. Also, the goal of total enterprise simulations is to put the participant in the role of a general manager (i.e., an executive position). Patz further states that intuition "is essential, and all these qualities are combined in a basically administrative arena." (Patz, 1990, p. 133). Patz hypothesized that the N and T dominant teams will establish an early lead in a total enterprise simulation and that these teams would maintain their lead throughout the simulation exercise.

Hypotheses

Based on Patz earlier work, the following hypotheses were tested:

- H1: N and T dominant individuals will out-perform all other dominant personality types over the first six periods of the simulation.
- H2: N and T dominant individuals will out-perform all other dominant personality types over the ten decision periods of the simulation.
- H3: N and T dominant individuals will out-perform all other dominant personality types over the last four decision periods of the simulation.

Research METHODOLOGY

The Subjects and the Course

Subjects for the study were seniors in their final year of study at a medium-sized, private, midwestern university. All were members of one of two sections of a business policy course conducted using a total enterprise simulation (described below) as a major component of the course pedagogy. The profile of the student was that of a typical college senior. All were majoring in various fields of business administration.

The Simulation

The simulation used was *Micromatic: A Management Simulation* by Scott and Strickland (1985). This is the same simulation that was used by Patz (1990) in his study. It is moderately complex, requiring decisions in the areas of production, marketing, finance, and accounting. Each decision set represents one quarter (three months) of a year's operation. Each decision set requires approximately 60 decisions to be made concerning the simulated company's operations.

The Methodology

The students initially participated in the simulation as one member of a group managing their simulation company. This served to expose the students to the mechanics of working with the simulation and its various components. After four decision periods, students were required to manage a simulation company as an individual in competition with the other individually managed companies in the course. The individually managed companies were operated from the beginning of the simulation exercise. That is, they were not continuations of the group managed companies. This resulted in 44 individually managed companies. Because of software restrictions these companies

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were organized into three separate industries; two industries of 15 companies each and one industry of 14 companies. The students were randomly assigned to one of the three industries. Competition among firms was within each industry, not across industries. A total of 10 decision sets (i.e., simulated quarters of operation) were made. Results were standardized so that a comparison of performance across the three industries could be made.

As in the Patz study, seven performance factors were measured in order to obtain current quarter and game-to-date rankings. These factors were sales revenues, net income, earnings per share, return on sales, return on assets, return on equity, and stock price. The percentage weights assigned were the same as the Patz study. Respectively, they were 10, 20, 10, 5, 25, 20, and 10. The simulation used (Micromatic) standardizes these factors so that a company's overall score for the seven factors, for either the current quarter or game-to-date, can range from 100 to -100. The individual's performance on the simulation counted for 25% of his or her grade for the course.

The Myers-Briggs Type Indicator instrument was administered to the students early in the semester. Feedback on the MBTI and their individual personality type was provided at the end of the semester, following the completion of the simulation exercise.

The current study extended the Patz study in a number of areas. First, each simulation company was managed by an individual rather than a group, eliminating the effect of group dynamics on simulation performance. This provides a "cleaner" measure of the relationship between dominant personality types and TE simulation performance. Second, the use of individuals as the unit of measure created a larger sample size, 44 in the current study versus 12 in the Patz study. Third, the current study ran for ten decision periods versus the eight conducted in the Patz study. These two extra decision periods allowed more time for any advantages of a particular personality type to take effect. The current study used the same TE simulation as the Patz study. This allows a direct comparison of the results of the two studies. If Patz's hypothesis can be supported, the extra decision sets should yield even stronger results demonstrating the relationship between dominant personality types and performance on the simulation.

RESULTS

Analysis of variance tests were conducted to measure the relationship between the Myers-Briggs dominant personality types and cumulative performance on the TE simulation after six decisions, after ten decisions, and for the last four decisions. Analysis of the last four decisions provided insight into whether "lucky" performance early in the simulation exercise influenced overall results.

Table #1 shows the cumulative performance of the different personality types after six decisions. No significant performance differences were found. The p-value of .585 indicates that the results did not approach significance. Clearly, after six decision sets, no dominant personality type had a significant advantage in performance on the simulation. This directly contradicts the results of the Patz study.

TABLE #1				
DOMINANT PERSONALITY TYPE VERSUS STANDARDIZED TE SIMULATION PERFORMANCE SCORES AFTER 6 DECISIONS				
	NT	NE	ST	SF
Sample Size	8	10	19	7
Mean	.230	-.311	.130	-.171
Standard Deviation	.982	.976	.948	1.122
p c .585				

Tables 2 and 3 also show a lack of significant difference between personality types after ten decisions had been made and for performance over the last four decisions. As Table 3 indicates, even if an initial misstep had affected cumulative performance over the duration of the simulation, no particular personality type was able to use insights gained during the simulation to outperform other personality types over the last four decisions.

TABLE #2				
DOMINANT PERSONALITY TYPE VERSUS STANDARDIZED TE SIMULATION PERFORMANCE SCORES AFTER 10 DECISIONS				
	NT	NF	ST	SF
Sample Size	8	10	19	7
Mean	.106	-.205	.262	-.539
Standard Deviation	.783	.872	1.013	1.121
p < .262				

TABLE #3				
DOMINANT PERSONALITY TYPE VERSUS STANDARDIZED TE SIMULATION PERFORMANCE SCORES OVER LAST 4 DECISIONS				
	NT	NE	ST	SF
Sample Size	8	10	19	7
Mean	.050	.041	.192	.637
Standard Deviation	1.031	.963	.998	.789
p < .296				

Since these results do not support those found in the Ritz study, further analysis was conducted to determine if significant differences in simulation performance related to any of the personality measures found in the Myers-Briggs inventory. Each of the dichotomous scales was analyzed to determine if any one scale was significantly related to performance on the simulation. The following hypotheses were tested with the results shown in Tables 4 - 7:

- H4: There will be no differences in the performance of extraverts and introverts.
- H5: Intuitives will outperform sensors. This hypothesis follows Patz's argument that intuition is likely to be positively related to performance.
- H6: Thinkers will outperform feelers. As with H5, this hypothesis rests on the logic that thinkers have an orientation that matches well with that needed for success in a simulation.
- H7: There will be no difference between the performance of perceivers and judgers.

Table 4 shows no significant differences between extraverts and introverts on their performance on the simulation. This lack of significance held for all three time periods measured; after 6 decisions, after 10 decisions, and over the last four decisions. Whether an individual has an inner or outer world focus does not appear to affect their simulation performance.

Table 5 also shows a lack of significant difference on simulation performance between sensing and intuitive types of individuals. There is no support for the hypothesis. In fact, with the exception of the last four periods, the sensors actually performed slightly better than the intuitives.

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Table 6 shows a marginally significant, but consistent difference between thinkers and feelers. A significant difference beyond the .05 level was found after 10 decisions and beyond .10 for the other cases. Thus, in all three cases, thinkers out-performed feelers on the simulation. This is consistent with Patz's arguments. He expected that a thinker's bias toward decision making based on cause and effect would yield better results than a feeler's orientation toward making decisions based on personal values.

TABLE #4				
EXTRAVERSION VERSUS INTROVERSION AND STANDARDIZED TE SIMULATION PERFORMANCE SCORES				
	n	Std Dev	Mean	p value *
After 6 Decisions				
Extraverts	28	-.069	.952	.55
Introverts	16	.120	1.040	
After 10 Decisions				
Extraverts	28	-.118	.965	.29
Introverts	16	.207	.980	
Over Last 4 Decisions				
Extraverts	28	-.083	.950	.47
Introverts	16	.150	1.040	

* All p-values correspond to two-tailed tests

TABLE #5				
SENSING VERSUS INTUITION AND STANDARDIZED TE SIMULATION PERFORMANCE SCORES				
	n	Std Dev	Mean	p value *
After 6 Decisions				
Extraverts	26	.049	.984	.65
Introverts	18	-.071	.989	
After 10 Decisions				
Extraverts	26	.050	1.080	.65
Introverts	18	-.067	.825	
Over Last 4 Decisions				
Extraverts	26	-.030	1.000	.40
Introverts	18	.045	.963	

*All p-values represent one-tailed tests that intuitives outperform sensors

TABLE #6				
SENSING VERSUS INTUITION AND STANDARDIZED TE SIMULATION PERFORMANCE SCORES				
	N	Std Dev	Mean	p value *
After 6 Decisions				
Extraverts	27	.160	.941	.092
Introverts	17	-.250	1.010	
After 10 Decisions				
Extraverts	27	.216	.939	.034
Introverts	17	-.343	.963	
Over Last 4 Decisions				
Extraverts	27	.150	.990	.099
Introverts	17	-.238	.934	

*All p-values represent one-tailed tests that initiatives outperform feelers

No significant differences were found on any of the performance measures for judging versus perceiving type individuals (Table 7). Neither a preference for planning and orderliness nor a preference for flexibility and spontaneity resulted in significantly better performance on the simulation.

TABLE #7				
JUDGING VERSUS PERCEIVING AND STANDARDIZED TE SIMULATION PERFORMANCE SCORES				
	n	Std Dev	Mean	p value *
After 6 Decisions				
Extraverts	19	.210	.892	.210
Introverts	25	-.160	1.020	
After 10 Decisions				
Extraverts	19	.062	.965	.720
Introverts	25	-.050	1.000	
Over Last 4 Decisions				
Extraverts	19	-.040	.898	.810
Introverts	25	.030	1.060	

All p-values correspond to two-tailed tests

CONCLUSIONS

The current study provides a better test of the hypothesis that total enterprise simulations are biased in favor of a particular personality type than the Patz (1990) study. It has the advantage of individual rather than group measures of simulation performance. It was a direct test of the relationship between an individual's personality and simulation performance, uncluttered by group effects. The current study also had a larger sample size than the Patz study, adding to the reliability of the results.

Patz's hypotheses were not supported by the results of this study. No significant differences were found among the four dominant personality types (NT, NE, ST, SF) and their performance on the simulation. However, tests of the individual dichotomous scales showed that "thinkers" outperformed "feelers." No evidence was found in this study that the other three dimensions of the Myers-Briggs type instrument affect performance.

Whether other simulations contain "personality biases" was not assessed in this study. Research testing the relationship between personality type and simulation performance should be conducted using other total enterprise simulations before generalizing the results of this study or the Patz (1990) study.

REFERENCES

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EXHIBIT #1

MYERS-BRIGGS TYPE THEORY SCALES

Scale	Description
Extraversion	People who tend to focus on the outer world of people and things.
Intraversion	People who tend to focus on their inner world of concepts and ideas.
Sensing	People who prefer to work with what is “given” in the here-and-now, and thus become more realistic and practical.
Intuition	People who prefer to deal with meanings, relationships, and possibilities that go beyond the sensory information.
Thinking	People who prefer to make decisions on the basis of cause and effect, by analyzing and weighing the evidence.
Feeling	People who prefer to make decisions by relying primarily on personal and social values.
Judging	People who prefer to live in a planned, orderly way, wanting to regulate life and control it.
Perceiving	People who prefer to live in a flexible, spontaneous way, gathering information and keeping options open.