

# Developments In Business Simulation & Experiential Exercises, Volume 19, 1992

## CONFIDENCE EXTREMES DIMINISH QUALITY PERFORMANCE IN A TOTAL ENTERPRISE SIMULATION

Alan L. Patz, University of Southern California  
John R. Milliman, University of Southern California

### ABSTRACT

Career confidence extremes within competing groups make a difference in the Corporation total enterprise (TE) simulation performance results. Groups with a high proportion of individuals who are either highly confident or, conversely, lack confidence in current career choices do not perform as well as groups with moderate career confidence levels. This result confirms a more general finding obtained with both the Micromatic and Multinational Management Game simulations. That is, TE simulations are biased in that group personality composition affects performance results one way or another. All of these findings support a basic but beginning behavioral model of total enterprise simulation performance that includes personal and interpersonal needs, decision styles, and preferences for processing information and making decisions. Moreover, they add additional support for the notion that TE simulations may be designed intentionally to favor one or more specific personality biases.

### INTRODUCTION

Recent studies have demonstrated a remarkable consistency in the relationship between group personality composition and performance in total enterprise (TE) simulations. Specifically, group information processing and decision making preferences, when translated into dominance orderings, are highly correlated with performance results in both the Micromatic (Scott & Strickland, 1985) and Multinational Management Game (Edge, Keys, & Remus, 1985) TE simulations. Group dominance characteristics were measured using the MBTI (Myers & McCaulley, 1985) test instrument, and their correlations with performance were  $r = .707$  and  $r = -.787$  for Micromatic and the Multinational Management Game respectively (Patz, in press).

In addition, matching groups on their information processing and decision making dominance orderings reduced the correlation to insignificance,  $r = -.055$ , leaving little question regarding the existence of the dominance phenomenon. But, there was one anomaly. A third TE simulation, Corporation (Smith & Colden, 1989), had none of the dominance relationships common to the other two.

Therefore, beginning for a second time with Micromatic, performance relationships with other personality concepts were investigated, and interesting results appeared again (Patz, Milliman, & Driver, 1991). That is, personal needs within competing groups, represented by career decision concepts (Osipow, Carney, Winer, Yanico, & Koschier, 1976), significantly enhanced the performance correlations with group information processing and decision making dominance ( $p < .05$ ). And, career success concepts (Driver

& Brousseau, 1983) in the same groups were significantly related to TE performance ( $p = .018$ ).

These results, of course, suggested a new avenue of approach to group personality correlates with the Corporation TE simulation. Would the same career decision and success concepts, representing personal needs, have significant correlations with Corporation performance results? Again, however, the answer was no. Corporation was different.

Nevertheless, other test instruments were administered to the competing groups in all the aforementioned TE simulations. Among them were the CDAS, Career Decision Assessment Scale (Milliman, Driver, & Simon, 1989), and the CES, Career Exploration Survey (Stumpf, Colarelli, & Hartman, 1983). This time the results were different, and the purpose of this paper is to present them and comment on their implications.

### Background

The earlier studies already noted suggested a basic but beginning behavioral model of TE simulation performance (Patz, in press), shown in Figure 1, that includes preferences, styles, interpersonal and personal needs. MBTI preference measures indicate an individual's, and by extension, a group's dominant orientation to the information processing and decision making routines of a TE simulation.

Style measures are included because the MBTI instrument measures only information processing and decision making preferences. It does not indicate how much information and how many alternatives are considered before actually making decisions. These two issues are matters of decision style, learned habits of behavior (Driver, Brousseau, & Hunsaker, 1990), and can be measured with the appropriate instruments (Driver, 1983, 1987).

In addition, members of the competing teams approach a TE simulation with differing interpersonal and personal needs. Among the more important of the inter-personal needs are those for inclusion by other group members, control over the group's decision making process, and affection received from and expressed to other group members (Schutz, 1989).

Foremost among the personal needs, especially for enduring an MBA program as the platform for attaining or maintaining gainful employment, are the various career decision making (Osipow, 1980) and success (Driver & Brousseau, 1983) concepts. The decision-making concepts are certainty and its counterpoint, indecision. Certainty is just what it suggests. Group members know what they will do or want to do after receiving an MBA. On the other hand, indecision occurs when group members are unable to choose specific occupations or career fields or are experiencing dilemmas about current choices.

Success concepts will be explained in subsequent paragraphs. The key point for now is that the

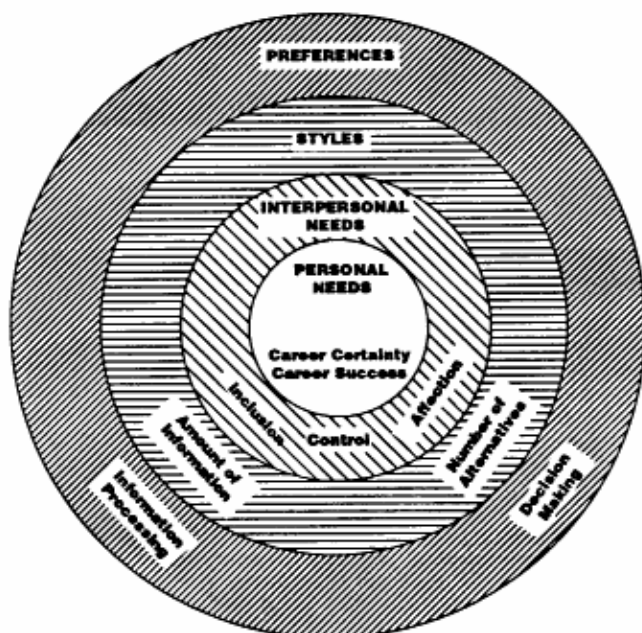
<sup>1</sup> The authors are indebted to Professors Arvind Bhambri and Nandini Rajagopalan for supplying the Corporation data from their classes.

# Developments In Business Simulation & Experiential Exercises, Volume 19, 1992

interpersonal and personal needs determine how much force

current career choices.

**FIGURE 1**  
**BEHAVIORAL BASES OF TOTAL ENTERPRISE SIMULATION PERFORMANCE**



is behind the exercise of preferences and styles in group decision making sessions. For example, two key hypotheses in the most recent study (Patz, Milliman, & Driver, 1991) were that high degrees of career certainty within a group would correlate negatively with TE performance results, and group indecision scores would not be correlated with performance. Both hypotheses were confirmed, and the above concepts, summarized in Figure 1, suggest why.

That is, a group of students who are rather sure of their career goals will view a TE simulation as another exercise necessary for graduation. This reduces the force or personal drive for TE simulation success. Indecision, however, is another matter. High degrees of group indecision may generate searches for resolution outside the classroom, negating TE simulation efforts; or, such uncertainty may encourage resolution efforts within the realm of business situations presented by TE simulations. In other words, group indecision may work either way, enhancing or diminishing TE simulation performance, and the net result is an insignificant correlation with performance.

## Related Certainty and Indecision Concepts

Now, as noted above, certainty and indecision, labeled CERNITY and INDECN, did not correlate significantly with Corporation performance results. Respectively, the results were  $r = .28$ ,  $p = .29$  and  $r = .20$ ,  $p = .46$  (Patz, 1991).

But, the CDAS, Career Decision Assessment Scale (Milliman, et al., 1989) and the CES, Career Exploration Survey (Stumpf, et al., 1983), the other two above mentioned ones were administered to the teams competing with the Corporation TE simulation. They were selected because of their related, yet different approaches to career decision making. For example, the CDAS measures the lack of confidence, LACCON, in current career choices. Conversely, the CES measures confidence, CONFID, in

A priori, it is reasonable to assume that certainty, CERNITY, and confidence CONFID, in career decisions are similar measures. Likewise, indecision, INDECN, and the lack of confidence, LACCON, could be similar cognitive structures. Therefore, in parallel with the two above-mentioned hypotheses, the first two hypotheses for this study are:

- H1: Group confidence scores will be negatively correlated with Corporation TE simulation performance results.
- H2: Group lack of confidence scores will not be correlated with Corporation TE simulation performance results.

## Related Success Concepts

Regarding success concepts, Driver et al. (1990) offer the following succinct statements regarding individual types:

1. The steady state view or career concept sees a career as a lifelong involvement in an occupation such as law with increasing expertise and respect as signs of success.
2. The linear career concept defines a career as a steadily upward movement on some clearly defined ladder. In organizational management career success is defined as reaching the top.
3. The spiral career concept sees a career as a series of different careers, each lasting about ten years and each building on the strengths of the past but allowing the development of new skills. Success is seen as the development of one's own inner potential to its maximum.
4. The transitory career concept defines a career as a series of one to four years in varied fields with the key being novel challenge. Success is translated into the ability to meet greater challenges (pp. 141-142).

These definitions lead to two further hypotheses, complementing those of the earlier study (Patz, Milliman, & Driver, 1991). That is, transitory types (TRANSY) value novel challenges the essence of TE simulation, and steady state types (STEADY) value stability, the antithesis of TE simulations- especially in the opening rounds of play. Therefore it is expected that:

- H3: Group transitory scores will be positively correlated with Corporation TE simulation performance results.
- H4: Group steady state scores will be negatively correlated with Corporation TE simulation performance results.

Hypotheses for predominantly linear and spiral success concept groups are more difficult to formulate, and the only indications so far are empirical. That is, Micromatic performance results had a significant quadratic correlation with the percentage of team members in each competing group who held either primary linear or spiral concepts of career success. For purposes of brevity, however, it may be stated now that this result did not hold for the Corporation TE simulation.

## Developments In Business Simulation & Experiential Exercises, Volume 19, 1992

In short, the only results noted here are for the seven group average variables noted above as CERNTY, INDECN, LACCON, CONFID, TRANSY, STEADY, and PERFOR. These labels, to repeat, are for career certainty, career indecision, lack of confidence in career choices, confidence in career choices, the transitory career success concept, the steady state career concept, and group performance results respectively. Group scores for each of these variables are obtained simply by determining the average of individual results in each group.

### METHOD

The Corporation TE simulation was conducted in two sections of a capstone MBA policy course. Each section formed an independent industry, and a total of 75 students participated. One section had seven teams; the other one had nine; and all teams were self-selected.

The Career Decision Assessment Scale and the Career Exploration Survey were only two of five administered at the beginning of the semester. A general explanation regarding the use of these instruments was provided, but the references were to improvements in curriculum design, not simulation research. However, a complete explanation of the entire effort was promised for, and delivered at, the end of the semester.

After one class devoted to the clarification of simulation rules, evaluation procedures, and decision-making mechanics, a one-quarter practice decision was completed. Questions pertaining to the results of the practice decision were answered in a brief period of the next class session, and the evaluation procedure was restated. That is, the students were reminded that the game-to-date rankings at the end of the simulation were the figures of merit.

The importance placed on ending game-to-date rather than current period results emphasized long- rather than short-term strategies. Moreover, attention was directed at three specific conditions. First, the actual ending period of the simulation would remain unknown. (The syllabus and the length of the semester actually allowed for a maximum of 12 quarters of play.) Second, all teams were expected to end their management tenure with a going concern, not a firm stripped of long term potential in order to gain short-term ranking enhancements. Third, 20% of the semester grade for the course depended upon ending game-to-date rankings.

One peculiarity of Corporation, however, is that the algorithm that generates game-to-date rankings is not discussed in the materials made available to the administrator and the students. Therefore, the participants must attempt to determine its nature along with all the other necessary analyses that underlie their decisions.

Eight actual decisions were conducted then over an eight-week period with one decision per week. Decisions were due at specific times, they were processed by the simulation model, and the results were available to participating teams within two days. This allowed five days before the next set of decisions were required on a weekly basis.

Play halted after the eighth decision, and each team gave a formal report to the class in the ninth week regarding their strategies, perceived reasons for successes and failures, and what they would do differently if they could begin again.

Following these presentations an explanation of the test instruments was provided. Finally, relationships between TE simulation performance and test instrument results, known at the time, were discussed.

### RESULTS

As noted in the earlier study (Patz, in press), a repeated measure analysis of variance indicated no performance differences between the seven Corporation teams in one section and the nine in the other, allowing the two sections to be combined for further analyses. Also, to repeat what was mentioned earlier, certainty, CERNTY, and indecision, INDECN, along with the linear, LINEAR, and spiral, SPIRAL, concepts of career success were eliminated as significant Corporation performance correlates. Therefore, attention was focused on the remaining assumptions and hypotheses. These findings are summarized in Tables 1 and 2 as well as Figure 2.

First, the summary in Table 1 confirms the assumed relationships among career certainty, indecision, lack of confidence, and confidence. Certainty, CERNTY, and the lack of confidence are negative correlated,  $r(13) = -.666$ ,  $p < .01$ ; CERNTY and confidence, CONFID, are similar measures,  $r(13) = .604$ ,  $p < .05$ . Likewise, career indecision, INDECN, and lack of confidence, LACCON, are correlated  $r(13) = .583$ ,  $p < .05$ ; and, the relationship between INDECN and CONFID is in the expected direction,  $r(13) = .187$ , but is not significant.

TABLE 1  
CAREER DECISION AND SUCCESS CORRELATIONS  
OUTLIER OMITTED (N = 15)

	INDECN	LACCON	CONFID	TRANSY	STEADY	PERFOR
CERNTY	-.595*	-.666**	.604*	.190	-.283	.048
INDECN		.583*	.187	.103	.357	-.007
LACCON			-.405	.297	.308	-.447
CONFID				.281	.150	-.275
TRANSY					.253	-.099
STEADY						-.236

\*  $p < .05$ , \*\*  $p < .01$

Second, as expected, the correlation between CERNTY and INDECN is significant,  $r(13) = -.595$ ,  $p < .05$ .<sup>2</sup> Third, and more important, the correlation between the lack of confidence, LACCON, and confidence, CONFID  $r(13) = .405$  is not significant, removing multicollinearity problems in performance, PERFOR, multiple regression procedures.

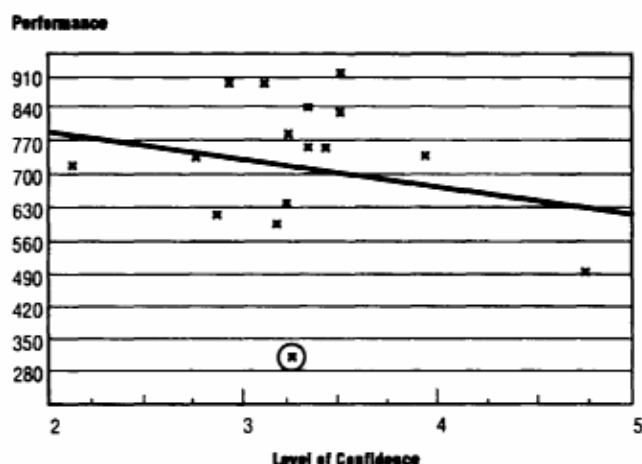
Before presenting other bivariate or multivariate results, however, it should be noted that the preceding statistics are for 15 rather than the 16 teams included in the study. The reason is that one team proved to be an outlier, and a typical example is shown in Figure 2, the performance regression on confidence with the outlier encircled. In all four cases of interest - the PERFOR regressions on LACCON, CONFID, TRANSY, and STEADY - a residual analysis

<sup>2</sup> 2 But, as noted earlier, the negative correlation is not large enough to suggest that CERNTY and INDECN are direct opposites. That is, certainty regarding career plans does not exclude indecision regarding rejected alternatives.

## Developments In Business Simulation & Experiential Exercises, Volume 19, 1992

(Dillon & Goldstein, 1984) confirmed this team as a significant outlier, beyond the  $p = .05$  level of significance.

FIGURE 2  
CORPORATION SIMULATION CONFIDENCE RELATIONSHIP



Now, regarding hypotheses H1 through the initial indications in Table 1 are that most may be rejected. For H1, group confidence averages, CONFID, do have the hypothesized negative correlation with performance, but the simple correlation is not significant. For H2, as hypothesized, there is no significant relationship between the lack of confidence, LACCON, and performance, PERFOR. Likewise, for H3, the group transitory, TRANSY, scores do not have the hypothesized positive correlation with performance; and, the steady state scores, STEADY, while negatively correlated with performance, are not statistically significant.

However, the size of the LACCON, CONFID, and STEADY correlations with PERFOR in Table 1 led to the obvious use of multiple regression examinations. Both forward and backward stepwise procedures were employed, and the significant results of both were the same, as summarized in Table 2.

TABLE 2  
STANDARD BETA COEFFICIENTS AND MULTIPLE  
CORRELATIONS FOR THE PERFORMANCE REGRESSIONS ON  
LACK OF CONFIDENCE AND CONFIDENCE

	LACCON	CONFID	R	N
	-.6497	-.4525	.6276	16
t	-2.762	-1.924		
F			4.221	
p	.0161	.0765	.0386	
	-.6677	-.5454	.6697	15
t	-2.848	-2.326		
F			4.879	
p	.0147	.0383	.0281	

The upper part of Table 2 is the analysis for all 16 teams, and the lower portion pertains to the 15 teams included in Table 1. Standard beta coefficients are shown in order to indicate the relative influences of LACCON and CONFID, and the overall result is clear. Both standard beta coefficients

are negative. Confidence extremes diminish quality performance in the Corporation simulation ( $R = .6697$ ,  $N = 15$ ,  $F(2, 12) = 4.879$ ,  $p = .0281$ , and the result holds even if the outlier is included in the analysis ( $R = .6276$ ,  $N = 16$ ,  $F(2, 13) = 4.221$ ,  $p = .0386$ ).

Thus, using these multivariate results and returning to the hypotheses, H1 is confirmed but H2 is not. The CONFID standard beta is negative and significant,  $t(12) = -2.848$ ,  $p = .0147$ , as stated in H1; however, so is the LACCON standard beta,  $t = -2.326$ ,  $p = .0383$ , just the opposite of hypothesis H2. H3 is not confirmed; TRANSY has no relationship at all with PERFOR. Finally, H4 will be held in abeyance until a larger sample is obtained. Group STEADY scores do have the hypothesized negative relationship with PERFOR; but, consistent with the simple correlations in Table 1, the result is not significant.

### DISCUSSION

These findings are important for several reasons. First, without any prior knowledge, they may have been anticipated. That is, every athletic coach attempts to fine-tune an individual's or team's level of confidence prior to a competition. Overconfidence leads to upsets by weaker opponents, and the lack of confidence inhibits them when facing stronger ones.<sup>3</sup>

Yet, there are some interesting variations. The Micromatic CERNY correlation with PERFOR in the earlier study (Patz, et al., 1991) was significantly negative, just as the CONFID one is here. Furthermore, the correlation between CERNY and CONFID in this study is significantly positive. Both measures appear to be determining factors of importance in TE simulations.

On the other hand, the INDECN correlation with Micromatic PERFOR results was essentially zero, and the LACCON one here is significantly negative. Yet INDECN and LACCON have a significant positive correlation in this sample. There are some puzzles here until further analyses are completed. They will be performed and reported when complete.

Similarly, the transitory, TRANSY, career success concept had a positive but insignificant correlation with PERFOR with Micromatic, as hypothesized. With Corporation, the correlation is zero. This is another puzzle, but steady state, STEADY, is not. Its correlation with PERFOR is negative in both studies, significantly so with Micromatic, and in the same direction with Corporation.

All things considered, however, one point is clear. Personal needs within a group are a factor in determining TE simulation results, and the basic model exhibited in Figure 1 is a reasonable assumption. Said in another way, group effects exist in TE simulations.

Furthermore, another point is even more important. TE simulations appear to contain personality biases. A search for the number of ways in which they may be biased, again, is suggested in Figure 1. Individual characteristics combined into group information processing and decision-making sessions, lead to different results depending upon the information processing and decision-making configuration. Corporation, Micromatic, and the Multicultural Management Game are different simulation configura-

<sup>3</sup> Appreciation is Extended to C.A. Patz (personal communication, July 21, 1991) for this observation.

## Developments In Business Simulation & Experiential Exercises, Volume 19, 1992

tions with different demands upon participants. This creates a healthy, competitive market among them as well as all the other ones available. Moreover, there is no reason to believe that anyone began with the notion of building personality biases into TE simulations.

But why not begin with this notion in mind? Determine the sources of TE personality biases and include them at will, depending upon learning objectives. The consistency in research results is now too evident to deny this possibility. Correlations of the magnitude reported in this study and the ones cited herein, do not occur ordinarily in behavioral data.

### REFERENCES

- Dillon, W. R., & Goldstein, M. (1984), Multivariate Analysis: Methods and Applications, New York; Wiley.
- Driver, M. J. (1983), Driver-Streufert Complexity Index, Santa Monica; Decision Dynamics Corporation.
- Driver, M. J. (1987), The Driver Decision Style Exercise, Santa Monica; Decision Dynamics Corporation
- Driver, M. J., & Brousseau, K. R. (1983), Career Concepts (Short Form), Santa Monica; Decision Dynamics Corporation
- Driver, M. J., Brousseau, K. R., & Humsaker, P. L (1990), The Dynamic Decision-Maker: Five Decision Styles for Executive and Business Success, New York; Harper & Row
- Edge, A. G., Keys, B., & Remus, W. E. (1985), The Multinational Management Game (2nd ed.), Plano, TX; Business Publications, Inc.
- Milliman, J. R., Driver, M. J., & Simon, M. (1989), "Cluster Analysis of Career Indecision in Graduate Business Students," Unpublished manuscript, University of Southern California, Los Angeles.
- Myers, I. B., & McCaulley, M. H. (1985), Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator, Palo Alto; Consulting Psychologists Press.
- Osipow, S. H. (1980), Manual for the Career Decision Scale (2nd ed), Columbus, OH; Marathon Consulting and Press.
- Osipow, S. H., Carney, C. G., Winer, J., Yanico, G., & Koschier M. (1976), The Career Decision Scale, Columbus, OH; Marathon Consulting and Press.
- Patz, A. L. (1991), "Corporation Total Enterprise (TE) Simulation Data Analyses," Unpublished data analyses.
- Patz, A. L. (in press), "Personality Bias in Total Enterprise Simulations," Simulation & Gaming.
- Patz, A. L., Milliman, J. F., & Driver, M. J. (1991), "Career Concepts and Total Enterprise Simulation Performance," Developments in Business Simulation and Experiential Exercises, 18, 84-89.
- Schutz, W. (1989), FIRO: A Three-Dimensional Theory of Interpersonal Behavior (3rd ed.), Muir Beach, CA; Will Schutz Associates, Inc.
- Scott, T. W., & Strickland, A. J., III (1985), "Micromatic: A Management Simulation," Boston; Houghton-Mifflin.
- Smith, J. R., & Golden, P. A. (1989), Corporation, Englewood Cliffs, NJ; Prentice-Hall
- Stumpf, S. A., Colarelli, S. M. & Hartman, J. K. (1983), "Development of the Career Exploration Survey (CES)," Journal of Vocational Behavior, 22, 191-226.