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CAREER CONCEPTS AND TOTAL ENTERPRISE SIMULATION PERFORMANCE

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ABSTRACT

Personal needs, reflected in career concepts, are added to information processing and decision making preferences in order to enhance the explanation of total enterprise (TE) simulation performance. All career, preference, and performance measures are from a sample of predominantly full-time employed MBA students in a capstone business policy course. Their individual career concepts combined into group averages significantly enhance the explanation of group TE performance results (B - .871) beyond that provided by preference data alone (r - .707). Moreover, they lend support for a model of TE simulation performance that combines preferences with decision styles as well as interpersonal and personal needs. Future research will focus on the inclusion of style and interpersonal needs with preferences and personal needs.

INTRODUCTION

Recent total enterprise (TE) simulation behavior studies provide strong support for the hypothesis that information processing and decision-making preferences determine competitive results. In particular, groups with a high percentage of members characterized as dominant intuitive information processors or thinking decision makers not only end a TE competition with the highest performance scores, but they also lead throughout the entire run of the game (Patz, 1990a; 1990b). These people are the classic N's for iNtuition and Ts for Thinking in Myers-Briggs Type Indicator (MBTI) theory (Myers & McCaulley, 1985).

Group TE performance correlations with N and T preferences are very high for social data, exceeding r - .7, but 50% of the variance in performance results remains unexplained. Therefore, the purpose of this study is to expand this MBTI preference focus with other theoretically valid measures in order to enhance the explanation of TE simulation performance.

Background

For example, while the MBTI instrument yields information processing and decision making preference measures, it does not indicate how much information individuals process and how many alternatives they consider before actually making decisions. These two issues are matters of decision style, learned habits of behavior (Driver, Brousseau, and Hunsaker, 1990), and can be measured with the appropriate instruments (Driver, 1983, 1987).

In addition, members of the various teams approach a TE competition with differing interpersonal and personal needs. Among the more important of the interpersonal 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 success (Driver & Brousseau, 1983) and decision making (Osipow, 1980) concepts.

In other words, the basic model behind the enhancement of TE simulation performance explanations is to supplement preference measures with style and interpersonal as well as personal need measures. The logic behind this choice of models, of course, is quite simple. Preference measures indicate an individual's, and by extension, a group's general orientation to the information processing and decision making routines of a TE simulation. Style measures focus on what happens within this general orientation in terms of how much information is processed and how many alternatives are considered before decisions are made. Last, need measures indicate how much force is behind the exercise of preferences and styles in-group decision making sessions.

Career Theory

This study is directed at a beginning analysis of the model's plausibility. It adds personal needs, in the form of career concept measures, to the preference data reported in an earlier study (Patz, 1990b). Preference data refer to the percentage of members in each competing TE simulation team that are typed as either dominant intuitive information processors or thinking decision makers, the NT% of each group as determined by the MBTI instrument.

Career data derive from the use of two well-known instruments. The first one is the Career Decision Scale (Osipow, Carney, Winer, Yanico, & Koschier, 1976) which provides measures of career certainty and its counterpoint, career indecision. Career indecision occurs when an individual is unable to choose or decide upon a specific occupation or career field.

The second one is Driver & Brousseau's (1983) Career Concepts (Short Form) which provides measures of four different individual notions of career success- -linear, spiral, steady-state, and transitory. Each one is an enduring cognitive structure, which defines the meaning of a career for a person in terms of job content as well as two dimensions of career movement- - frequency of movement and direction of movement (Driver, 1979; 1980; 1982).

In the order mentioned in the preceding paragraphs, these variables may be labeled CERNTY, INDECN, LINEAR, SPIRAL, STEADY, and TRANSY. Furthermore, they all refer to individual measures, and group measures are the key issue for TE simulation studies. Therefore, group averages of these measures are used for all analyses reported in this study.

More important are the performance hypotheses related to these group measures. It would not be unreasonable to suppose, for example, that TE simulation performance and group career certainty scores, CERNTY, are negatively correlated. That is, a group of students who are rather sure of their career goals

will view a TE simulation as an exercise necessary for graduation. This reduces the force or personal drive far TE simulation success. Formally stated, the first hypothesis is:

H1: Group career certainty scares will be negatively correlated with TE simulation performance results.

Second, career indecision is a counterpoint to career certainty rather than its apposite because many of the items comprising the indecision scale measure the difficulty an individual experiences in making a career choice, rather than being undecided per se. For example, an individual may have decided upon a career but is still experiencing same dilemmas about rejected alternatives.

Therefore, it would be reasonable to assume that group indecision scores, INDECN, are not at all related to TE simulation performance results. Indecision may generate searches for resolution outside the classroom, negating TE simulation efforts. On the other hand, such uncertainty may encourage resolution efforts within the realm of business situations presented by TE simulations, enhancing TE simulation efforts. Thus, the formal hypothesis is:

H2: Group indecision scores will not be correlated with TE simulation performance results.

Career concept definitions. Similar hypotheses for the career concept scale are not quite as straightforward, however, far group measures of linear, spiral, steady-state, and transitory concepts. First of all, they need to be defined. Second, they need to be interpreted in terms of TE simulation games.

Far example, regarding definitions, Driver et al. (1990) offer the following succinct statements regarding career concept 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 tap.

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 short engagements 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)

On this matter of type, the Career Concepts instrument assigns scores on a 5-point scale for each of the above four definitions. Thus. the primary. secondary. tertiary. and quaternary career success needs may be determined for any individual. Equally important, it is known from previous samplings (Simon, 1990) that the general population of MBA students used in this study is composed predominantly of linears or spirals. Therefore, the hypotheses that fallow refer to a restricted rather than a general population.

Career concept hypotheses. Nevertheless, to the extent that steady state and transitory notions are present in this population, two hypotheses follow directly from the above definitions. That is, transitory types value navel challenges, the essence of TE simulations, and steady state types 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 TE simulation performance results.

H4: Group steady state scores will be negatively correlated with TE simulation performance results.

Hypotheses far the more "upwardly-aggressive" linears and "skill-oriented" spirals, however, are not so easily derived. Almost any statement asserting a positive correlation of group linear or spiral scares with TE simulation performance results can be countered with an equally plausible one asserting a negative relationship. Therefore, the approach in this beginning study is exploratory and conducted along two paths.

First, as with all the other variables, group LINEAR and SPIRAL averages are checked for significant performance correlations. Second, past experience with MBTI measures suggests that group LINEAR and SPIRAL percentage scores be checked for significant performance correlations.

That is, the NT% scares that correlate so highly with TE performance are just that, percentages, not MBTI scale values. As noted above, the preference data refer to the percentage of members in each competing group that are typed as either dominant intuitive information processors or thinking decision-makers. It is the presence rather than a precise measure of these characteristics in a group that is sufficient. Measures of a characteristic may vary considerably during the course of an intense, face-to-face decision session, but the characteristic itself is always present.

Therefore, remembering that the Career Concepts instrument measures the primary, secondary, and so forth career success needs for any individual, define:

PL - percentage of each group's members who are primary linears

SL - percentage of each group's members who are secondary linears

PS = percentage of each group's members who are primary spirals

SS - percentage of each group's members *who* are secondary spirals.

This focus on linear and spiral success concepts reflects again the population being sampled. More important, the use of percentages allows for meaningful arithmetic combinations of the above four variables. Any attempt to combine raw linear and spiral scores leads to difficult interpretations both empirically and theoretically.

A TE simulation (Scott & Strickland, 1985) was conducted in two sections of a capstone MBA policy course. Six teams were established in each section, and each section formed an independent industry. A total of 72 students participated, and all teams were self-selected.

Basic Procedures

The Career Decision Scale, Career Concepts, and MBTI instruments were only three of five administered at the beginning of the semester. An 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 session 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 session 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.

Seven performance dimensions were measured in order to obtain current quarter and game-to-date rankings: sales, net income, earnings per share, return on sales, return on assets, return on equity, and stock price. The percentage weights assigned to each of these dimensions respectively were 10, 20, 10, 5, 25, 20, and 10. Furthermore, the TE simulation used is programmed to standardize team scores on each dimension with the maximum possible score being the percentage weight for the dimension, and the minimum possible score being the negative of the maximum. Thus, a team's overall score, summed across the seven dimensions on either the current quarter or the game-to-date, could vary between 100 and -100.

Eight actual decision quarters were then conducted over a seven-week period. These quarters were number nine through sixteen since the simulation has an eight-quarter history.

The first four quarters required one set of decisions per week for four weeks. The fifth week was devoted to confidential annual reports from each team. Two decisions per week were required during weeks six and seven in order to increase the level of "general management-pressure. Then, the simulation was ended because first and last place teams were well established in each section.

Other Considerations

Certain environmental factors dictated the choice of some methods described in the preceding paragraphs. First, the participants in the study live in a very large metropolitan area, making a random assignment to teams impossible. That is, the primary criterion for forming groups was that the members could actually meet without traveling thirty or forty miles to do so. Nevertheless, an effective random assignment to groups was achieved given the fact that almost all of the participants were employed full-time and had no contact outside of the classroom.

Second, the capstone policy course within which the simulation was conducted is very crowded in terms of content and student requirements. From a student's point of view, effort has to be distributed across five major components including cases, industry reports, company reports, a simulation, and class participation. Cases and the related exams occupy 40% of this effort; industry and company reports take another 30%; and minimizing class participation at 10% leaves 20% for the simulation. Also, prior experience with this highly competitive population indicates that the placing of more than 20% of the semester grade on simulation results is disruptive. Case analyses, classroom discussions, and reports suffer as teams attempt to avoid an embarrassing game-to-date ranking.

Third, grade point averages (GPAs) in the competing groups are not a problem for this study since there is no statistical variation of significance among them. On a 4-point scale, the second year MBAs in this study have a GPA average of 3.30, and most vary between 3.10 and 3.50. Furthermore, probation is the usual consequence for anyone falling below a 3.00 average.

RESULTS

As reported earlier (Patz, 1990b), the two class sections participating in this study were combined for data analyses since their average performance results were virtually identical over the eight periods of competition. Likewise the results reported here refer to a sample of N - 72 individuals combined into G - 12 groups.

Individual Career Summary

On an individual basis, the results are as expected. Using the 4-point Career Decision Scale the average CERNTY and INDEGN scores were 2.84 and 1.62 respectively, and the standard test of the difference between correlated means yielded 1(7l) - 7.88, C .0001.

Similarly, using the 5-point Career Concepts scale, the mean LINEAR, SPIRAL, STEADY, and TRANSY scores were 3.89, 3.61, 2.60, and 2.34 respectively. Again, these differences are significant as indicated by a repeated measures analysis of variance, £(3,71) -65.18, p < .0001. Further Scheffe comparisons indicate no significant differences between LINEAR and SPIRAL means as well as between STEADY and TRANSY averages. However, the LINEAR and SPIRAL means are significantly larger, p C .01.

Another way of looking at this last result is that of the 72 in the sample are primary linears and 26 are primary spirals. In short, this is a business school sample, not representative of the general population. Its members are highly certain of their

Career intentions, and their success concepts are predominantly (90%) linear and spiral.

Group Performance Results

On a group basis, the results are mainly as hypothesized. For example, Table 1 shows the correlation matrix for the group average scores on all the variables considered in this study. (Note: The NT% and performance data are labeled as NTPERC and PERFOR respectively.) The PERFOR column of this table provides immediate support for hypothesis H4. Croup STEADY scores are negatively correlated with PERFOR, r(l0) - - .513, p C .10. Also, regarding hypothesis H3 group TRANSY scores show a positive but not significant correlation with PERFOR r - 233. Therefore, this hypothesis must be held in abeyance until larger sample sizes are available.

Other items of interest in Table 1 include: (a) a significant negative correlation between group LINEAR and SPIRAL scores, r(l0) - - .573, p **C** .05, again reflecting the composition of this sample; (b) the previously reported very high correlation of NTPERC with PERFOR, r(l0) - .707, p < .01; and (c) a new variable, HOMGEN. In terms of group percentage scores, its definition is:

HOMGEN - [PL – SL] + [PS – SS] (1)

HOMGEN and PERFOR correlations will be considered shortly. For now, Table 2 shows the multiple correlation results pertinent for hypotheses Hl and H2, and both are confirmed. In equation form, Table 2 results indicate:

PERFOR - 62.32 + 1.07NTPERC - 44.22CERNTY + 25.9l INDECN.

The coefficient of NTPERC is positive and significant as previously known t - 4.440, p = .002; the Coefficient of CERNTY is negative and significant, t - 2.581, p - .033, confirming H1; and the nonsignificant coefficient of INDECN t - 1 725, p = 123, confirms H2.

Overall, the multiple R - .871 has a significance level of p - .0076. Equally important, the enhancement of the NTPERC correlation in Table 1, r - .707, to the multiple R - .871 in Table 2, is significant, F(2,9) - 4.828, p < .05. More important elimination of the nonsignificant INDECN term in Equation 2 produces the same result. That is, the multiple correlation of PERFOR on NTPERC and CERNTY is R = .817, p = .005, and the NTPERC correlation enhancement from r - .707 to R - .817 is significant, F(l,l0) - 5.036, Q **C** .05.

Now, looking again at HOMGEN's definition, it refers to the LINEAR or SPRIAL homogeneity of a group and is based on the Myers & McCaulley (1985) MBTI preference strength score definitions. That is, in the MBTI framework, the strength of a preference for, say, iNtuitive as opposed to Sensing information processing is measured as a function of the absolute value of the difference between the N and S scores provided by the MBTI instrument, i. e., IN - SI.

In other words, MBTI strength scores compensate for (1) the degree to which a primary preference is attenuated by a secondary one. Likewise, HOMGEN does the same for primary and secondary LINEAR and SPIRAL career success concepts in a group. Furthermore, addition of the [PL – SL] and PS - ~ differences, allows for the simultaneous expression of LINEAR and SPIRAL personal needs.

Of course, HOMGEN also happens to be the best of many (2) different arithmetic combinations of PL, SL, PS, and SS in terms of correlations with PERFOR. It's high

TABLE 1
CAREER CONCEPT AND MBTI NT% CORRELATION MATRIX

	INDECN	LINEAR	SPIRAL	STEADY	TRANSY	HOMGEN	NTPERC
CERNTY	.127	.031	-.333	.469	-.213	.120	.022	-.395
INDECN		-.228	.232	.321	-.445	.319	-.303	.014
LINEAR			-~573**	-.125	-.467	.253	.029	-.122
SPIRAL				.363	.344	-.147	.203	.292
STEADY					-.485	-.126	-.383	-.513*
TRANSY						-.041	.249	.233
HOMGEN							495*	.494*
NTPERC								. 707***

*P<.10, **p <.05, ***p <.01

TABLE 2
CAREER DECISION SCALE MULTIPLE CORRELATION WITH PERFORMANCE

	NTPERC	CERNTY	INDECN	Other	p	
Constant				62.315		
Coefficient	1.070	-44.217	25.912			
Standard Error	.241	17.131	15.020			
t		4.440	2.581	1.725		
p	.002	.033	.123			
Multiple R	~			.871	.0076	

correlation with NTPERC, ~ = .495, p <.1, negates its use with NTPERC in the explanation of PERFOR results due to multicollinearity. But, other considerations are equally if not more interesting.

For example, the linear correlation of PERFOR on HOMGEN, detailed in Table 3, and plotted in Figure 1, is fairly high, r - .494, p<.l. But a glance at Figure 2 and the second line of Table 3 indicates that the relationship is not linear.

In fact, it is quadratic r = 665, p = .018. form of this relationship was not expected,

PERFOR - -46.38 + 2.66HOMGEN - .O1HOMGEN^2, (3)

But it does merit serious consideration in future research.

FIGURE 1
ORDINARY PERFORMANCE RELATIONSHIP
WITH
LINEAR AND SPIRAL HOMOGENEITY (R = .494)

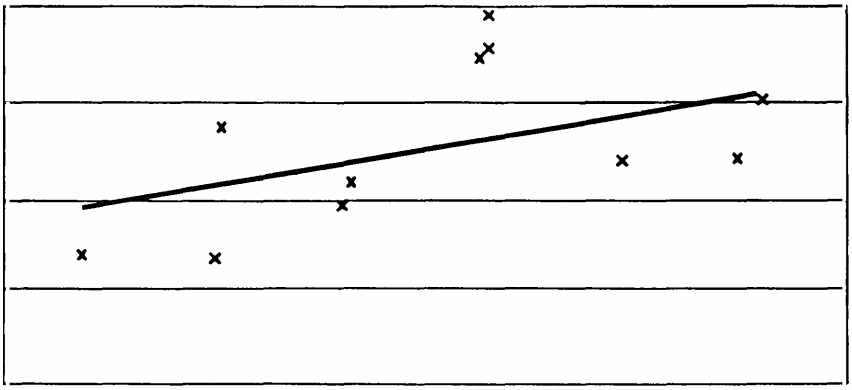

FIGURE 2
QUADRATIC PERFORMANCE
RELATIONSHIP
WITH
LINEAR AND SPIRAL HOMOGENEITY
(R = .665)

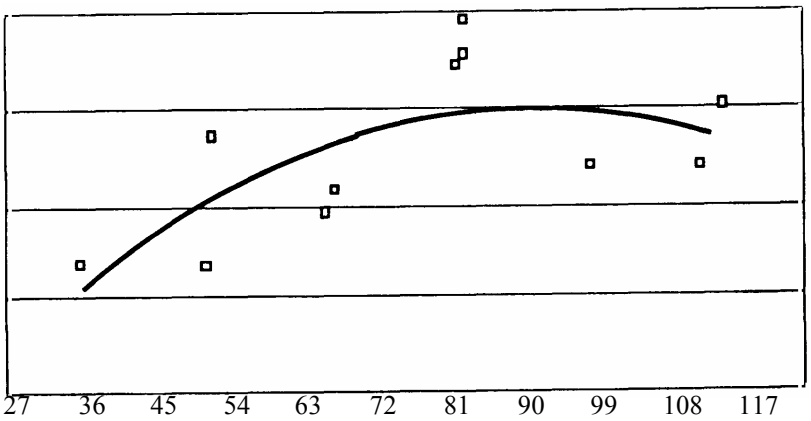

TABLE 3

CAREER CONCEPT HOMOGENEITY (HOMGEN) CORRELATIONS WITH PERFORMANCE

	df	r	t	2
Linear	10	.494	1.798	.100
Quadratic	9	.665	2.817	.018

Four important conclusions follow from these results. First, as just noted, personal needs add significantly to the explanation of TE simulation performance. The Career Decision Scale CERNTY measure enhances the overall explanation of PERFOR whether or not it is combined with its INDECN counterpoint. Therefore, the preferences, styles, and needs model proposed in this paper is worth some further consideration. In particular, now that preferences and needs have been examined, the intervening styles concept will be assessed in future studies.

Second, as mentioned several times, career INDECN is a counterpoint to rather than the opposite of CERNTY when group performance. is at issue. Otherwise, referring again to Table 1, the correlation between the two should have been negative rather than positive. In short, certainty regarding career plans does not exclude indecision regarding alternatives. Reasonable individuals, especially MBA students with several years of business experience, are able to contemplate simultaneously both of these concepts.

Third, this simultaneous contemplation issue is exactly what was emphasized earlier regarding the presence of MBTI preferences or linear and spiral career concepts in the HOMGEN definition. Explicit measures of intuitive or thinking preferences, as well as linear and spiral success concepts, may suffice on an individual basis. However, they give no indication of malleability in face-to-face decision making circumstances where the participants have different interpersonal and personal needs for participating.

In these group circumstances, this behavioral TE study and the ones reported earlier are leading to a most interesting hypothesis. That is, individual psychological test instruments provide necessary and sufficient data for understanding group information processing and decision making performance results. However, specific scores are not as important as the information they provide about the percentage personality composition of a group.

Fourth, combining all the results reported in this and previous papers, the career concept approach needs to include decision style information, be expanded to a larger sample size, test different TE simulations, and consider theoretical bases for nonlinear relationships. All of these research directions, of course, are in progress, and their outcomes will be the subjects of future reports.

Simultaneously, as emphasized earlier (Patz, 1987; 1990b), it is even more important to understand why these phenomena occur at all. TE simulations produce most interesting behaviors, and some of the patterns are extraordinarily uniform. An understanding of why these results occur should promote the design of open system simulations that are more or less favorable to various combinations of group personality compositions and market structure dynamics.

Said in another way, TE simulations have only begun to scratch the surface of their potential. Past and current efforts have made it clear that they generate the data necessary for understanding information processing and decision making in complex competitive environments. Future efforts will take advantage of this data generation capacity to explicate the interactions of market realities with information processing and decision making preferences and styles as well as interpersonal and personal needs.

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