

AN EXPLORATORY STUDY OF THE IMPACT OF A SIMULATION EXERCISE ON THE MANAGERIAL AND PERSONALITY TRAITS AND THE DECISION MAKING STYLES OF MARKETING STUDENTS

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ABSTRACT

Using a pre-test/post-test experimental design, the present study explores how the experience of participating in a marketing simulation game impacts the managerial and personality traits and decision making styles of the simulation players. The present study sought to determine whether the simulation experience had an impact on selected managerial and personality traits of the participants and their decision-making style. The study findings, involving a usable sample of 325 students, showed that the simulation experience brought about a number of changes in participant managerial and personality traits and decision making styles and that in many instances, the extent of these changes were related to performance level. In particular, the traits of competitiveness and Big 5 extraversion were found to have potential as stable predictors of simulation game performance.

INTRODUCTION

Business simulation games have been in use in North America since 1957 (Watson 1981). Since that time, the use of business simulation games has grown enormously. In 1961 it was estimated that more than 100 business simulations were in use in the U.S. alone and had been played by over 30,000 business executives and countless students (Kibbee, Craft and Nanus, 1961). The Guide to Simulations/Games for Education and Training (Horn and Cleaves, 1980) published in 1980 described 228 business simulation games then in use at universities, community colleges and by business firms for management training

purposes. Various surveys of AACSB member schools undertaken from 1962 through 1998 reported that business simulation game usage at these universities grew from 71.1 percent of the responding universities in 1962 to 97.5 percent of the responding universities in 1998 (Faria, 1998). A 2004 e-mail survey sent to 14,497 university business professors, yielding 1,085 returns, reported that 47.4 percent of the survey respondents had used one or more business simulation games during their teaching careers (Faria and Wellington, 2004).

As simulation game usage has grown since 1957, there has also been a growing body of research on simulation game usage. This body of past research includes examinations of: (1) the internal validity of business simulations; (2) the external validity of business games; (3) the relative merit of simulation games versus other teaching approaches; (4) the learning, or skills training, benefits of simulation games; and (5) correlates of simulation performance; among other research areas.

When used, simulation games generally utilize significant student time and contribute in a significant fashion to each student's final grade. Across the 514 responding business professors to the Faria and Wellington (2004) e-mail survey who use business simulation games, on average, 23.8 percent of class time and 25.1 percent of the final course grade were accounted for by the simulation exercise. If simulation games are to merit this usage level and the amount of course time devoted to them, one would hope that the simulation game would have a positive impact on the game participants. To examine this issue, an exploratory study was undertaken.

STUDY BACKGROUND AND PURPOSE

Despite simulation gaming's widespread use and the considerable research undertaken on this teaching approach, the full impact of simulation games on student managerial/personality traits and decision making skills is still largely unknown (Faria et al., 2009).

Research into the skills training or learning aspects of business simulation games dates back almost to the earliest uses of these exercises. The reported types of learning brought about by the use of business simulation games includes goal setting and information processing; organizational behavior and personal interaction skills; sales forecasting; entrepreneurial skills; financial analysis; basic economic concepts; inventory management; mathematical modeling; personnel skills such as hiring, firing, training, leading and motivating; creative skills; communications skills; data analysis; and formal planning and report preparation skills among others. Faria (2001) provides a history and extensive list of references covering research on learning and skills training through the use of business simulation games.

Past simulation research has also examined the relationship between student performance in simulation games

and a wide range of participant and team variables. Among the variables examined have been numerous personality characteristics, locus of team control, achievement motivation, previous academic performance, time pressure, ethnic origin of team members, gender, team size, previous business experience, team organizational structure, method of team formation, and grade weighting (see for example Anderson and Lawton, 1992; Brenenstuhl and Badgett, 1977; Butler and Parasuraman, 1977; Chisholm, Krishnakuman and Clay, 1980; Edge and Remus, 1984; Faria, 2001; Gentry, 1980; Glomnes, 2004; Gosenpud, 1989; Gosenpud and Miesing, 1992; Hergert and Hergert, 1990; Hornaday, 2001; Hsu, 1984; Moorhead, Brenenstuhl and Catalanello, 1980; Newgren, Stair and Kuehn, 1980; Patz, 1990; Roderick, 1984; Walker, 1979; Washbush, 1992; Wheatley, Anthony and Maddox, 1988; Wellington and Faria, 1996; and Wolfe, Bowen and Roberts, 1989).

As the opportunity was available, it was decided to undertake a large sample study of business simulation game participants and how certain personality and managerial traits might change as a result of simulation game participation. A number of sources, including the Bernie Keys Library, Simulation & Gaming, the Journal of Management & Decision Making, and the Journal of Behavioral Decision Making, were examined to determine what personality

Table 1
Personality and Managerial Traits Selected for Present Study

Trait	Number of Prior Study Mentions
Ambiguity Intolerance	333
Locus of Control	261
Competitiveness	145
Decision-Making Style	98
Openness	91
Self Confidence	79
Extraversion	76
Indecisiveness	71
Basis of Decision-Making	32
Attitude toward Simulation	30
Decision Tool Usage	26
Risk Averseness	25
Optimism	19
Gaming Interest	9
Agreeableness	9
Conscientiousness	7
Work Drive	4
Neuroticism	3

and managerial traits have been most often studied in the context of business simulation game participation. From our review of past simulation gaming research, the personality and managerial traits identified in Exhibit 1 were selected for inclusion in our study.

A trait is defined by psychologists as a habitual pattern of behavior, thought and emotion (Kassin, 2003). Based on a review of psychological and decision-making literature, the traits to be covered in this study can be described as follows: ambiguity intolerance (a tendency to perceive or interpret information as vague, incomplete, uncertain, inconsistent, contradictory and unclear); locus of control (the extent to which individuals believe that they can control events that affect them); competitiveness (the degree to which an individual strives or contends against others); decision-making style (tendency to use either an analytical or intuitive mental strategy for processing information and making a decision); openness (a decision making approach that recognizes communal management rather than centralized authority); self confidence (being self assured in one's personal judgment and ability); extraversion (a tendency toward being gregarious, assertive and interested in seeking out external stimulus); indecisiveness (an inability to make a decision); basis of decision-making (relative roles played by affect and cognition in decision making); attitude toward simulation (being positive or negative toward the simulation experience); decision tool usage (the range of managerial aids used in the decision-making process); risk averseness (the reluctance to take action when there is an uncertain outcome); optimism (possessing hopefulness and confidence about the future or the successful outcome of a

decision); gaming interest (individuals self reported level of gaming interest); agreeableness (a tendency to be pleasant and accommodating); conscientiousness (being painstaking and careful); work drive (a person's disposition to work hard); and neuroticism (a tendency to experience negative emotional states).

METHODOLOGY

The subjects for the research to be reported here were 460 students who completed a Principles of Marketing course from the same instructor in two different semesters. The simulation used in the class was *Merlin: A Marketing Simulation* (Anderson, Beveridge, Lawton and Scott, 2004). The *Merlin* participants played as single member companies divided into industries of seven companies each and participated in a seven period competition.

The study design was a basic pre-test/post-test quasi-experiment where students were asked to complete self-report questionnaires at the beginning and at the end of the seven simulation decision periods. The pretest measures involved two different questionnaire administrations. The first pretest questionnaire occurred before the students were assigned to simulation companies and any simulation exercise explanations were undertaken. This questionnaire focused on general managerial and personality trait measures which were composed of a priori scales which were drawn from the literature including: ambiguity intolerance (1 to 6 point Strongly Agree – Strongly Disagree Scale from Budner, 1962), competitiveness (1 to 5 point Strongly Disagree – Strongly Agree Scale from Mowen, 2000), the Big 5 con-

Table 2
Pre-test and Post-test Measurement Scale Reliabilities

Scale	Number of Items	Pretest		Posttest	
		Alpha Reliability	N	Alpha Reliability	N
Ambiguity intolerance,	15	.452	316	.589	312
Attitude Towards The Simulation	7	.881	314	.920	317
Basis of Decision Making,	4	.787	321	.829	319
Big 5 Agreeableness,	9	.749	321	.752	320
Big 5 Conscientiousness,	9	.784	321	.780	321
Big 5 Extraversion,	8	.839	319	.823	314
Big 5 Neuroticism	8	.803	322	.798	321
Big 5 Openness	9	.758	322	.778	319
Competitiveness	4	.769	324	.808	324
Decision making style,	4	.784	323	.855	321
Decision Making Tool Usage,	3	.726	320	.598	320
Gaming interest	4	.883	317	.906	320
Indecisiveness	15	.818	317	.832	315
Locus of Control	10	.717	318	.742	320
Optimism,	8	.730	319	.767	321
Risk Averseness,	4	.586	322	.660	321
Self Confidence,	3	.899	325	.898	324
Work Drive	9	.848	320	.842	319

sisting of agreeableness, conscientiousness, extraversion, neuroticism and openness (1 to 5 point Strongly Disagree – Strongly Agree Scales from John, Donahue and Kentle, 1991 and John, Naumann and Soto, 2008), indecisiveness (1 to 5 point Strongly Disagree – Strongly Agree Scale from Frost and Shows, 1993), locus of control (1 to 6 point Strongly Agree – Strongly Disagree Scale from Rotter, 1966 and Ferguson, 1993), risk averseness (1 to 6 point Strongly Agree – Strongly Disagree Scale from Burton, Lichtenstein, Netemeyer and Garretson, 1998 and Burton, 2000), optimism (1 to 5 point Strongly Disagree – Strongly Agree Scale from Sheier and Carver, 1985) and work drive (1 to 5 point Strongly Disagree – Strongly Agree Scale from Lounsbury, Sundstrom, Loveland & Gibson, 2003 and Lounsbury, Gibson & Hamrick, 2004). The second pretest questionnaire was administered after participants had been assigned to simulation companies and had received a lecture on the simulation exercise and its purpose. The second pretest questionnaire contained measures of decision making styles and some additional managerial and personality traits which were presented in the context of the Merlin simulation experience. The characteristics measured included student attitude towards the Merlin simulation (1 to 7 point Strongly Agree – Strongly Disagree Scale from Wellington, Hutchinson and Faria, 2010), decision making style (1 to 7 point Strongly Agree – Strongly Disagree Scale from Mantel and Kardes, 1999), self confidence (1 to 7 point Semantic differential Scale from Urbany, Bearden, Kaicker and Smith-de Borrero, 1997), interest in gaming (1 to 7 point Strongly Agree – Strongly Disagree Scale from Wellington, Hutchinson and Faria, 2010), decision making tool usage (1 to 7 point Strongly Agree – Strongly Disagree Scale from Wellington, Hutchinson and Faria, 2010), and the basis of decision making-affect or cognition (1 to 7 point semantic differential Scale from Shiv and Fedorikhin, 1999).

At the conclusion of the simulation, both sets of questions from the pretest questionnaires were presented for completion simultaneously. The alpha reliabilities for the pre-test and post-test multi-item scales are reported on in Table 2.

Students were told that the nature of their responses would not affect their grade in the course. Only students who returned both the pre-competition and post-competition questionnaires with complete sets of attitude data were included in the data analysis. This resulted in a final usable sample of 325 students which represents a 70.7 percent response rate.

In the Merlin simulation competition, performance is measured using a ranking based on an index of company sales, earnings, return on sales and forecast accuracy. These indexes were weighted 5%, 85%, 5% and 5%, respectively, resulting in each participant/company being ranked from first place to last place within their industry (e.g., from first to seventh position). Teams were then classified as high performers if they had a ranking from first to third position while participants whose performance rankings

were fourth through seventh were classified as low performers.

An assessment of the changes in traits and the relationship of these changes to performance was undertaken using a repeated measures MANOVA analysis for each of the managerial and personality traits measured as well as the decision style variables. This allowed for simultaneous examination of changes over time and the interaction of these changes with simulation game performance. In addition, a repeated measures MANOVA analysis is well suited to this study design because the managerial and personality trait measures were essentially ordinal in nature.

FINDINGS

The overall findings are reported on in Tables 3 and 4 and indicate that the simulation game participant experience was associated with a number of significant changes in managerial and personality traits and decision making style variables. The following variables exhibited statistically significant results in the repeated measures MANOVA indicating changes within subjects over time during the simulation experience:

- Agreeableness decreased
- Conscientiousness decreased
- Openness decreased
- Locus of control decreased
- Optimism decreased
- Self Confidence increased for good performers and decreased for poor performer;
- Basis of decision moved towards being more rational for top performers with no change for poor performers
- Indecisiveness increased

The following variables had statistically significant results in the repeated measures MANOVA indicating differences in values owing to the performance group classification (high versus low):

- Conscientiousness - high performers were more conscientious than low performers
- Extraversion - high performers were more extraverted than low performers
- Neuroticism - high performers were less neurotic than low performers
- Competitiveness - high performers were more competitive than low performers
- Locus of control - high performers felt more in control than low performers
- Optimism - high performers were more optimistic than low performers
- Self confidence - high performers had more self confidence than low performers
- Basis of decision making - high performers report be-

Table 3
Pre-test Versus Post-test Repeated Measures MANOVA Comparison
Of Change in Managerial and Personality Traits or Decision Styles By
Performance Group: Significant Results

Variable	Measure	High Performance Group Score	Low Performance Group Score	Within subjects: Sig. of Time	Within subjects: Sig. of Time x Rank	Between Subjects: Sig. of Rank
Ambiguity intolerance	Pretest	3.75	3.75	.167	.011*	.199
(Low value = low tolerance)	Posttest	3.78	3.65			
Attitude Towards Merlin	Pretest	3.64	3.65	.547	.000*	.000*
(Low value = negative attitude)	Posttest	4.18	3.18			
Basis of Decision Making	Pretest	5.08	4.85	.001*	.000*	.000*
(Low value=more emotional)	Posttest	5.52	4.82			
Big 5-Agreeableness	Pretest	3.83	3.81	.001*	.460	.997
(Low value=Less agreeable)	Posttest	3.73	3.75			
Big 5- Conscientiousness	Pretest	3.65	3.50	.015*	.604	.016*
(Low value=Less conscientious)	Posttest	3.59	3.42			
Big 5 Extraversion	Pretest	3.38	3.18	.863	.105	.048*
(Low value=Less extraverted)	Posttest	3.34	3.23			
Big 5 Neuroticism	Pretest	3.42	3.29	.107	.047*	.020*
(Low value=More neurotic)	Posttest	3.43	3.18			
Big 5 Openness	Pretest	3.62	3.58	.016*	.842	.564
(Low value=Less open)	Posttest	3.54	3.51			
Competitiveness	Pretest	3.73	3.50	.198	.768	.006*
(Low value=Less competitive)	Posttest	3.69	3.44			
Decision Making Style	Pretest	4.47	4.28	.229	.002*	.000*
(Low value=More Intuitive)	Posttest	4.58	4.02			
Gaming Interest	Pretest	3.41	3.38	.479	.000*	.139
(Low value=Less interest)	Posttest	3.60	3.13			
Indecisiveness	Pretest	3.39	3.28	.027*	.243	.029*
(Low value=More indecisive)	Posttest	3.36	3.19			
Locus of Control	Pretest	3.41	3.18	.033*	.548	.000*
(Low value=Less in control)	Posttest	3.35	3.08			
Optimism	Pretest	3.57	3.43	.010*	.769	.036*
(Low value=Less Optimism)	Posttest	3.51	3.36			
Self Confidence	Pretest	4.12	4.03	.000*	.000*	.000*
(Low value=Less Confidence)	Posttest	5.10	3.89			

ing less emotional in their decision making than low performers

- Decision making style - high performers report being more analytical and less intuitive than low performers
- Indecisiveness - high performers report being less indecisive than low performers
- Attitude towards the simulation experience - high performers report more positive attitudes than low performers

The repeated measures MANOVA analysis also revealed that a number of variables changed only for high performers or low performers or in different directions for high versus low performers. These variables include:

- Basis of decision making - high performers became significantly more rational in their decision-making
- Neuroticism - low performers became more neurotic
- Decision making style - high performers became more analytical while poor performers became more intuitive
- Attitude toward the simulation - high performers became more positive while low performers became more negative
- Ambiguity intolerance – increased for high performers and decreased for poor performers
- Gaming interest – increased for high performers and decreased for low performers

Finally, according to the repeated measures MANOVA there were also a number of variables for which the simulation experience did not seem to have any impact. The personality traits of risk averseness and work drive did not appear to have been altered by the experience nor were they associated with the level of performance. The decision

style variable of decision tools usage was also not altered by the experience or associated with the level of performance.

DISCUSSION AND CONCLUSIONS

The research reported here sought to explore whether the experience of playing a marketing simulation game was associated with changes in selected managerial and personality traits or the decision making style of the game participants. If simulation participation does change managerial traits, personality traits or decision style, it is possible that simulation participation changes decision-making skill as well. If simulation participation improves decision-making ability, we have complete justification for committing significant student and class time to this teaching approach.

What have we learned from the present study? First, a summary of the findings from the repeated measures MANOVA results are shown in Table 5. The summary table indicates that the variables of basis of decision making (rational or emotional) and self confidence changed over time within subjects, they changed over time within subjects in relation to performance and the difference in performance levels between subjects was significant. This means these variables have potential as predictors of game performance as they were related to performance. Conscientiousness also has potential as a pretest performance predictor as it was related to performance level between subjects and while this trait changed over time within subjects, it did not seem to be interacting with performance as it changed over time within subjects. This pattern of findings was also evident for the traits of indecisiveness, locus of control and optimism. As such, all of these traits might be considered worthy as potential predictors of performance in a simulation game but are also traits that are transformed

Table 4
Pre-test Versus Post-test Repeated Measures MANOVA Comparison
Of Change In Managerial And Personality Traits or Decision Styles By
Performance Group: Non-Significant Results

Variable	Measure	High Performance Group Score	Low Performance Group Score	Within subjects: Sig. of Time	Within subjects: Sig. of Time x Rank	Between Subjects: Sig. of Rank
Decision Tools Usage	Pretest	2.86	2.78	.094	.886	.644
(Low value=Less use of tools)	Posttest	2.99	2.93			
Risk Averseness	Pretest	3.64	3.55	.561	.561	.483
(Low value=More Risk Averse)	Posttest	3.59	3.55			
Work Drive	Pretest	3.22	3.11	.219	.193	.074
(Low value=Less Work Drive)	Posttest	3.22	3.04			

by the experience.

In contrast, the variables of gaming interest, decision style, and attitude towards the simulation experience are merely correlates of performance as they changed over the course of simulation play in a positive direction for good simulation performers and in a negative direction for poor simulation performers. The experience of playing the simulation affected these traits but only in relation to how the player performed.

Importantly, the traits of extraversion and competitiveness revealed themselves as having the potential to serve as stable pretest predictors of high versus low simulation game performance. This conclusion is based on the finding that these traits did not change over time within subjects but exhibited a significant relationship with performance.

The variables of usage of decision tools, risk averseness, and work drive were unaffected by either simulation participation or simulation performance.

The implications from these findings are that the simulation gaming experience can produce managerial trait changes in marketing students. However, not all of the changes observed in this study were necessarily for the

better given that many of the traits declined for poor performers. Specifically, poor performing simulation participants became less agreeable, less conscientious, less extraverted, more neurotic and less open. As well, the high performers did not seem to gain in these traits as a result of the simulation experience. Further research is called for to confirm or refute the findings from this study and to explain the unexpected changes in traits discovered in this research. Finally, as a number of managerial traits appear to predict the simulation game performance of marketing students, this merits further research to determine how well and useful they might be as general predictors of managerial performance.

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Table 5
Summary Table of Conclusions from the Study of
Changes in Managerial and Personality Traits, and Decision Styles

Traits	Within Subjects	Between Subjects		Potential Performance Predictor
	Change	Good Performer	Poor Performer	
Competitiveness		Greater	Lower	Yes
Big 5 Extraversion		Higher	Lower	Yes
Big 5 Neuroticism		Less	More	
Big 5 Agreeableness	Decreased			
Big 5 Openness	Decreased			
Big 5 Conscientiousness	Decreased	Higher	Lower	Yes
Locus of control	Decreased	Higher	Lower	Yes
Indecisiveness	Increased	Less	More	Yes
Optimism	Decreased	Higher	Lower	Yes
Basis of decision making (Rationale)	Bidirectional	More rational		Yes
Self confidence	Bidirectional	Increased	Decreased	Yes
Ambiguity intolerance		Increased		
Decision style (Analytical / Intuitive)		Analytical	Intuitive	
Attitude toward the simulation		More positive	Less Positive	
Gaming interest		Increased	Decreased	
Decision tool usage				
Risk averseness				
Work drive				

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