

# Developments in Business Simulation & Experiential Exercises, Volume 10, 1983

## BOSS: A BEHAVIORAL-QUANTITATIVE, COMPUTER-SUPPORTED GAME

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### ABSTRACT

Boss is not a simulation, but a genotypical game enabling students to learn how to be bosses by making them bosses. Quantitative aspects of the game involve pricing, inventory control, and statistical analysis. Behavioral aspects involve employment, compensation, and supervision. Computer support is interactive and two-tiered: programs supporting the game are in turn supported by other programs. The game is designed to supplement an integrative course such as business policies, to accommodate 20 to 80 students, to run for an academic term, and to require only two hours of class time for its duration.

### INTRODUCTION

An organization is a cluster of relationships, prime among which are the relationships between superior and subordinates. A superior performs well to the extent the superior is able to develop good relationships with subordinates. This game, Boss, enables students to practice developing such relationships.

The game teaches students to be bosses by making them bosses—learning by doing is the underlying philosophy. Students playing the game take superior and subordinate roles, and can act only by the prerogatives of their roles. The game is structured such that all players will boss other players in one part of the game, and will be bossed by the others in another part. The game is essentially an extended multiple role play [1] without the pretense required in role playing.

The computer supports the game. It assures the distinction between roles is never confounded. It executes the buying and selling constituting the content of the game. It allows buyers to buy; sellers to sell; managers to hire, fire, and pay; and owners to employ managers and move funds. It keeps accounts, it scores the game, and it enforces rules that impede collusion in restraint of trade. Students interact directly with the computer, playing the game at times convenient to themselves. Although essential to the game, the computer is not, in the least, part of the substance of the game. The computer referees the game; it does not play in the game.

The game is not meant to be realistic, or phenotypically real. To the extent that it may be realistic, that is fortuitous. Superiors in the game do not pretend to be superiors; they are superiors. They have the power, enforced by the computer with absolute finality, to hire, to fire, and to pay another player to work for them. Similarly, subordinates in the game are subordinates in reality. They work when hired and cannot work when fired. Computer enforcement makes pretense irrelevant. Thus, this game is not a simulation. It is a created reality, a genotypical game [2].

### NATURE OF THE GAME

Each player owns a firm. Firms profit by buying goods and then selling them at higher prices. Owners reap that profit by

transferring funds from the firms account into their own. The administrator scores performance by regularly depleting each player's personal account, assigning points in relation to the balance. These activities frame the game.

Each firm is part of one industry. Firms in the first industry buy from a regulated supply where prices, charges, and quantities are fixed by the administrator. Firms in the second industry buy from the first through a free market, and sell to a regulated demand where prices, charges, and quantities are also fixed. Figure 1 illustrates the flow.

Figure 1  
FLOW OF GOODS



### Quantitative Aspects

The quantitative aspects of the game are rooted in the markets. The free market functions by the interchange of offers and counteroffers brokered by the computer. Buyers ask; sellers bid. Either may accept the others' offers or extend counteroffers. The regulated supplying and demanding markets differ in that counteroffers are not allowed. Here, all traders are presented identical offers with terms set by the administrator.

Whenever a trader acts, whether to buy or to sell, a period elapses, and whenever a period elapses, interest is charged or credited on the cash balances of all accounts. Hence, the game has its own clock, keyed directly to the players' level of activity, and adjusting automatically to variations and interruptions occasioned by weekends, holidays, and breakdowns.

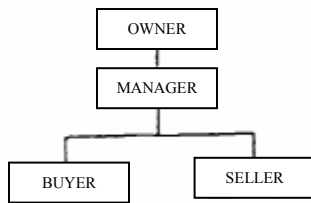
Goods traded are named alphas, betas, gammas, deltas, and epsilons. The terms of trade are limited to a maximum quantity, a minimum quantity, a selling charge, and a price. In general, the maximum quantity offered for sale at the regulated supply will differ from the maximum quantity bought at the regulated demand, giving rise to considerations of economic buying and selling quantities. In general also, the price asked at the regulated supply will be lower than the price given at the regulated demand, permitting a profit to be divided between the industries according to the vicissitudes of the interposing free market. Regulated prices change from time to time, and are statistically related to some of a group of numerical series available to all players. Thus, players with knowledge of statistics can predict changes in prices with a degree of certainty increasing as the game progresses, and can use that knowledge to increase their profits.

### Behavioral Aspects

The behavioral aspects of the game are rooted in the roles. Each firm is composed of four roles: owner, manager, buyer, and seller. The roles are structured as shown in the organizational chart of Figure 2.

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FIGURE 2  
ORGANIZATIONAL CHART



Each player begins the same by assuming all four roles in the firm the player owns. Later, each will be encouraged to employ players from the other industry to take on the subordinate roles. Hence, owners of firms in the first industry will hire owners of firms in the second industry and vice versa. To assure the integrity of the superior-subordinate relationship, once an owner has hired another, that other cannot hire the owner in return. And to discourage collusion, an owner cannot hire a competitor, one owning another firm in the same industry.

Employment is encouraged by a shorter waiting queue. All buyers and all sellers must queue with others of the same role in the same industry to trade. The queue get increasingly shorter as the firm's number of employees increases. Essentially, each trader takes a queuing number. When the number being served advances to or past the trader's queuing number, the trader is allowed to enter the market. After the trader enters the market, the number being served advances by one, and the trader is given a new and higher queuing number. Traders of firms with more employees get queuing numbers closer together than traders of firms with fewer employees.

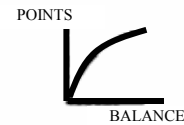
A player's incentive to accept employment is pay. Only an owner can hire, fire, and pay a manager; and only a manager can hire, fire, and pay a buyer and a seller. Compensation is not automatic; employers must develop their own compensation schemes, calculate the pay, and order each payment. The computer just executes the pay-men t.

Accordingly, the game drives players into taking superior and subordinate positions, but it does not determine the quality of the relationship between those positions. It leaves to players the tasks of selecting jobs, employers, and employees; of devising a scheme of compensation; and of planning, delegating, and coordinating the work.

## Scoring

The game is scored weekly. To score the game, the administrator runs a computer program that depletes each player's personal account and assigns points corresponding to the balance. A player whose balance is at or below zero receives no point. The player with the highest balance receives the maximum points. Players with balances in between receive points according to a logistic curve<sup>1</sup> having its inflection point at the origin, and its upper asymptote slightly above the maximum points. The shape of the curve is shown in Figure 3.

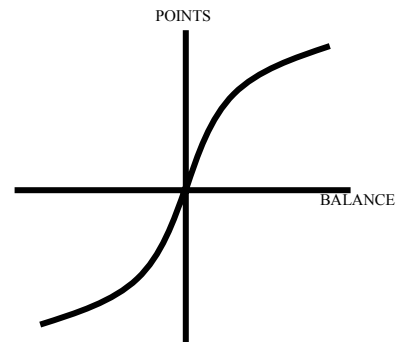
FIGURE 3  
SCORING CURVE FOR BALANCE OF PERSONAL ACCOUNT



Because the number of points assigned per dollar balance is greatest at zero, the scoring curve encourages players who do poorly to remain active in the game.

At the end of the game, the same computer program will add together the balances in each player's personal and business accounts, and assign points according to another logistic curve, this one having its inflection point also at the origin, but its upper asymptote slightly above the sum of the maximum points assigned to date, as illustrated in Figure 4. Now, negative net balances will be assessed negative points, offsetting the positive points that might have been assigned to date.

FIGURE 4  
SCORING CURVE FOR NET BALANCE



This scoring system is so designed that those who break even playing the game will get approximately zero points, that those who do exceedingly well will get no more than a fixed number of points, that those who do better will always get more points than those who do less well, and that those who are active consistently over the course of the game will get more points than those who are not as consistent. This system is also designed to be flexible. Inasmuch as the logistic curve includes regions of concavity, linearity, and convexity; and inasmuch as the curve is completely specified by only four parameters, the relationship between balances and points can be easily changed. In fact, the computer program is written such that these changes can be made while running the program, hence, the coding need not even be modified.

## COMPUTER SUPPORT

The game is supported on IBM's Virtual Storage Personal Computing (VSPC) system, an interactive, mainframe system assigning to each student a personal user number and password. Each student can run the programs supporting the game at any time and from any one of the numerous terminals of the system. Files of the game are stored in a project library dedicated to the game. When the program executing decisions in the game are run, the computer acquires these files from the project library, updates them, and releases them at the end of the run. Thus, only one person can run the executing

<sup>1</sup>  $y = \frac{N}{1 + Be^{-ANx}} + C$

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program at a time, and thus, the number of players must be limited to about 80. A profile with an editable workspace of 45,000 bytes, an object workspace of 65,000 bytes, and disk storage of 120,000 bytes is sufficient for the project library and for each of the students' private libraries.

The game is supported by four Fortran<sup>2</sup> and three CLIST<sup>3</sup> programs. Of the four Fortran programs, one executes decisions of players, one scores the game, one models the quantitative aspects of the game, and one allows the administrator to track and control participation in the game. Of the three CLIST programs, one drives the Fortran programs, one strengthens the security of the files, and one sets up all the other programs and the files. This arrangement of programs supporting other programs permits the administrator to set up the game, change the parameters, examine the files, and perform all other administrative work necessary to the game by running programs that prompt for the desired actions. Normally, the administrator sets up the game with six runs of the various programs. With the game in play, the administrator intervenes once a week to score the game and change the terms of offers in the regulated markets. Once every two weeks, at the most, the administrator changes the parameters of the game. Except for these occasional interventions, the game runs by itself.

### CONCLUSIONS

This genotypical game gives students opportunities to practice skills of general management, wherein the consequences of their actions are real, but wherein any damage done will not be truly important. The game is most suited to students who have had courses in multivariate statistics, quantitative analysis, personnel, and the psychology of superior-subordinate relationships. The game requires little class time: one hour to explain the game and another hour to get players started on hiring one another suffices. The game is designed to accommodate 20 to 30 students, to supplement an integrative course such as business policies, and to run for an academic term.

Because the game is real and because decisions are recorded in computer memory, the game can conveniently provide data for research into decision-making. A possibility is to study the effects of employment decisions. One might study, for instance, hiring sequences, such as hiring from the bottom up, which in the game would be hiring the buyer and the seller first, the manager later, or hiring from the top down, which in the game would be hiring the manager first, the buyer and the seller later. The game facilitates rigorous research by keeping alive for months a culture of superior-subordinate relationships that may be experimentally treated and closely observed.

The game is flexible. The number of industries can be changed, and so can the number of roles. A game of one industry, dropping the free markets, becomes purely deterministic; a game of three or more industries, adding free markets, becomes highly statistical for industries in the middle, which buy from one free market and sell to another free market. The game could be expanded to include product managers, who would control both the buying and the selling of one product, giving rise to a product-line or a matrix organizational structure. Hence, the game can be made more simple, or much more complex.

The game is designed to fit available technology and the requirements of higher education. It is complicated for the computer, simple for the administrator, challenging for students, and possible for researchers. It works.

### REFERENCES

- [1] Maier, N. R. F. and L. F. Zerfoss, "MRP: A Technique for Training Large Groups of Supervisors and Its Potential Use in Social Research," Human Relations, Vol. 5, 1952, pp. 177-186.
- [2] Thavikulwat, Precha, "Blocks & Chips: A Computer-Assisted, Genotypical Entrepreneurial Game," in David V. Fritzsche and Lee A. Graf (editors), Developments in Business Simulation & Experiential Exercises, (The Proceedings of the Ninth Annual Conference of the Association for Business Simulation and Experiential Learning, Vol. 9, 1982, pp. 273-275.

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<sup>2</sup> VSPC free-format Fortran

<sup>3</sup> VSPC command list