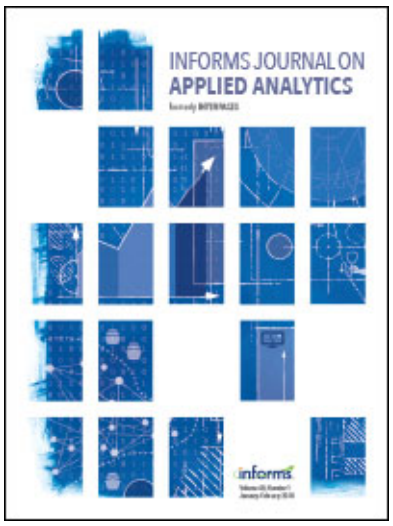

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LETTERS TO THE EDITOR

To the Editor:

Subject: Rosenblatt, M.J. and Jucker, J.V., "Capital expenditure decision making: some tools and trends, *Interfaces*, 9, No. 2, Part 1, Feb. 1979, pp. 63—69.

Readers interested in the practical use of capital budgeting techniques should notice that the following two articles present surveys on the same topic:

(1) Brigham, E.F., "Hurdle rates for screening capital expenditure proposals," *Financial Management* 5, 1976, pp. 17—25.

(2) Gitman, L.J. and Forrester, J.R. "A survey of capital budgeting techniques used by major U.S. firms," *Financial Management* 6, Fall 1977, pp. 66—71.

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To the Editor:

Here is my "call for basic research" for your approval.

The application of Operations Research is unique among "hard" scientific disciplines in that basic knowledge of the elements and systems used in developing OR models as they actually exist are virtually unknown. For example, in inventory models a cost structure is usually assumed. You will seldom, if ever, see any reference to basic cost research which gives data validating the cost structure. This is in direct contrast to such disciplines as chemical engineering where handbooks abound with data on density, viscosity, and thermodynamic properties of fluids that are used in regular design analysis. Studying the properties of new types of fluids represents a continuing research problem and need in the chemical industry.

What constitutes basic research in Operations Research? This is a question that has not been definitely answered to my knowledge. I would suggest some areas as starters.

What is the real effect on costs of idle time, reducing inventory, freeing space?

How uniform are the work rates of workers? What is the dependence of work rates on backlog, number of other workers, work environment?

What are the factors involved in resistance to implementing acknowledged improvements? For example, many people agree that implementing a significant cost savings procedure would result in damage to the individual because it would present his previous work in an unfavorable light, i.e., "Do you mean you *could* have been doing this job for one million less *all* the time?"

What capability does the individual have who must use the technique? Does he have the training to use the work? Will he have computer aids that will allow the technique to be used?

What are the *actual* work tasks normally required of OR practioners in industry?

What are the real criteria used to judge alternative courses of action?

How closely are OR techniques in practice to the theory taught? For example, in most companies the assembly line balancing technique used bears little resemblance to theory taught in industrial engineering schools.

The most important aspect of basic research concerns data. In practice, what is the certainty of the data, what accuracy?

Is there a need for basic software packages in queueing that will give numerical solutions to those models presented as transforms?

I believe there is a strong need for papers in *Interfaces* defining basic research in Operations Research and presenting the results of such basic research.

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To the Editor:

The recent article "Concerning the Dangers of Little Knowledge" (*Interfaces* Vol. 9 No. 3, May 1979, p. 78) states that "... and the odds offered are 4 to 1, that is, if you bet $100 and if the ball stops on Red, you get back your $100 plus another $300. In other words, Red provides a gain of $300 and Black a loss of $100. Should you place the bet?"

Since odds of 4 to 1 should return $500 rather than $400 on a $100 wager I don't think the bet should be placed in any event.

Donald Thompson
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A Reply:

We have here a clear case of semantic pollution, and to clarify, I apply the precepts from my own columns [1] and [2]. What is the meaning of the word *odds*?

There is a whole slew of meanings given in my unabridged Webster's, but only a few are pertinent here. First look at the mathematical definition of the word odds as used in my Finite Mathematics book [3], where I describe betting on Lady Lovelace. The probability of winning/losing is:

$$P[\text{Lady Lovelace wins}] = \tfrac{3}{4} \qquad P[\text{Lady Lovelace loses}] = \tfrac{1}{4}.$$

The mathematical definition of *odds* is given by the ratio of the probabilities:

$$\text{Odds in favor of Lady Lovelace} = \tfrac{3}{4}:\tfrac{1}{4} = 3:1.$$

In a mathematically *fair bet*:

ODDS = BET: GAIN

Therefore, if BET = $100, GAIN = $33.33, and the total return is $100 + $33.33 = $133.33. Thus, if the mathematical odds are 4:1 on a $100 bet, the total return is $100 + $25 = $125.

However, on the racetrack a different meaning for the word *odds* is used, as described by Wishengrad of the *New York Times* [4]. The odds board showed that the filly Euphrosyne was available at odds of 6 to 1, and Euphrosyne swept on to victory, repaying her backers $14.80 for $2. How come!

The pari-mutuel betting system was invented by Pierre Oller in Paris in 1872. The bettors pool their money, betting among themselves, rather than against the racetrack. The payoff is based on the ratio of the bets on a horse to the total bets on the other horses.

For example, if there are twelve horses and the money is evenly divided, the *natural odds* on Euphrosyne are 11 to 1, and a $2 bet returns a gain of $22, that is a total of $24. But this is not quite right because the track must deduct the *takeout* and so the odds quoted are less than 11 to 1. Also the track often does not quote fractional odds, and so the ratio of funds in the pool may be more than 6, yet the odds of 6 to 1 are quoted. This seems to be the explanation for why Wishengrad got $14.80 for the $2 bet.

Do odds of 6 to 1 ever return $14 on $2? Yes, this is what the bookmaker would pay. Note the difference between the pari-mutuel system and the bookmaker. On the racetrack the odds change as the betting goes on, because the ratio of funds in the pool changes. It is the final odds which determine the payoffs. But the bookmaker offers fixed odds which never change. Suppose eight horses are running and the prior probability of the bookmaker is that the chances are even. The natural odds would be 7 to 1, but the bookmaker, to cover himself, may offer only odds of 6 to 1 (a point *shorter* than natural odds) to make an honest living.

So we have three definitions of the word odds: the mathematical, the pari-mutuel, and the bookmaker's. Now to return to the article in question, which Thompson criticized.

The article says that "... a dubious-looking individual, Jacques, invites you to place a single bet on his 'private roulette wheel'." Naturally, Jacques, being a denizen of Monte Carlo, offers the bet in French. I checked the source documents and uncovered that Jacques used the word *avantage* and not *cote*. The fact is that *cote* means *odds* in English, while *avantage* is a more general and fuzzy word. I must plead guilty to the sloppy translation of Jacques' offer. However, this all boils down to the principle of Humpty Dumpty [3]: "When I use a word, it means just what I choose it to mean — neither more nor less."

In my column on Semantic Pollution [2] I established certain rules.

Rule 1: Accept the "meaning" of words as given by your boss, your client, and/or your colleagues.

In my article it is clearly stated that Red yields a gain of $300 and Black a loss of $100.

Rule 2: Establish by patient search the operational meaning of words.

In my article I establish that the subjective probability of Red coming up is .2 and I calculate the expected value of the bet as −$20. Using Bayes' Decision Rule, I conclude that the bet should not be taken.

Thompson, in his cryptic statement, provides no hint of what his decision rule is. Wishengrad of *The New York Times* clearly states in his piece that he bet on Euphrosyne because that was the name of the principal of the grammar school Wishengrad attended in Bridgeport, Connecticut. Wishengrad appears to use the decision rule to bet on horses which bear the names of grammar school principals.

This may be a good decision rule, though not supported by decision theory. Wishengrad does not state whether he would have bet, had he known there to be absolutely no chance for Euphrosyne to win.

Neither is Thompson clear about his decision rule, although he states " ... I don't think the bet should be placed in any event." Does Thompson mean that he would not bet, even if he were absolutely certain that Red would come up?

To sum up, Thompson does not clearly state what he means, and specifically, he does not state his decision rule, and how probabilities, if at all, enter into his decision. Only execution of my Rule 2 could resolve the meaning of Thompson's statement.

References

[1] Vazsonyi, Andrew, "Semantic Pollution in Information Systems," *Interfaces*, Vol. 3, No. 4, August 1973, pp. 43—46.

[2] Vazsonyi, Andrew, "How to Do Away with Semantic Pollution in Information Systems," *Interfaces*, Vol. 4, No. 1, November 1973, pp. 28—31.

[3] Vazsonyi, Andrew, *Finite Mathematics, Quantitative Analysis for Management*, John Wiley & Sons, Inc., Santa Barbara, Cal. 1977, pp. 150—154.

[4] Wishengrad, H. R., "A Filly, a Grace, a Joy," *The New York Times*, June 22, 1979.

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