A Probabilistic Formulation of Murphy Dynamics as Applied to the Analysis of Operational Research Problems

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Abstract

The author contends that the formulation of Murphy's Law as presently accepted in the open literature is useful only as a general statement of life patterns, but meaningless to the application of operational research problems. In fact, the direct application may be dangerously wrong.

The author contends that the formulation of Murphy's Law should be changed. This formulation not only better fits the facts of life, but can lend itself to a mathematical formulation that can be used in the analysis of operational research problems. Such a formulation is presented based on a probabilistic model of operational realizations. Numerous examples of direct applications are cited.

1. Introduction

The classical formulation of Murphy's Law as proposed by Edsall Murphy[1] in *The Physical Universe* is as follows:

"If anything can go wrong it probably will."

This is an absolute statement of the transpiring events and is conditional only on possibility. The oft-cited example is that of the dropped jelly bread. Murphy's Law would state that the bread would always fall jelly side down. This, however, is in direct conflict with experimental data as extracted from reference 2 and shown in Table 1.

Table 1

Jelly Bread Experimentation

No. of Trials	Jelly Side Up	Jelly Side Down	Bread	Jelly
227	14	213	Wheat	Grape
314 1/2[2]	26 1/2	288	White	Strawberry
37	0[3]	37	Potato	Orange marmalade with sardines
176	39	137	Rye	Cream cheese and apple jelly
200	20	180	Pumpernickel	Guava
14	6	7	Russian rye[4]	Mint jelly
1712	206	1506	Various	Peanut butter and various

1 · Murphy, Edsall. *The Physical Universe.* Naples, Italy: Gross-Press, July 1723.

2 · One experimental trial was half consumed by an experimenter and may have presented a physically significant different set of parameters.

3 · The lack of an entry here is deemed insignificant and is attributed to sample size.

4 · The Russian rye used in the experiment was somewhat stale, and one trial actually landed on edge.

			jellies
2680 1/2	311 1/2	2368	

Although the current formulation is new, its presence is not unknown. Witness, for example, the Harvard of animal behavior:

"Under precisely controlled experimental procedures, an animal will behave as it damn well pleases."

This also was thought to be a corollary of Murphy's at one time, but has been since grouped with several others to form the Generalized Uncertainty Principle (GUP) which states:

"Complex systems exhibit unexpected behavior."

While the behavior may be unexpected, it may not be unpredictable, as we shall see.

2. The first principle law of Murphydynamics

Consider the systems delineated in the introductory section of this paper. The event space may be taken as the sum of possible events. Consider the state variable in the jelly-bread problem:

Consider also the events and their relative utilities as given in Table 2.

Table 2

Outcomes and Usefulness of Jelly Bread Experiment Events

Event	Qualitative Usefulness	Comments
1.	Nothing	Highest There is some conjecture as

			to the possibility of this event
2.	Fall to an edgewise	High	Least mess, most edible result
3.	Falls jellyside up	Better than Nothing	Potential edible result
4.	Falls jellyside down	Low	Murphy prediction

Table 2 when compared to Table 1 leads to immediate conclusions. For example, the event with the highest usefulness did not occur, while the event with the lowest usefulness occurred most frequently (88%). Event two, with high usefulness, occurred only once and event three–the intermediate–occurred 12% of the time.

The conclusion is inescapable; the probability of occurrence of an event is inversely proportional to the utility, or:

This equation represents the basic formulation of Murphydynamics. It is also the embodiment of the phrase:

“If something can go wrong, it might.”

This explains why regression sometimes shows high correlation in unrelated data, or why failures occur primarily in critical items.

3. Antropy and the second law

A casual observance of the aforementioned formulation would place a pessimistic view of what events would occur and which ones would not. For example, if one works really hard to make a highly useful item, it will hardly ever work. This is almost true, but not quite. If the basic formulation is examined again, and the proportionality is replaced with a proportional equation:

3.1 Antropy

The proportionality constant (a) is termed antropy and is a measure of failure not connected directly with the main event, such as the failure of a backup system when the primary system is still functional.[5],[6] Antropy is the accumulation of confusion in a system.

An example of the creative incompetence within the Navy, and the proper application of the antropy is the A–5 which was painstakingly designed as an attack aircraft (unsuccessful?) but turned out to be an excellent reconnaissance aircraft (successful?).

The antropy, however, carries with it the penalty of timing. This explains why the bureaucracy works, albeit slow, in spite of its inherent internal confusion and potential usefulness. The utility is, of course, decreased by improper timing.

3.2 Phase shift

The accumulation of antropy can cause a phase shift as well as a timing problem. The phase shift may result in the system doing things it was not designed to do and not doing things it was supposed to do.

5 · Gall, John. *Systematics.* New York: Quadrangle Press, 1977.

6 · Parkinson, C. Northcote. *Parkinson's Law and Other Studies in Administration.* Boston: Houghton Mifflin, 1957.

Gall[7]

4. Absolute antropy and the third law

The existence of antropy and the formulation of the second law leads to the inescapable conclusion that the antropy goes to zero when the utiles go to zero. This offers us the ability to make some statements as to the possibility of the occurrence of events.

4.1 Possibility

Possibility may be mathematically defined as that event having a finite probability of occurrence. Or possibility exists when

7 · Peter, Laurence. *The Peter Principle.* New York: Bantam, 1970.