

A possible explanation for “Murphy’s Law”

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ABSTRACT

Most people are familiar with “Murphy’s Law”, which is often quoted in explanation of an unfortunate incident, but why does this Law apply so often? When observing a range of events it appears that the harder you push any “system” the more likely it is to fail and so the more we tend to manage the system to try and avoid the inevitable, so Murphy is referring to the symptoms and consequences rather than the cause of the problem. Many examples confirming Harris’ Law can be given, so it may provide some assistance in improving reliability.

INTRODUCTION

“Murphy’s Law”, “Anything that can fail will fail in the worst possible way at the worst possible time”, is often quoted as the explanation for a problem but, to quote Professor Julius Sumner Miller, “Why is this so?”. “O’Toole” comments “Murphy was an optimist!” and I offer Harris’ Corollary – “Solving any problem will immediately create at least two more problems”.

After observing various systems and events over the years and looking at papers on anaerobic digesters I began to realize that “systems” usually fail when they are at their limit, so I began to formulate Harris’ Law – “The harder you push any system the more unstable it becomes and the more management it requires”. I first started to formalize this by posting a query on the sci.engineering newsgroup some years ago and the only response I received was along the lines that that I had not properly defined “system” or “unstable”, but no-one came back saying that the idea already existed. As I have quoted “Harris’ Law” over the past few years I have had a few comments about how appropriate it is, but never anyone saying that some other statement covers it – I guess it is so obvious that it is taken for granted.

When things are viewed from the perspective of Harris’ Law I believe that more robust systems will be adopted, so I invite you to consider some evidence.

DISCUSSION

There are many examples that confirm Harris’ Law, so I will only outline a few of them to illustrate the range of applicability.

Engines provide a fairly good example of how “pushing the system” causes “instability”, in this case indicated by failure. Apparently WWII fighters such as the spitfire had a throttle stop that the pilot could over ride in an emergency, but at emergency power the engine would only last a couple of minutes – sufficient time to escape the luftwaffe and land. The caterpillar engine utilized in Steiger tractors rated at 200-350 HP was also used in tanks and patrol boats, but rated at some 2000 HP with a service life of 8 hours. If a car is driven gently it will give many years of economical service with minimal attention but the same car driven

hard will need management in the form of more fuel, tyres, brake pads etc and will not last as long – it may also need the attention of a panel beater as well as more servicing.

A comparison between the family car and an F1 machine is also a good example. The engine used in the car will carry up to 5 people and luggage some 300,000 km with the care of a fraction of a mechanic and lasts a number of years of intermittent use or about 12 months of continual use. The engine of a formula one car lasts about 2 hours and carries one passenger (with no luggage) some hundreds of kilometers with the attention of half a team of mechanics.

Moving away from mechanical examples consider the human body! If you look after yourself by eating properly and getting enough sleep you will function quite well for many years. If you work long hours, so cut back on sleep, it is not that long before performance drops and you begin to get sick in some way. Eating the wrong foods, or either too much or too little, is another way of causing health problems. Also consider the management top athletes employ to try and gain maximum performance, as well as the injuries they sustain. Of course if you “push the system” by totally avoiding any physical activity you will also begin to experience health problems, so at least sometimes a balance is needed for satisfactory performance of the system.

A couple of personal examples from cycling and our garden will also help show what I mean. Last year my son and I took part in a ride from Gawler to Hobart (we crossed Bass Strait by ferry!). Most of the group started in Perth (WA) and we rode in two groups, the Mavericks were the fast ones and Y (Why are we doing this?) took their time, starting a bit earlier and usually finishing later. One rider who usually went in the Mavericks averaged a puncture every 500 km and I think I was probably next with two punctures in 1300 km, although I rode in the Ys. Admittedly punctures are a bit of a lottery and some of the Mavericks may not have had any in 4000 km, but the slow group had far less stops. I can only remember 5 punctures in the Ys, 3 on one wet day (when Mavericks had 4!) but a couple of times most days the Mavericks would be held up, which I put down to them riding harder so hitting bumps harder and also probably having higher performance/lighter tyres. In our small back yard we have two large dogs and when we had a recent wet spell to put more pressure on the lawn we ended up with a quagmire, as you can see in the photo below. The grass is a bit better where we kept the dogs off, but outside the fence (without dogs) the weeds are doing well, even though there was a sand heap out there until a few months ago.

Networks (computer, power and telephone) provide more good examples. Computer networks are quite good until you add too many computers, then the response time goes down. I realize there are technical reasons for the major power blackouts that have occurred in the USA, Eastern states and SA, but these blackouts occur because we are approaching the limits of the system and trying to “save money” by skimping on maintenance. Once the number of users on a telephone network approaches the limit of the system you get more holdups as the line is engaged and faults have to be repaired as quickly as possible to avoid pressure on the remaining network.

CONCLUSIONS

The proposed law appears to apply in a wide range of situations and provides a basis for developing more robust systems.

Some systems can be “pushed” by both increasing and decreasing inputs, both of which require more management to return the system to a stable state. This stable state is not necessarily at optimum performance.

REFERENCES

Many Sources of information have contributed to this paper, but I have not knowingly drawn on any major published references directly.