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NASA's Russian Roulette

By JAMES GLEICK;

There's a kind of self-deception familiar to gamblers everywhere. You make a rule for yourself ("I'm going to leave the roulette table when I'm down $200") and when the crucial moment comes, you find a reason to break it ("I just remembered that red is my lucky color").

The late physicist Richard Feynman caught the space agency at precisely this game in 1986, when he served on the Presidential commission investigating the explosion of the space shuttle Challenger. He found that the National Aeronautics and Space Administration was setting safety standards and then bending them at the last minute as needed.

"I read all of these [flight] reviews," he said that April, "and they agonize whether they can go even though they had some blow-by in the seal or they had a cracked blade . . . and they decide yes."

He went on: "For the next flight we can lower our standards a little bit because we got away with it last time. . . . It is a kind of Russian roulette."

Seven years later, desperate as ever to keep the shuttle flying, NASA is bending the rules again. As William J. Broad reported this month in this newspaper, the shuttle's solid-fuel booster rockets have been creating erratic, uneven power thrusts that could tear the shuttle apart. Engineers calculated that a worst-case thrust would exceed the allowable safety margin.

NASA's solution: to change its safety margin.

This is the return of Mr. Feynman's Russian roulette. As every honest scientist knows, an engineering standard has to be calculated with blind disregard for what happens to meet it -- if you use the knowledge that a particular hazard will flunk the test as a reason to revise the test, you have poisoned the test.

Early in the Challenger investigation, Mr. Feynman stunned a national TV audience by dunking a piece of rubber from the booster-rocket's seals into a glass of ice water and demonstrating that it lost resiliency in the sort of cold temperatures that prevailed the morning of the launch. It was a simple demonstration that cut directly through jargon and obfuscation to the heart of the matter.

But Mr. Feynman's more profound contribution to our understanding of the disaster was even subtler: his independent investigation of how the space agency calculates risk. He ridiculed the agency's estimates that the chances of disaster on each flight were about 1 in 100,000 -- a number that its engineers knew was a product of wishful thinking and fraudulent arithmetic.

NASA now more honestly estimates the chance of a catastrophe on any shuttle flight to be 1 in 78. That's not much less than the chance of dealing the queen of spades off the top of a deck of cards -- a staggeringly high risk for a disaster that would cost billions of dollars and the lives of the crew.

But where it matters most, Mr. Feynman's legacy has turned to dust: The agency launches shuttles anyway, bending its own rules. This is surely the gambler's self-deception -- the kind Mr. Feynman had in mind seven years ago when he wrote the prescription NASA now appears to have discarded: "For a successful technology, reality must take precedence over public relations, for nature cannot be fooled."

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