The Probability of Evolution

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There are lies, dammed lies, and statistics. (Mark Twain)

I'm reminded of a story about newspaper reporting in the old Soviet Union (I don't know if it's true or not, but it illustrates a point well). A car race between the United States and the Soviets ended with the United States car in first, and the Soviet car second (you should also know only two cars were in this race). But the reporting in the Soviet Union stated the Soviet car came in second, while the United States car came in second to last. Perfectly true, and yet perfectly misleading.

You must be careful with statistics. For example, it's *possible* the air in your room right now could spontaneously all move in the same direction at once, piling up in the other side of the room leaving you gasping for air. Possible, yes. But when calculated, the probability is so small as to be reasonably rounded off to zero (it's not going to happen, so breathe easy).

A similar argument against evolution applies to the probability of events occurring which result in new species (mutations, natural selection and spontaneous generation). That probability is zero (when rounded off reasonably). It's mathematically *possible*, but the expectation is so low we logically round it down to zero and state the event is never going to occur.

So the evolutionist has a problem — the odds of evolution occurring are zero. One tactic evolutionists attempt to show the theory isn't ridiculous (i.e. mathematically impossible) is showing highly improbable events happen all the time — unfortunately, it's usually through a misapplication of statistics. You see, simple logic and common sense tell you if (as they claim) improbable events happen frequently one of two situations is most likely true.

- The event really isn't that improbable. Thus, our mathematical calculation of statistical odds is incorrect. An error in math has been made.
- Statistics have been misused or misunderstood, similar to our car race example. The facts and math are correct, but the application of that knowledge is wrong.

Common sense explains the argument is already wrong, but we can continue with a specific example and explain exactly *why* it's wrong. One of the methods the evolutionist uses draws false conclusions from a deck of cards. Even a college professor can make this mistake; consider the following discussion from a professor of mathematics at Temple university.

> *So if, after the fact, we observe the particular evolutionary path actually taken and then calculate the a priori probability of its being taken, we will get the minuscule probability that creationists mistakenly attach to the process as a whole.*
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> *Here's another example. We have a deck of cards before us. There are almost 10 to the 68th power — a one with 68 zeroes after it — orderings of the 52 cards in the deck. Any of the 52 cards might be first, any of the remaining 51 second, any of the remaining 50 third, and so on. This is a humongous number, but it's not hard to devise even everyday situations that give rise to much larger numbers.*
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> *Now if we shuffle this deck of cards for a long time and then examine the particular ordering of the cards that happens to result, we would be justified in concluding that the probability of this particular ordering of the cards having occurred is approximately 1 chance in 10 to the 68th power. This certainly qualifies as minuscule.*
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> *Still, we would not be justified in concluding that the shuffles could not have possibly resulted in this particular ordering because its a priori probability is so very tiny. Some ordering had to result from the shuffling, and this one did.*[1]

[1] "What's wrong with Creationist Probability" http://abcnews.go.com/Technology/print?id=2384584

Mr. Paulos gets his math right, but the statistics wrong. The card example comes up repeatedly in attempts to show evolution isn't mathematically impossible, but this is the first time I've actually seen a professor of math make the mistake.

His problem lies in the card example. Suppose I have a deck of cards. He is correct in the 10^{68} combinations of cards (the probability of any 1 combination occurring). But he makes the mistake of applying statistics. Actually, by shuffling and dealing the cards the probability is 1 — it's a certainty *one* sequence will occur (one of the 10^{68} possibilities). Mr. Paulos does understand this, as he says "Some ordering had to result from the shuffling".

The one in 10^{68} is the probability of calling out each card—in order—as you turn them up. That's the correct analogy between cards and evolution. It's a certainty you will get *a* sequence. But is it the exact sequence you want? Correct math, wrong application. The probability is 1 you will get a sequence, but much less likely you could correctly call out each card as it's dealt (This is also sometimes illustrated as a group of monkeys randomly typing out the works of Shakespeare).

The card example illustrates a common mistake in the application of statistics, and statistical mistakes can be difficult to uncover. As already noted, if such improbable events really do happen commonly, they're not so improbable, are they (by definition)? But since the odds calculation *is* correct (it's not an error in math), it must be the *application* of knowledge.

Let's turn to Physicist Richard Feynman to explain the faulty reasoning and the professor's error immediately becomes obvious. For those who might not know, Feynman was a Nobel-prize winning physicist involved in The Manhattan Project, and on the panel investigating the space shuttle Challenger disaster. But perhaps best known for a series of undergraduate lectures captured in the famous "Feynman lectures on Physics", Feynman had the ability to illustrate complex problems simply.

> *What came to Feynman by "common sense" were often brilliant twists that perfectly captured the essence of his point. Once, during a public lecture, he was trying to explain why one must not verify an idea using the same data that suggested the idea in the first place. Seeming to wander off the subject, Feynman began talking about license plates. "You know, the most amazing thing happened to me tonight. I was coming here, on the way to the lecture, and I came in through the parking lot. And you won't believe what happened. I saw a car with the license plate ARW 357. Can you imagine? Of all the millions of license plates in the state, what was the chance that I would see that particular one tonight? Amazing!" A point even many scientists fail to grasp was made clear through Feynman's remarkable "common sense".*[2]

Feynman makes Professor Paulos' mistake with the cards clear — it's not an error in *math*, it's an error in *science*. The issue with cards relating to evolution isn't that any given sequence is wildly improbable, yet dealing the cards the sequence comes up — when dealing cards it's a statistical certainty *a* sequence will occur (probability one). The correct example relating to evolution would be to predict each card as it is dealt (probability zero).

Physicist Feynman illustrates the difficulty when applying mathematical statistics to science. It's quite easy to make a mistake, even for a professor of mathematics; Feynman illustrates the error through his license plate example. Don't be misled by lengthly, complicated examples — anyone truly understanding a subject should be able to explain it simply, as Feynman did. Sometimes (though certainly not always), the complicated explanation simply provides a way to mask the uncertainty involved.

> *Feynman was once asked by a Caltech faculty member to explain why spin 1/2 particles obey Fermi-Dirac statistics. He gauged his audience perfectly and said "I'll prepare a freshman lecture on it". But a few days later he returned and said "You know, I couldn't do it. I couldn't reduce it to the freshman level. That means we really don't understand it".*[3]

Predicting a sequence of cards as it is dealt is impossible and correctly displays the improbability of evolution. The probability of evolution occurring rounds down to zero — it's not going to happen.

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[2] "The Feynman lectures on Physics Volume I" , Feynman, Leighton, Sands page xi-xii
[3] "The Feynman lectures on Physics Volume I" , Feynman, Leighton, Sands page xii