Miracles: Divine Intervention or Statistics

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Abstract
This article illustrates a numerical example performed in Matlab, showing that what we perceive as miracles can often be explained by simple statistics.

Keywords
Miracles; statistics; probability; numerical simulation

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The human brain is a marvelous piece of engineering; it is a testament to what evolution can achieve, given enough time. However, it often faces difficulty trying to comprehend things like exponentials (topic for another article) and statistics. Our brains have naturally been biased to think linearly and not consider statistics in the thinking process. These traits of the human brain are more likely to be evolutionary.

Now, let us perform a hypothetical experiment to understand events that rarely happen (miracles). We have called 500 volunteers (for the sake of science), and each volunteer is assigned a chest number ranging from 1 to 500. Each of these volunteers is also provided with nearly unbiased coins. The volunteers are further asked to flip the coins simultaneously. After the flip, the volunteers who got tails are requested to leave. These trials are repeated till no candidates remain. An attempt was made to simulate this experiment in Matlab, and the results are shown in Figs. 1 and 2. The randi routine in Matlab was used for simulating the coin flips, and it should be borne in mind that this routine cannot simulate truly unbiased coin flips.

We had started with 500 volunteers, and after nine trials, only volunteer 142 was left (why nine ?, hint: think in powers of 2). Fig. 1 shows the chest numbers of volunteers remaining at the beginning of each trial, while Fig. 2 shows the total number of volunteers remaining at the beginning of each trial. Since the probability of getting a tail in an unbiased ideal coin is 0.5, around half of the volunteers leave after each trial. Now let us focus our attention on volunteers 142 and 464 in Fig. 1. These two volunteers got heads consecutively nine and eight times, respectively, even though the probability of getting a tail was similar to that of getting a head. These two people might think that this is a miracle, and the reporters from all T.V channels will rush to them. They might not realize that this is statistically bound to happen in such an experiment. Even though they were lucky, nearly half of the volunteers were unlucky in each trial and were eliminated. This experiment shows that some people are bound to be luckier than others in a large population and can confuse statistics with divine intervention.

This article is just the author's take on miracles. The author believes in miracles but not so much in divine interventions. The central premise in science is to ask questions systematically and not to believe blindly. One should be willing to introspect before accepting any social axioms and should not be afraid to ask questions. The author feels that developing scientific temperament, especially among the younger generation, will save our world

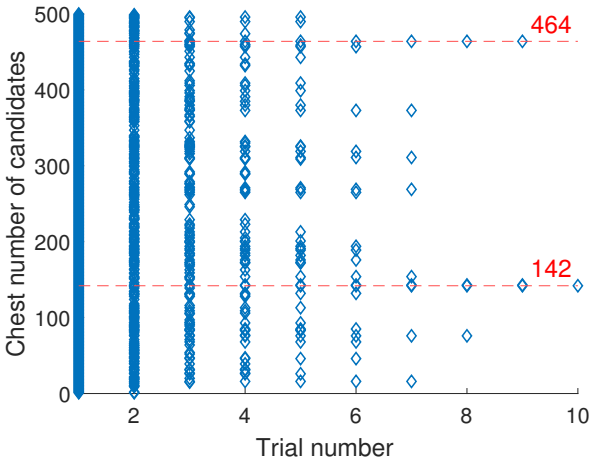

Figure 1. Chest numbers of volunteers remaining at the beginning of each trial.

Note

This article expresses the personal thoughts and perspectives of the author. The author is just utilizing the Constitution's fundamental rights and trying to develop scientific temperament. This article is not meant to offend anyone, and people who are not interested have the freedom to ignore this article completely

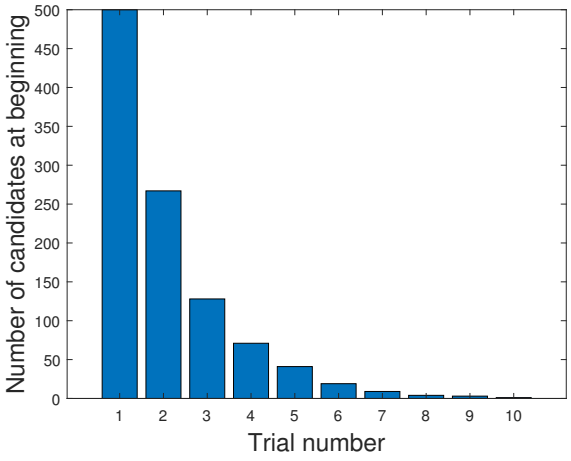

Figure 2. Total number of volunteers remaining at the beginning of each trial.

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This article was inspired from one of the talks given by Dr. Niel deGrasse Tyson.

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