still engaged in what they considered to be an original line of inquiry. The specific study Amos described was about how people, in their decision making, responded to new information. As Amos told it, the psychologists had brought people in and presented them with two book bags filled with poker chips. Each bag contained both red poker chips and white poker chips. In one of the bags, 75 percent of the chips were white and 25 percent were red; in the other bag, 75 percent of the chips were red and 25 percent were white. The subject picked one of the bags at random and, without glancing inside the bag, began to pull chips out of it, one at a time. After extracting each chip, he'd give the psychologists his best guess of the odds that the bag he was holding was filled with mostly red, or mostly white, chips.

The beauty of the experiment was that there was a correct answer to the question: What is the probability that I am holding the bag of mostly red chips? It was provided by a statistical formula called Bayes's theorem (after Thomas Bayes, who, strangely, left the formula for others to discover in his papers after his death, in 1761). Bayes's rule allowed you to calculate the true odds, after each new chip was pulled from it, that the book bag in question was the one with majority white, or majority red, chips. Before any chips had been withdrawn, those odds were 50:50—the bag in your hands was equally likely to be either majority red or majority white. But how did the odds shift after each new chip was revealed?

That depended, in a big way, on the so-called base rate: the percentage of red versus white chips in the bag. (These percentages were presumed to be known.) If you know that one bag contains 99 percent red chips and the other, 99 percent white chips, the color of the first chip drawn from the bag tells you a lot more than if you know that each bag contains only 51 percent red or white. But how much more does it tell you? Plug the base rate into Bayes's formula and you get an answer. In the case of two bags known to be 75 percent-25 percent majority red or white, the odds that you are holding the bag containing mostly red chips rise by three times every time you draw a red chip, and are divided by three every time you draw a white chip. If the first chip you draw is red, there is a 3:1 (or 75 percent) chance that the bag you are holding is majority red. If the second chip you draw is also red, the odds rise to 9:1, or 90 percent. If the third chip you draw is white, they fall back to 3:1. And so on.

The bigger the base rate—the known ratio of red to white chips—the faster the odds shift around. If the first three chips you draw are red, from a bag in which 75 percent of the chips are known to be either red or white, there's a 27:1, or slightly greater than 96 percent, chance you are holding the bag filled with mostly red chips.

The innocent subjects who pulled the poker chips out of the book bags weren't expected to know Bayes's rule. The experiment would have been ruined if they had. Their job was to guess the odds, so that the psychologists could compare those guesses with the correct answer. From their guesses, the psychologists hoped to get a sense of just how closely whatever was going on in people's minds resembled a statistical calculation when those minds were presented with new information. Were human beings good intuitive statisticians? When they didn't know the formula, did they still behave as if they did?

At the time, the experiments felt radical and exciting. In the minds of the psychologists, the results spoke to all sorts of real-world problems: How do investors respond to earnings reports, or patients to diagnoses, or political strategists to polls, or coaches to a new score? A woman in her twenties who receives from a single test a diagnosis of breast cancer is many times more likely to have been misdiagnosed than is a woman in her forties who receives the same diagnosis. (The base rates are different: