The Three Prisoners

Let me start by telling you about a different puzzle: the **Problem of the Three Prisoners**. I don't know who invented it, but I learned about it thanks to philosopher and computer scientist Rohit Parikh, from the City University of New York.

Setup: Suppose there are three prisoners in a room. They all close their eyes, and each of them is approached by a guard. Each guard flips a fair coin. If the coin lands Heads, he gives his prisoner a red hat; if it lands tails, he gives his prisoner a blue hat.

Once all three prisoners have been assigned hats, they are all allowed to open their eyes. Each of them can see the colors of the others' hats but has no idea about the color of his own hat.

As soon as everyone knows the color of everyone else's hat, the prisoners are taken into separate cells, so that they are unable to communicate with each other. At that point, they are each to be asked about the color of their hat. They are free to offer an answer or remain silent. The guards will then proceed as follows:

- If all three prisoners remain silent, all three will be killed.
- If one of them answers incorrectly, all three will be killed.
- If at least one prisoner offers an answer, and everyone who offers an answer answers correctly, then all three prisoners will be set free.

Problem: Find a strategy that the prisoners could agree upon ahead of time which would guarantee that their chance of survival is above 50%.

Before attempting to solve the puzzle, notice that there certainly is a strategy that gives the prisoners a chance of survival of *exactly* 50%. The prisoners can select one amongst them to serve as their "captain", and agree that only the captain is to offer an answer. Since the captain has no idea of the color of his hat, he must answer at random. And because the color of his has was chosen by the toss of a fair coin, he has a 50% chance of answering correctly.

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