# The Hard Hat-Problem

**Bacon's Puzzle**

**Paradox Grade: 7**

Let me now tell you about a hard version of the hat-problem, which is due to University of Southern California philosopher Andrew Bacon.

> *Setup:* As before, we have a line of prisoners. They are all wearing hats, and for each prisoner, a coin was flipped to determine whether to give her a red hat or a blue hat. This time, however, the prisoners form an $\omega$-sequence, with one prisoner for each natural number: $P_1, P_2, P_3, \ldots$. As before, $P_1$ is at the very end of the line, in front of her is $P_2$, in front of him is $P_3$, and so forth. Each prisoner knows her position in line. As before, each person in the sequence can see the hats of the prisoners in front of her, but cannot see her own hat (or the hat of anyone behind her). This time, however, the prisoners will not be called on one at a time to guess their hat color; instead, at a set time, everyone has to guess the color of her own hat by crying out "Red!" or "Blue!" Everyone is to speak simultaneously, so that nobody's guess can be informed by what others say. People who correctly call out the color of their own hats will be spared. Everyone else will be shot.
>
> *Problem:* Find a strategy that $P_1, P_2, P_3, \ldots$ could agree upon in advance, and which would guarantee that at most finitely many people are shot.

Astonishingly, it is possible to find such a strategy. In fact, describing the strategy is relatively straightforward, and we shall do so shortly. The hard part, and the reason I give this puzzle a paradoxicality grade of 7, is making sense of the fact that the strategy exists.

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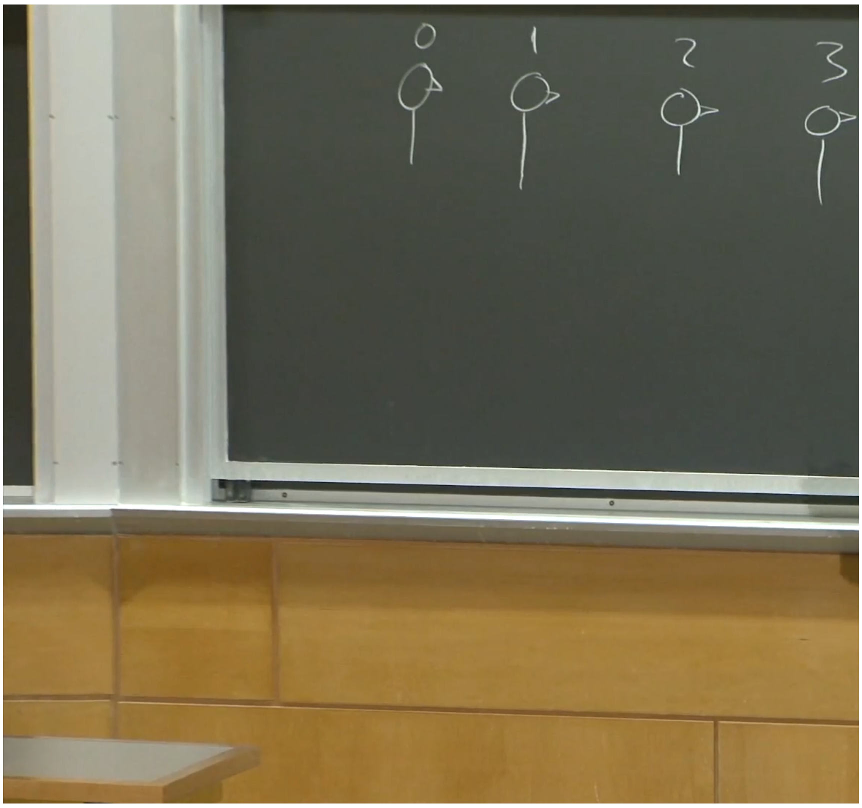
## Video Review: Bacon's Puzzle

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**In this case, all you have to go on**

is the colors of the hats of people in front of you.

And by the definition of the case,

the decisions about what hats to place on people

were independent of one another because each person

got their own assistant with a coin toss.

So hat decisions were all independent of one another.

So it seems impossible.

And yet, it's true.

In fact, it's worse than true.

So often with these puzzles, it all seems very mysterious.

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