

Hat Problem: People Standing in a Line

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The Set Up

100 people working together as a team, must stand in a line. Each person can see the heads of everyone in front of her, but not her own head, or the heads of those in back of her. BEFORE hats are placed (the next step) they can discuss strategy; however, the adversary listens in on that conversation.

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The Contestants Move: After the hats have been placed, each contestant, in turn starting from the back of the line and proceeding one by one to the front of the line, will call out one of the two colors, **red** or **blue**. Their goal is to get as many people as possible to correctly call out their own hat color.

Work on the Following in Groups

n people. 2 hat colors:

1. Is there a strategy that is guaranteed to get at least $n/2$ hats correct? (YES)
2. Is there a strategy that is guaranteed to get MORE THAN $n/2$ hats correct?
3. What is the best they can do? (If finish early work then look at an infinite number of people.)

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4. $p_1, p_2, \dots, p_{\lfloor g_2 n \rfloor}$ spell out in binary the number of **red** hats among $p_{\lfloor g_2 n \rfloor + 1}, \dots, p_n$. Each person can deduce their color based on the number and the prior utterances.

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6. BILL- TELL the Story!

Infinite Number of People!

Infinite number of people and 2 colors of hats.

Want a protocol such that all but a finite number get it right.

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They all end up collectively saying REP, which is only a finite number of hats away from the real answer.

Can They Do Better?

Vote

1. There is a protocol and a constant C so that the protocol always results in $\leq C$ hats wrong, and this is known.
2. For all protocols and all constant C there is a way for the adversary to put hats on peoples heads so that the protocol gets $\geq c$ wrong, and this is known.
3. The question
Is there a protocol and a C such that BLAH BLAH is independent of ZFC.
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Work on it in small groups.

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3. Similar for all p_i with $i \geq 2$.

More Hat Colors

More Hat Colors will be on a HW.