

Common Knowledge Problem: Blue Eyes Logic Puzzle

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November 8, 2015

Problem: *There is legend of a lost island inhabited solely by 100 blue-eyed white dragons. They are a peaceful species and infallibly logical. There is one magical rule on the island: If a dragon ever finds out that he/she has blue eyes, then at exactly midnight of the same day, he/she will be locked away into a playing card. One day, a dark magician arrives at the island, and tells the dragons that at least one of them has blue eyes. What will happen now to the dragons?*

Solution 1: Each blue-eyed white dragon recognizes that the other 99 dragons also have blue eyes. This validates the dark magician's claim that at least one has blue eyes, as each dragon already understands that 99 other dragons have blue eyes. Thus, there is no effect, as the individual dragons do not realize that they have blue eyes.

Solution 2: All dragons will be trapped into a playing card at midnight of the 100th day.

Taking a base case of one blue-eyed white dragon: the dragon would realize on the first day that it is the only dragon and thus, must have blue-eyes.

Taking a case of two blue-eyed white dragons: each dragon sees that the other has blue eyes; thus, it expects the other dragon will be trapped that night. However, as neither dragon gets trapped, both dragons realize that they must have blue-eyes and get trapped on the second day.

Inducting this to our case of 100 blue-eyed dragons: Being completely logical creatures, each dragon would postulate that on the 99th day, all other dragons would get trapped into cards, because they see the other 99 dragons with blue eyes. On the 99th day, each dragon realizes that because the other dragons have not been trapped, it itself must have blue eyes. As each of the 100 dragons has obtained this realization on the 99th day, on the 100th day at midnight, each dragon gets trapped in a playing card.