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Newcomb's Paradox

Okay kids, the aliens have landed and they're a Game Show Culture from Alpha Centauri. They claim to be able to read people's minds. They've set up a game at McCarter Theatre, and here's how it works. If you want to participate, they interview you. Then a week later you go up alone on the stage at McCarter, where they've already set up a table and two boxes, A and B. Box A always has $1000 in it. Box B may have $1,000,000 or it may be empty. Your only choices:

1) Take both boxes.

2) Take box B only.

The aliens believe they can predict what you'll do. If they predicted you'll take both boxes, they left box B empty. If they predicted you'll take just box B, they put $1,000,000 in it. According to the newspapers the aliens are pretty good at predicting. So far one hundred people have chosen both boxes, and they've all found box B empty. So they've won $1000 each. One hundred other people have chosen just box B, and they've all won $1,000,000 each.

They've asked me (RAF) to participate and I was interviewed last weekend. (And yes, they really are Little Green Men.) This Saturday I'll get to choose. To help me decide, I asked two professors for advice. Here's what they said:

Professor Smith: It's obvious! Everyone who chose just box B got $1,000,000. Everyone who chose both boxes got only $1000. Choose box B!

Professor Jones: It's obvious! The money is already set up when you go on stage. Either box B has $1,000,000 or it doesn't. Either way you'll get $1000 more by choosing both boxes. Why leave $1000 lying around? Choose both boxes!

Philosophers, mathematicians and theologians have written hundreds of pages about this paradox since it was invented by William A. Newcomb, a physicist, in 1960. Some of the topics they've touched on have included freedom, free will, "determinism," causality—even particles that move faster than light. If you want to read more, you can look for *Knotted Doughnuts* by Martin Gardner, or try "Newcomb's Paradox" on an internet search engine.

YOUR JOB: Write about Newcomb's Paradox! You can write a letter of advice to me. Let me know if you think one of the professors is wrong, and why. Or perhaps you can write a dialog between two people. You can also write about what you would choose to do. You might want to consider whether the problem would be different if the aliens were right only 90% of the time, or if the amounts of money were different. What if the audience can see what's in the boxes (but you still can't)? Do you think the story is impossible? Why?

Use your imagination!

Have fun!

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The Return of Number Necklaces!

This is a great problem! It's easy to get into, but hard to understand completely. Here's how it goes:

You have a whole lot of beads numbered 0 to 9. You may choose any two numbers to start your necklace (including choosing two of the same number). Then you add them to see which number to put on your necklace next. If the sum is a number bigger than 9, you use its ones digit to get your next bead.

Here's an example. Begin with 2-2. So the next will be 4 (2+2), then 6 (2+4). But then 4+6=10, a two-digit number. So we use the 0 from 10 to get our next number, 0. The beginning of this necklace will look like this: 2-2-4-6-0-6-6-2. (Do you see where that last 2 came from?)

1) Choose two numbers and make a necklace. When you get the same two numbers again, in the same order, snip them off. Your necklace is now complete. How many beads are in your necklace?

2) Must a necklace cycle around to the same two numbers in the same order? Why or why not?

3) How many starting pairs of numbers can be made from the numbers 0 to 9?

4) Can you make other necklaces different from your first one?

5) Can you find a complete solution to this problem, that is, find all the possible necklaces? What are the lengths of your necklaces? What do you notice about them?

6) Can you explain why this problem breaks up into a certain number of necklaces of certain lengths? [I'm still working on this myself!--RAF] You might want to see how this problem shapes up in Base Two, Base Three, etc.

7) Present all your work neatly, so it will look attractive and readable on the bulletin board. Be sure your name is neat and prominent!

8) Can you make up a similar problem?

9) Have fun!