

Waiting Game

THIS ISSUE'S PUZZLE

The plane had been sitting on the tarmac, waiting to take off, for almost 30 minutes when the guy in the seat next to me challenged me to a game of tick-tack-toe. Mind you, we had not spoken a word to each other up to that point, so I was a bit startled; but I couldn't think of a reason to decline, so I agreed. We played three games in the next couple of minutes, and I won all three.

"Well, I can see you are pretty good at this game," my companion said. "What do you say we make it a little more interesting and put some money on this next one?"

"What do you have in mind?" I asked.

"I'll bet you a dollar that you don't beat me in our next game."

I may not be exactly streetwise, but I can recognize a hustle when I see one—even if, as in this case, the hustler is only 8 years old. I paused, as if considering.

"Tell you what," I said after a minute, "to keep this fair, let's make it a game of chance. We'll number the cells 1 through 9, and also write the numbers 1 through 9 on some slips of paper. Then we can draw numbers at random to determine where we get to go on our turn. You can go first. If you win, I pay you a dollar; otherwise, you pay me a dollar."

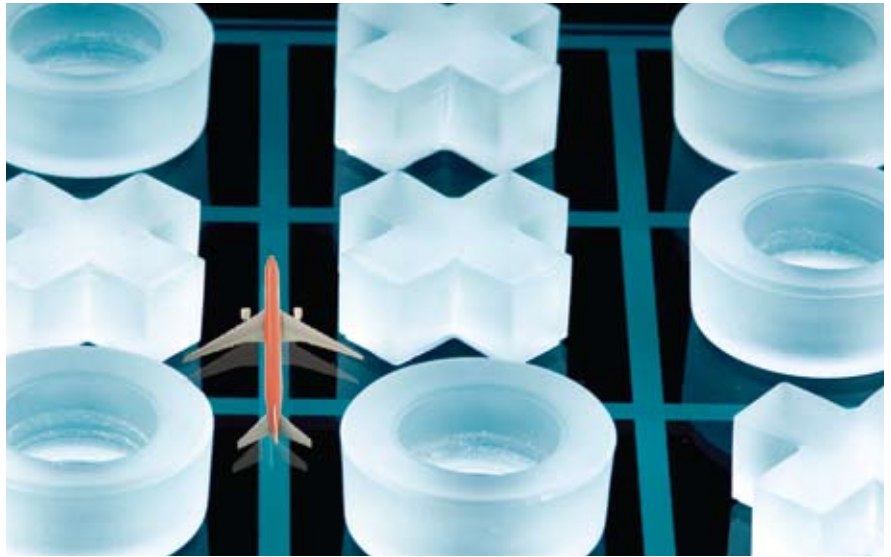
He thought this over, and agreed.

So the question is, was that a fair bet? Or is my wife correct that I was ripping off an 8-year-old? What is the probability of the first player winning in a randomized game of tick-tack-toe? And, while you are at it, what is the probability of a tie game?

PREVIOUS ISSUE PUZZLE

Dance Moves

"Come dancing," my sister requested of me one Saturday. My sister used to go dancing every weekend, but she'd never before invited me. So I was, naturally, a little puzzled. She explained that she had joined a folk dancing troupe. Folk dancing, as you might know, is the source of many natural



puzzles. Why do it at all? Why do twice as many women as men show up to dance? Has anyone thought to bring cookies?

In this particular case, though, my sister was looking for help with the choreography.

"We're doing a dance called the Dudeny Reel," she explained. "We start off with 11 dancers in a circle, but with a gap on the audience's side where a 12th dancer could stand. The dancers are wearing hand-knit sweaters with the letters 's r e c n a d k l o f' embroidered on the front, one letter per dancer..."

"Wait a second," I interrupted. "Who knit the sweaters? And who in the world wears sweaters to dance in?"

"Don't interrupt," she scolded. "In turns, one of the dancers is the mover. The mover must either be next to the gap, in which case they do a side-step-pivot-turn-and-bow into the gap (and their former position becomes the new gap), or the mover can be one person away from the gap, in which case they do a grapevine-hop-and-turn around the person separating them from the gap (and again their former position becomes the new gap)."

"What do the other dancers do?"

"They do a four-count turn in place.

Now, the goal of the dance is to have the dancers end with their initial positions reversed, and the gap in the same place. So, at the end, their sweaters spell out "folk dancers," reading clockwise around the circle. It's a dramatic, crowd-pleasing finish. But the problem is, our recording of the song for this dance is only two minutes long. The best I have been able to figure out, we need 50 moves, and the dancers simply cannot make that many moves in that little time!"

I got out a fresh pencil and set to work. Fortunately, I found a couple of alternatives for her that took a good bit fewer than 50 moves. How well can you do? Number the dancers clockwise 1, 2, 3, ..., 11 starting from the gap. To submit your answer, send me a sequence of numbers indicating which dancer is the mover at each step. There are multiple solutions but you need only submit one valid solution to make the solvers' list, assuming you take no more moves than I needed.

Answer

Broadly speaking, this is the kind of puzzle you might encounter when learning sorting algorithms, if you had a particularly perverse instructor. To make the solver's

list, you were asked to reverse the dancers, and to take no more moves than I needed. That was a fudge, because the best I had done was 41 moves, whereas I had it on good authority that the best possible is 39 moves. One solver gets special honors for getting to 39 with the following sequence: 10, 8, 6, 4, 2, 10, 8, 9, 6, 4, 2, 3, 10, 8, 9, 4, 2, 3, 5, 7, 6, 2, 3, 5, 8, 9, 1, 10, 9, 10, 11, 2, 3, 6, 5, 6, 4, 2, 1.

Solution

This puzzle requires a high tolerance for trial and error. Most of the solvers, myself included, seemed to try to keep the dancers in two groups—one of the middle dancers (4 through 8) and another of the outside dancers (1 through 3 and 9 through 11), which were reversed

separately. That is, you start by partially reversing the outside dancers, and at some point the middle dancers “grab” the

Solutions may be e-mailed to cont.puzzles@gmail.com or mailed to Puzzles, 65 W. 35th Place, Eugene, Ore. 97405.

In order to make the solver list, please make sure that your answers and solutions are received by **May 31, 2008**. Depending on the response volume, solver lists may contain only the names of people who solved puzzles on the first attempt.

gap, using it to reverse themselves, then pass the gap back to the outside dancers to finish their reversal. Mr. Morse did not do that at all, and his solution seems based more on a philosophy of “as much as possible, keep the gap moving in the same direction round the circle.” ●

SOLVER LIST:

Because of an administrative deadline, names of only those people who submitted correct solutions by March 31, 2008, are shown on the list.

Solvers—*Robert Bartholomew, Yan Fridman, Christophe Gaboriaud, John Hubenschmidt, Lee Michelson, Geoff Moak, Philip Morse, Al Spooner*

Honorable Mention—*Rui Guo, Yehuda Haber, Robert Share, Tony Torelli*

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