

SCI 199Y: Random Walks and Mathematical Discovery

Group assignment, week 1.

1. Find a partner. Introduce yourselves. Decide who will be “**A**” and who will be “**B**”.
2. As a pair, take one 6-sided die, and eight pennies.
3. Give six pennies to **A**, and two pennies to **B**.
4. Roll the die. If it comes up 1 or 2, then **B** gives one penny to **A**. If it comes up 3, 4, 5, or 6, then **A** gives one penny to **B**.
5. Repeat step 4 until either **A** or **B** wins all eight pennies. That person is the “winner”.
6. Repeat steps 3–5 a few more times, keeping track of who wins. See if you can estimate the chance that **A** wins. Is it more or less than 50%? [Since **A** starts with more pennies, **A** is “rich”. Since **B** has a better chance of winning each individual bet, **B** is “lucky”. So the question is, is it better to be born rich or lucky?]

If you have time, you can try some variations on the game, such as:

7. Suppose **A** starts with seven pennies? Or with five pennies? How does that affect their chance of winning?
8. Suppose that each time we bet two pennies instead of one. That is, suppose we change step 4 to say, “Roll the die. If it comes up 1 or 2, then **B** gives two pennies to **A**. If it comes up 3, 4, 5, or 6, then **A** gives two pennies to **B**.” Does this affect the chance that **A** will win?
9. Suppose that for each bet, **A** can choose how much the bet will be. (So, betting one penny is like step 4 above, betting two pennies is like step 8 above, etc.) What should **A** choose to have the best chance of winning?

While you’re trying these things out, you might start wondering:

10. How could we figure out, mathematically, the chance that **A** will win these different games?

We will come back to this question later!

Assignment for next week: Read the first half (everything before “Gaining Confidence in Own Math Abilities”, p. 10) of “Cooperative Learning and Learning Mathematics”, by D.W. Johnson and R.T. Johnson. Be prepared to discuss what you have read, including your opinions about it.