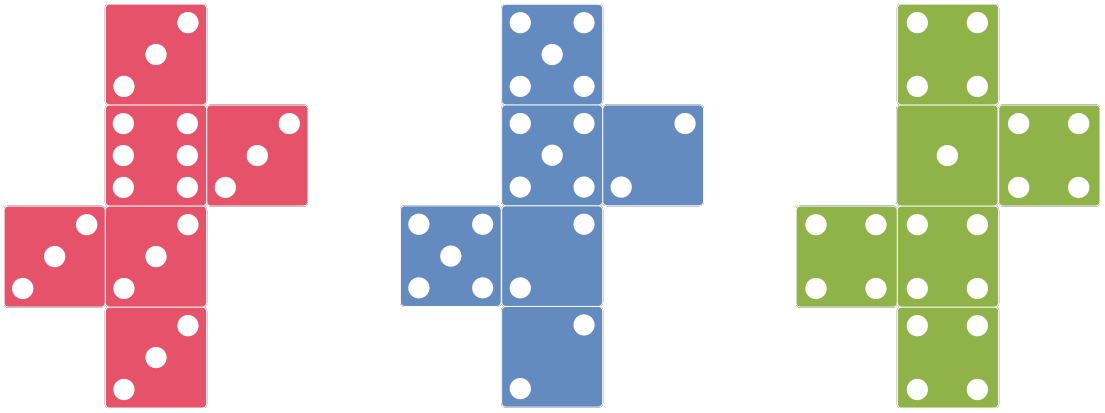
Non Transitive Dice

Euro 1re

Look at the three dice below. They do not have values 1 to 6 like normal dice. In fact each die[1] is distinct.
We can play a two-player game in which each player picks a die and then rolls it. The player who has the highest value on his die wins. For example, a 6 on the red die beats a 2 on the blue die.



1. What is the mean value for the red die ?

2. What is the probability of the red die beating the blue die ?

3. If your opponent choses the red die, which die would you choose ?

4. Is one of the dice better than the other two ? Why/why not ?

5. Now consider a game in which we throw two red dice and two blue dice. We compare the total on the two red dice and the total on the two blue dice in order to see who has won. Draw a tree diagram to show the probabilities. At the first level, draw three branches for each possible total for the two red dice. At the second level of the tree, draw three branches for the totals of the two blue dice.

What is the probability of the blue dice beating the red dice ?

TODO

- Identify all the words and/or sentances which need to be defined or clarified.
- Find appropriate notations for all the relevant quantities of this problem.
- Prepare a 5 minute talk on your results, which you could present to the others.

[1] die is singular, dice is plural