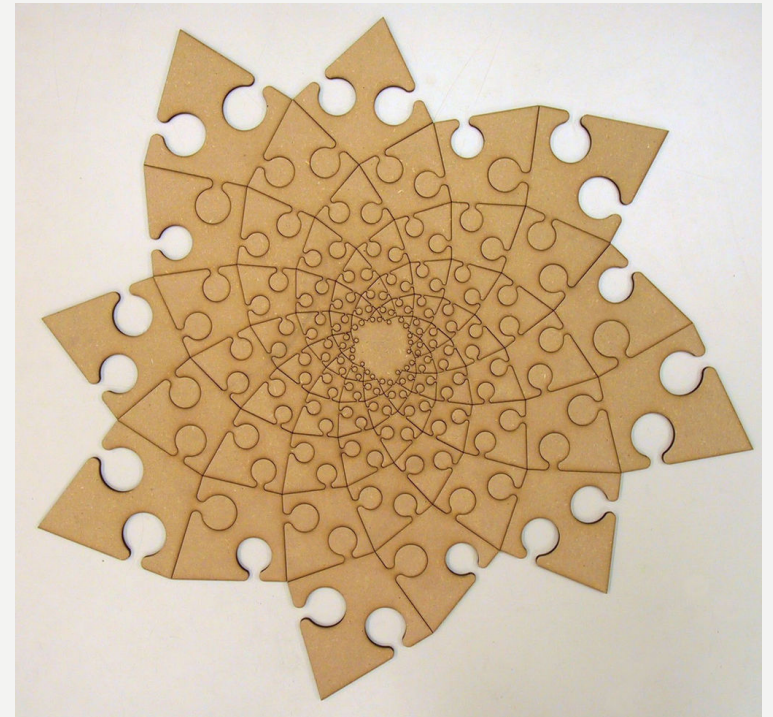
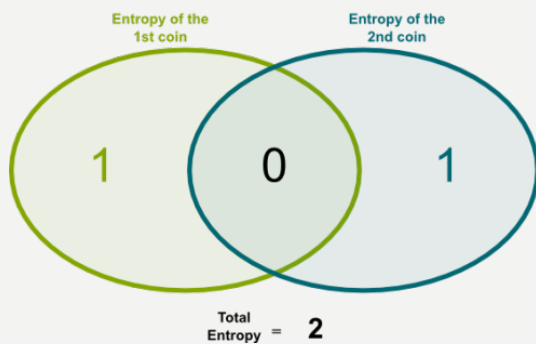


PUZZLES

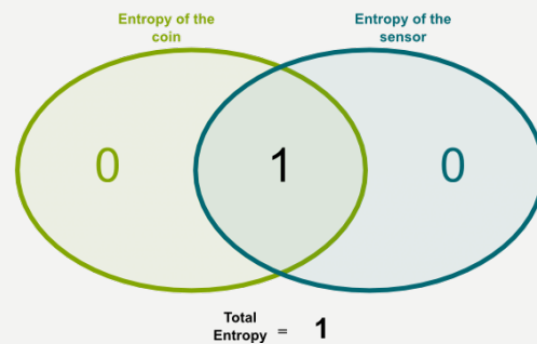
CLAUDE SHANNON CENTENARY @ UC SAN DIEGO



Throws of two independent coins



One coin and a sensor



BAD WINE

A king has 1000 bottles of exquisite wine and one of them is poisoned. Whoever drinks the bad wine, even very small amount, will die within 5 days. The king decides to force his prisoners to drink the wine, so he can figure out which bottle is bad before the kingdom's annual feast in a week.

If there were 1000 prisoners, he could simply assign each prisoner to a distinct bottle and check who dies. But unfortunately, the king has only 10 prisoners. Can he still enjoy the wine at the feast?



TWENTY QUESTIONS

One player (the oracle) picks a word, any word in the dictionary, and the other player (the analyst) tries to figure out what word it is. The analyst is allowed to ask 20 yes/no questions. What's more, the analyst should write down all 20 questions in advance, which means none of the questions can be designed based on the answers to previous questions.

Could you find the word?



HAT PROBLEM

Three people enter the room, each with a hat on their head. They are assigned randomly, red or blue. Each person can see the hats of the two other people, but they can't see their own hats. Each person can either try to guess the color of their own hat or pass. All three do it simultaneously. If nobody guesses incorrectly and at least one person guesses correctly, they all share a big prize. Otherwise they all lose.

Before the contest, the three people have a meeting during which they decide their strategy. What is the best strategy?

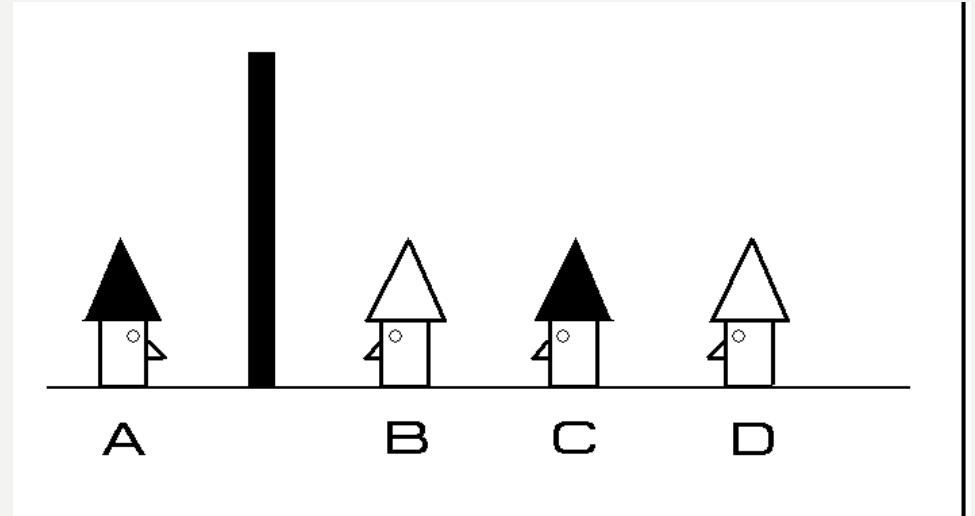


FOUR MEN IN HATS

Shown are four men buried up to their necks in the ground. They cannot move, so they can only look forward. Between A and B is a brick wall which cannot be seen through.

They all know that between them they are wearing four hats--two black and two white--but they do not know what color they are wearing. Each of them know where the other three men are buried. In order to avoid being shot, one of them must call out to the executioner the color of their hat. If they get it wrong, everyone will be shot. They are not allowed to talk to each other and have 10 minutes to figure it out.

Which one of them calls out? Why is he 100% certain of the color of his hat?



A & B can only see their respective sides of the wall, C can see B, and D can see B & C.

TWELVE COINS

Suppose that we have 12 identical-looking coins, among which there may or may not be one counterfeit coin. A counterfeit coin is either heavier or lighter than normal coins. The coins are weighed by a balance.

By using the balance 3 times, can we find which one is the counterfeit (if any) among 12 coins and correctly declare it to be heavier or lighter? If so, how?



IDEA OF TWELVE COINS

