

A Hungarian teacher T. Varga performed the following experiment (described in a book on probability):

His class of secondary school children is divided into two sections.

In one of the sections each child is given a coin which they then throw two hundred times, recording the resulting head and tail sequence on a piece of paper.

In the other section the children do not receive coins but are told instead that they should try to write down a "random" head and tail sequence of length two hundred.

Collecting these slips of paper, he then tries to subdivide them into their original groups. Most of the time he succeeds quite well.

His secret is that he had observed that in a randomly produced sequence of length two hundred, there are, say, head-runs of length seven.

On the other hand, he had also observed that most of those children who were to write down an imaginary random sequence are usually afraid of putting down runs of longer than four.

Hence, in order to find the slips coming from the coin tossing group, he simply selects the ones which contain runs longer than five.

This experiment led T. Varga to ask:

What is the length of the longest run of pure heads in n Bernoulli trials?

This problem has a very complicated solution, found by Paul Erdos in 1970 or so.