Warning Labels for Lotteries: Visual Display of Small Probabilities

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Challenge of small and large numbers

People do not have common everyday experience with either extremely large or extremely small numbers. Once numbers become small enough, they become indistinguishable and it is easy to overestimate the chance of winning.

And these numbers are difficult to display. The electronic version of this poster contains 8,871,552 addressable pixels. The probability of winning the grand prize in Lotto 6/49 is 1 in 13,893,816, or one pixel in about one and a half posters.

Semantic Grounding

Like everyday numbers, large and small numbers must be grounded in common experience to have meaning. Probability experience is similarly limited.

Since large and small are relative terms, visual comparatives of familiar objects are employed. Here we use comparisons of length, area, and time. A standard trick is to switch scales, but this must be done with care to meaning. Here expected payoffs and logarithmic scales tailored to commonplace probabilistic experience are used.

Gambling and lotteries

Money raised from state run lotteries fund many worthwhile community projects. Unfortunately, these good works often draw money from those of greatest need. Gambling addicts are frequently those who also have suffered from mental illness or other addiction disorders or are the more marginal members of society.

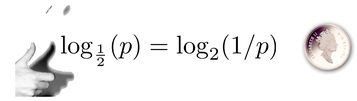
Approximately 340,000 Ontarians (4.8% of the gambling population) suffer from problem gambling while another 9.6% of the general population are at risk of developing into problem gamblers.

According to one recent study, gambling addicts are responsible for as much as 35% of all Ontario government revenue from gambling.

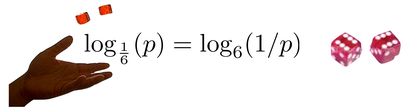
Governments also receive considerable revenue from tobacco products.
There, however, Canadian legislators require warning labels to discourage use.

Probability's "natural logarithms"

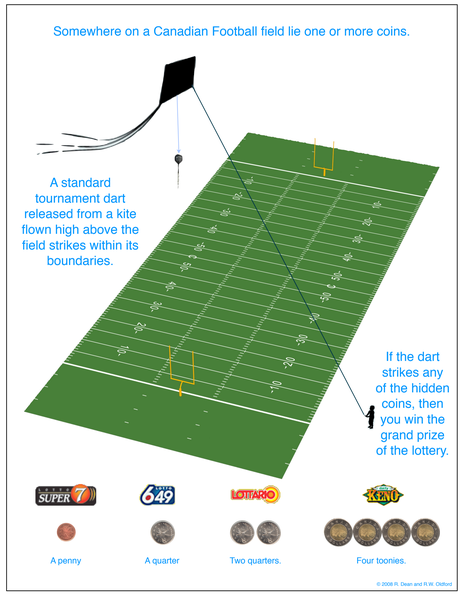
Number of fair coins tossed simultaneously, all of which must land heads.

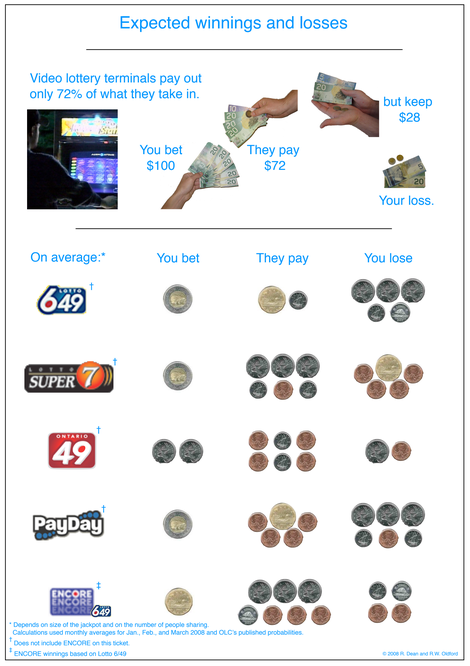


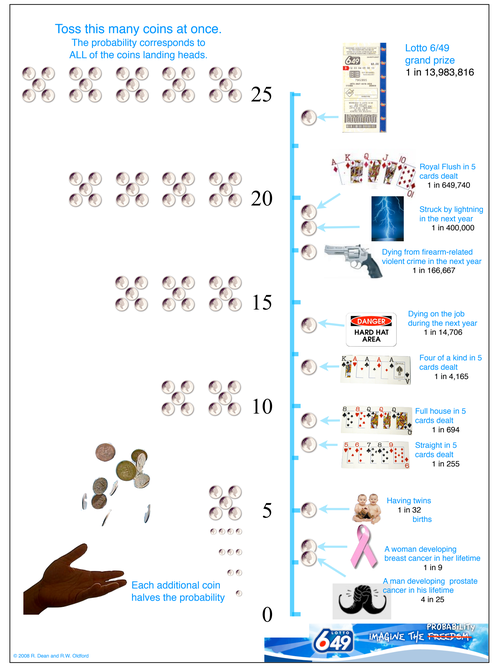
Number of fair dice tossed simultaneously, all of which must land showing 6.



Perhaps it's time we had warning labels for lotteries as well.







Visual Explanation

The goal is to enable an understanding of the magnitude of the probabilities. The graphic must provide the viewer a visual explanation, of probability (or outcome) and of the quantitative magnitude of the numbers themselves.

It must also be memorable. A narrative structure mixing images and text is a powerful means to reinforce the message. Humour helps.

How long should I expect to play to win the grand prize?

Quite a while. If your ancestors bought one ticket per weekly draw, the expected number of draws they would have to play to win the grand prize in Lotto 6/49 would be 13,983,816, or have played for about 268,000 years.

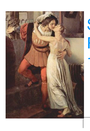
On the up side, according to some genetic evidence, homo sapiens seems to have differentiated itself as a species as recently as 270,000 years ago, so your family has had the time ...

Great pyramids at Giza constructed during the reign of Khufu
2589-2566 BCE

Alexander the Great is born
356 BCE

Jesus of Nazereth Born circa 1 BCE

Charlemagne becomes King of the Franks
768



Shakespeare writes Romeo and Juliet
1595

413 years	100	tickets per weekly draw
1,239 years	21	
2,008 years	39	
2,359 years	114	
4,581 years	88	

2574 BCE — 352 BCE — 1 BCE — 769 — 1595 — 2008

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