

Abstract

The Rubik’s Cube, an iconic 3D puzzle, has captured the imagination of enthusiasts and mathematicians alike for decades. This poster delves into the mathematical intricacies of the Rubik’s Cube. We investigate the cube’s symmetry, its staggering number of possible permutations, and the use of computer aided proof-assistants to calculate the algorithms to solve the Rubik’s Cube. Whether you’re a puzzle enthusiast or a math fanatic, this poster invites you to embark on a fascinating journey into the world of Rubik’s Cube mathematics.

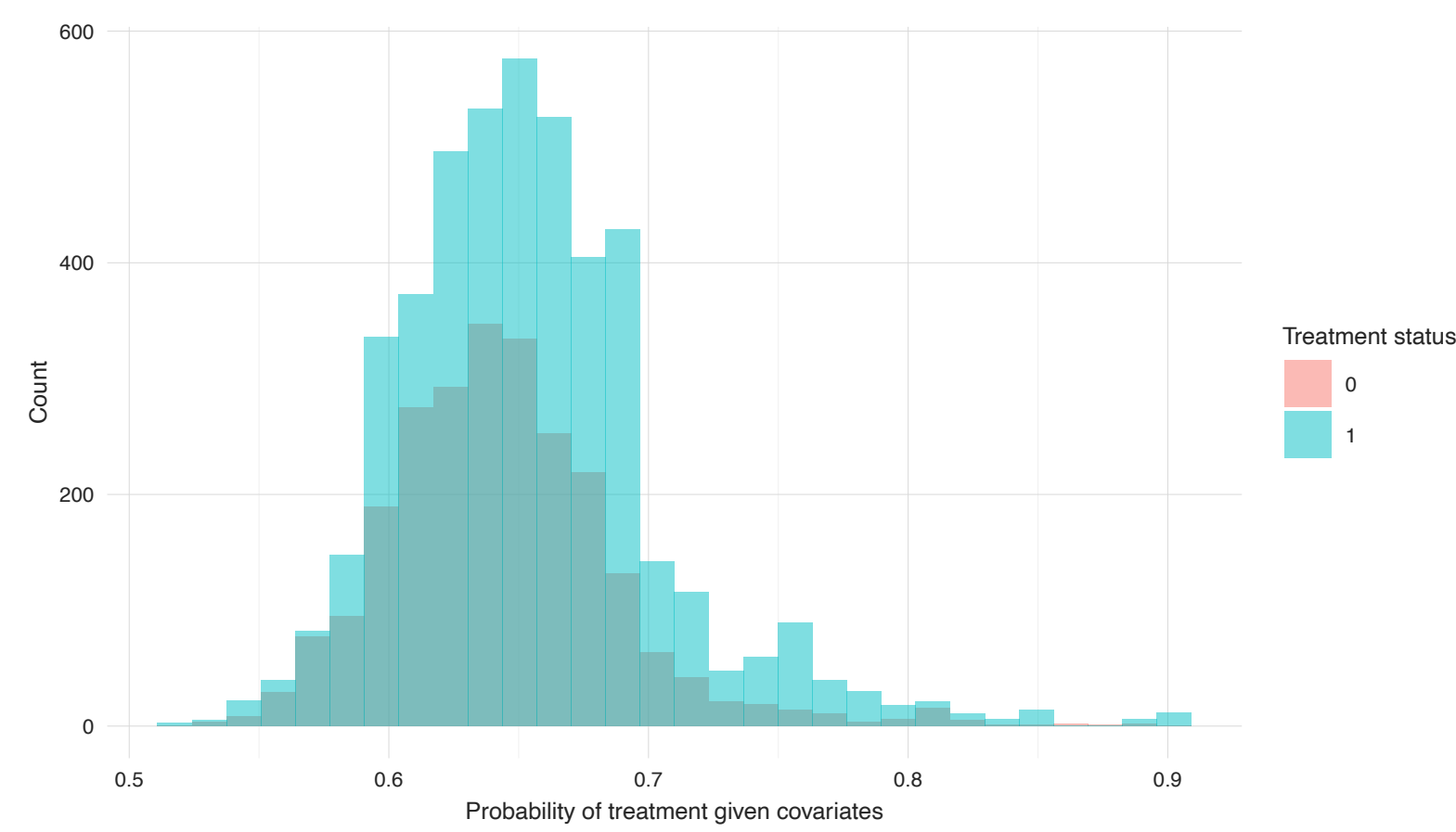
Combinations of a Rubik’s Cube

There are three (four if you count the not-visible core) types of pieces:

- **Corners:** 8 of these on each corner of the cube
- **Edges:** 12 of these connecting adjacent corners
- **Centers:** 6 of these on each face of the cube

There are 8! ways we can permute the corner pieces to the corners of a cube, and 12! ways we can permute the edge pieces into the 12 edge slots of a cube. There are  $3^7$  ways we can orient 7 of the corner pieces (the last one will be based upon the previous 7 orientations), and  $2^{11}$  ways we can orient 11 of the edge pieces, with the last one being determined after. We also have to divide by 2, since some states are impossible, as each move involves an even number of piece swaps, so odd ones are impossible. This yields the final formula:

$$\frac{8! \cdot 12! \cdot 3^6 \cdot 2^{11}}{2} = 43252003274489856000$$



How big is 43 Quintillion?

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- **Suspendisse vulputate** mauris vel placerat consectetur. Mauris semper, purus ac hendrerit molestie, elit mi dignissim odio, in

Solving a Rubik’s Cube

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3. **Vestibulum et massa diam**. Phasellus fermentum augue non nulla accumsan, non rhoncus lectus condimentum.

God’s Algorithm and Number

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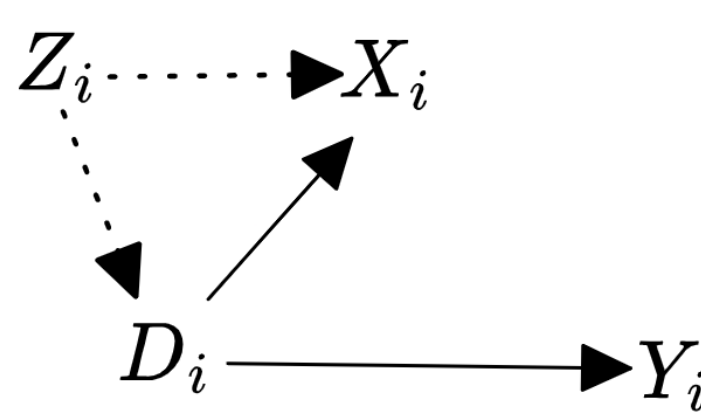


Figure 1. Another figure caption.

Proof Assistants/Computer Aided proof

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Statistics of Speed Cubing

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

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A heading inside a block

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Another heading inside a block

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What about larger Rubik’s Cubes?

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First column	Second column	Third column	Fourth
Foo	13.37	384,394	$\alpha$
Bar	2.17	1,392	$\beta$
Baz	3.14	83,742	$\delta$
Qux	7.59	974	$\gamma$

Table 1. A table caption.

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References