

XERRADES-TALLER DE LA FACULTAT DE MATEMÀTIQUES

EL QUE DIUEN ELS NOMBRES

MARTÍN SOMBRA (ICREA & UB)

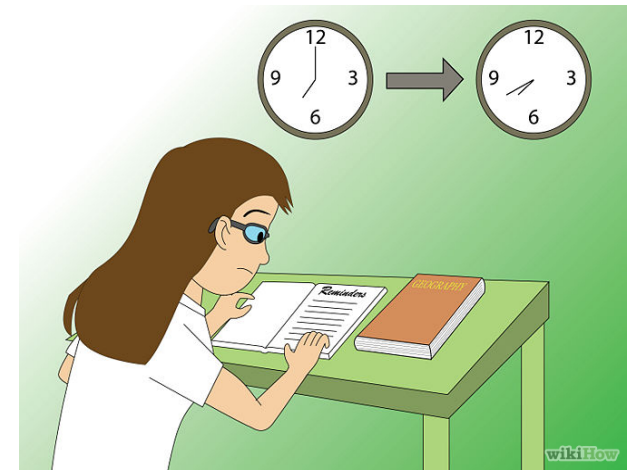


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PROBABILIDADES?

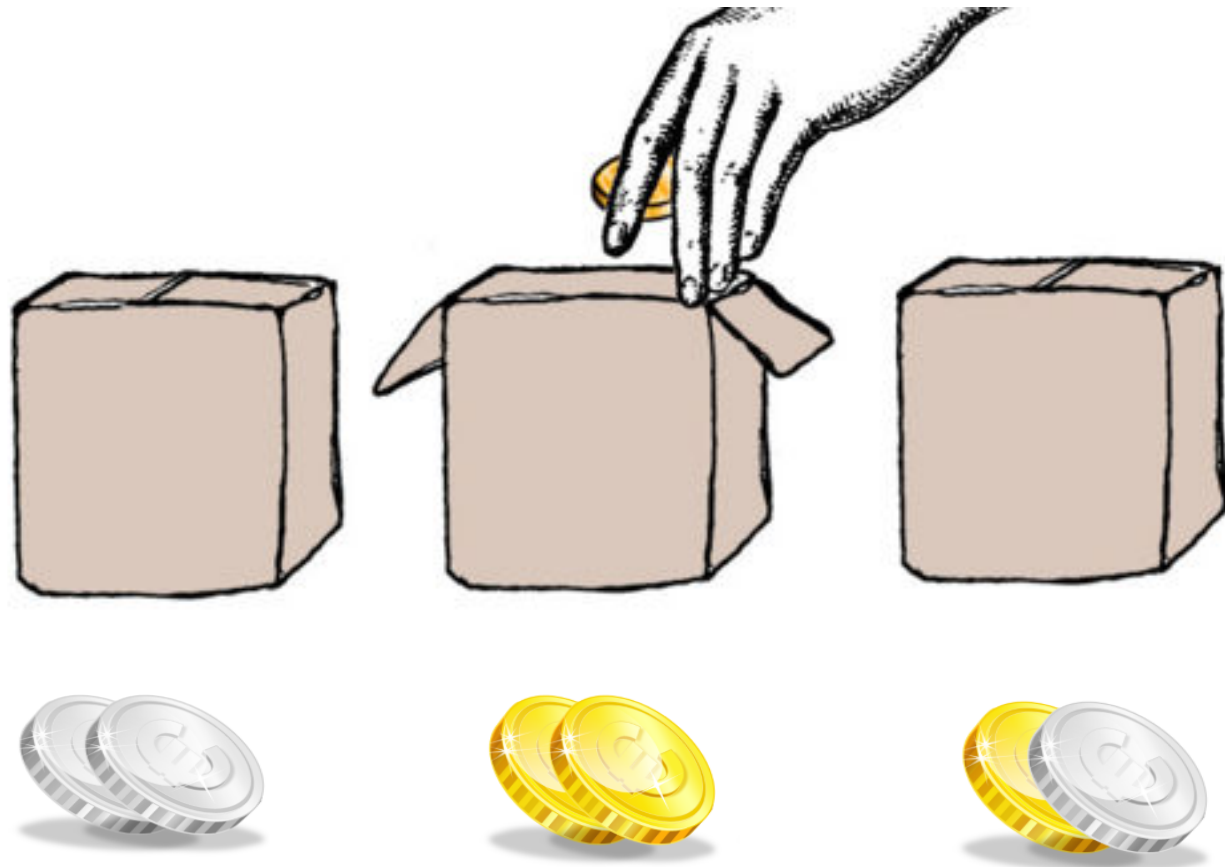
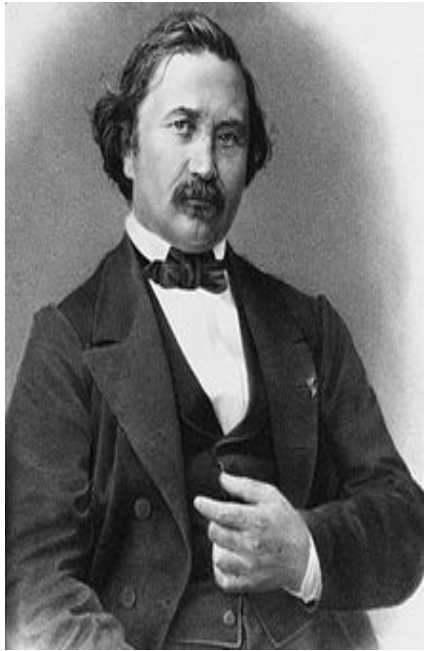


$$P = \frac{\# \{ \text{CASOS FAVORABLES} \}}{\# \{ \text{CASOS POSIBLES} \}}$$

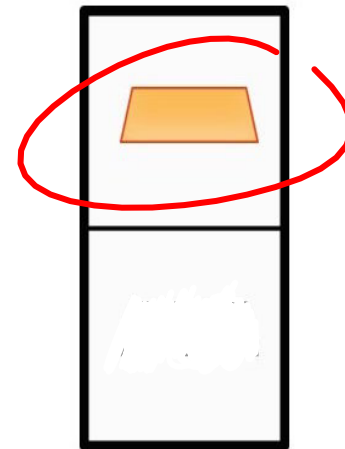
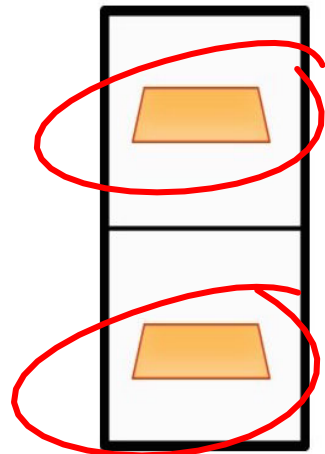
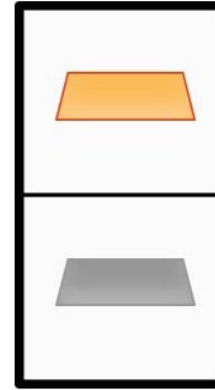
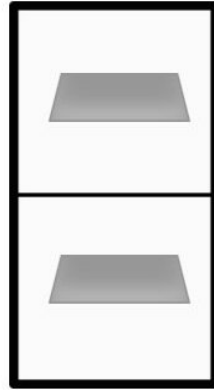
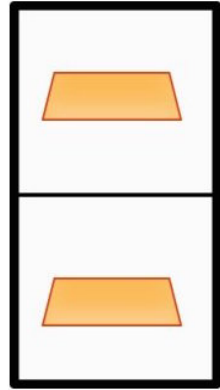


$$P = \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$$

LAS CAJAS DE BERTRAND (1889)



Análisis



RULETA

GANANCIA MEDIA

$$-\frac{1}{37} = -0,027$$



		0		
1 st 18	1 st 12	1	2	3
		4	5	6
EVEN		7	8	9
	2 nd 12	10	11	12
		13	14	15
		16	17	18
	3 rd 12	19	20	21
		22	23	24
ODD		25	26	27
	19 th 36	28	29	30
		31	32	33
		34	35	36
		2 to 1	2 to 1	2 to 1



EuroMillones

- Precio : 2€
- Premio MAYOR $\approx 150.000.000€$
- PROBABILIDAD DE ACERTAR $\approx \frac{1}{116.000.000}$



60 años

$$P \approx \frac{1}{19.000}$$

584 años

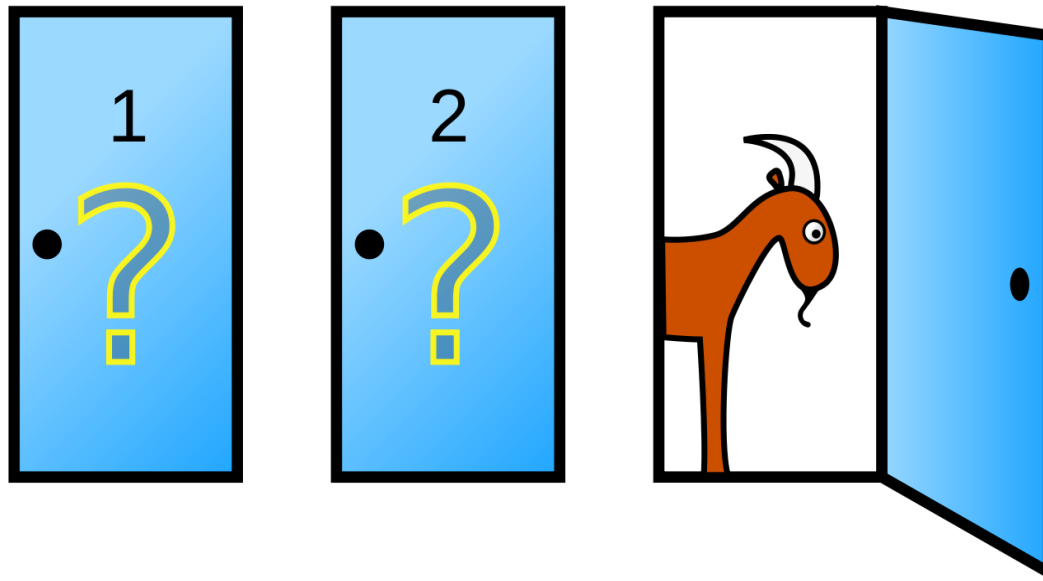
$$P \approx \frac{1}{1950}$$



200.000 años

$$P \approx \frac{1}{6}$$

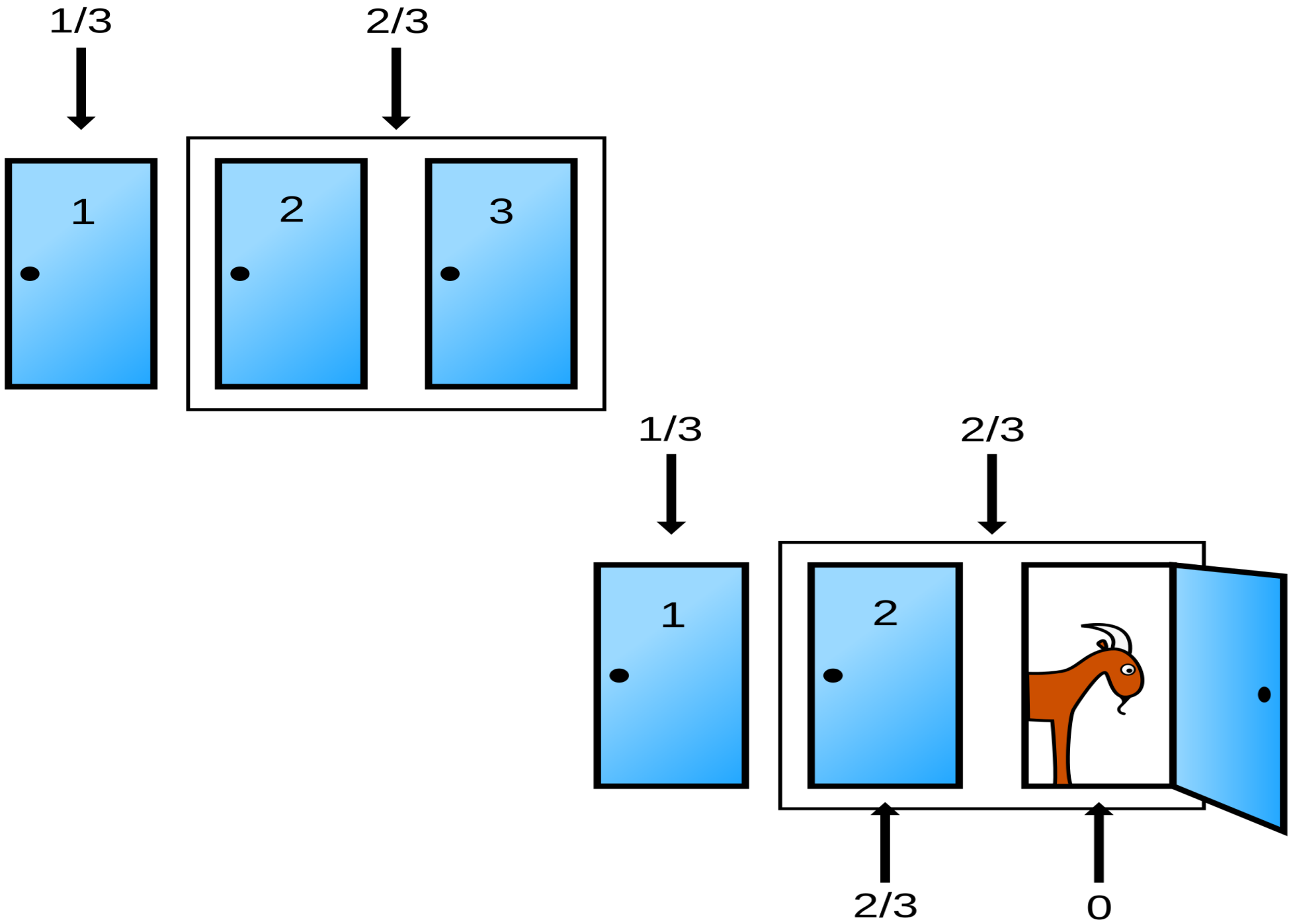
EL PROBLEMA DE MONTY HALL (1975)



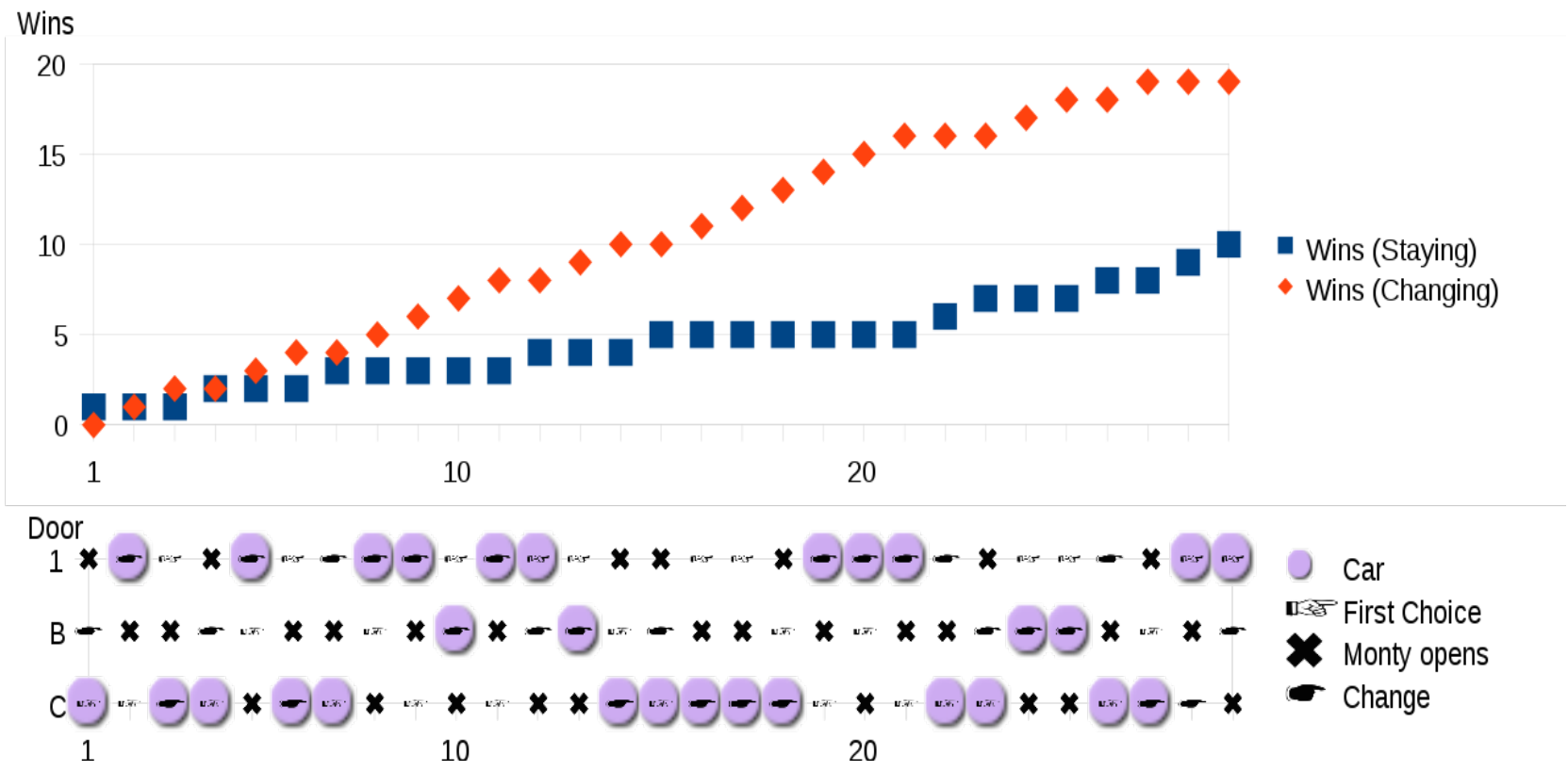
3 PUERTAS

2 CABRAS

1 COCHE



UNA SIMULACIÓN



LA LEY DE LOS GRANDES NÚMEROS



- $N \gg 0$

- x_i : elegir 0 ó 1 c/prueba $1/2$ c/u

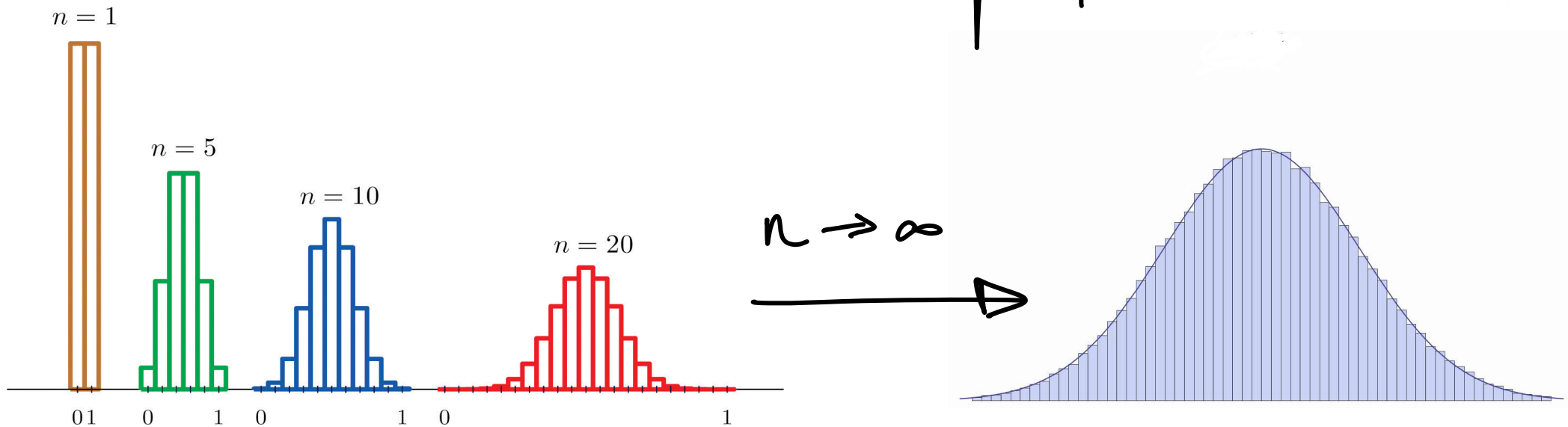
- $X = \sum_{i=1}^N x_i$

$$\frac{1}{N} X \xrightarrow{N \rightarrow \infty} \frac{1}{2}$$

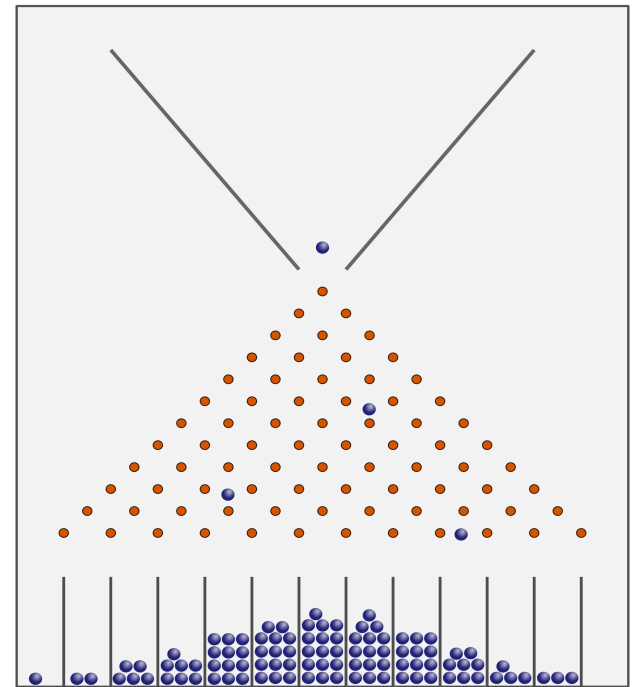
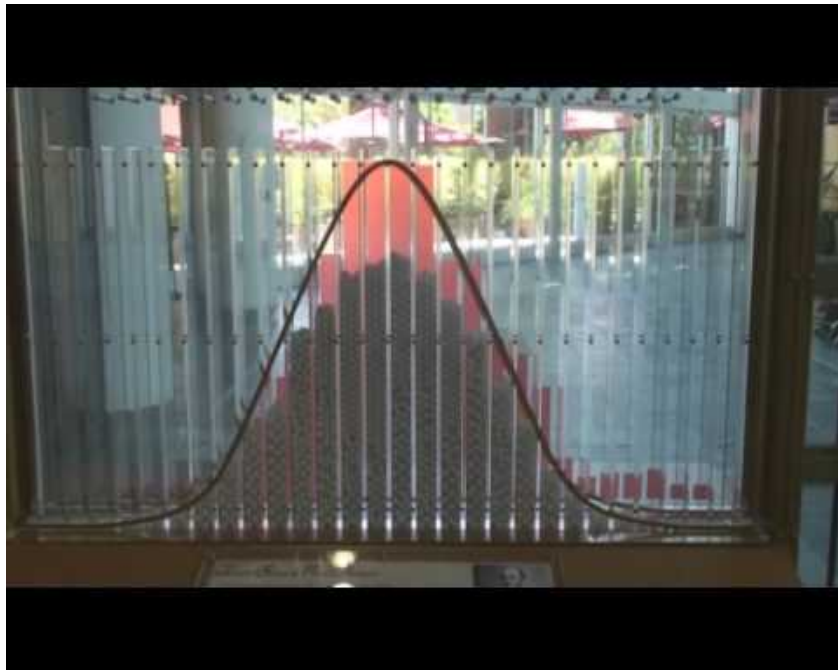
EL TEOREMA CENTRAL DEL LÍMITE

$$\frac{X - N/2}{\sqrt{N/4}} \xrightarrow{N \rightarrow \infty} \left(X \mapsto \frac{e^{-x^2/2}}{\sqrt{2\pi}} \right)$$

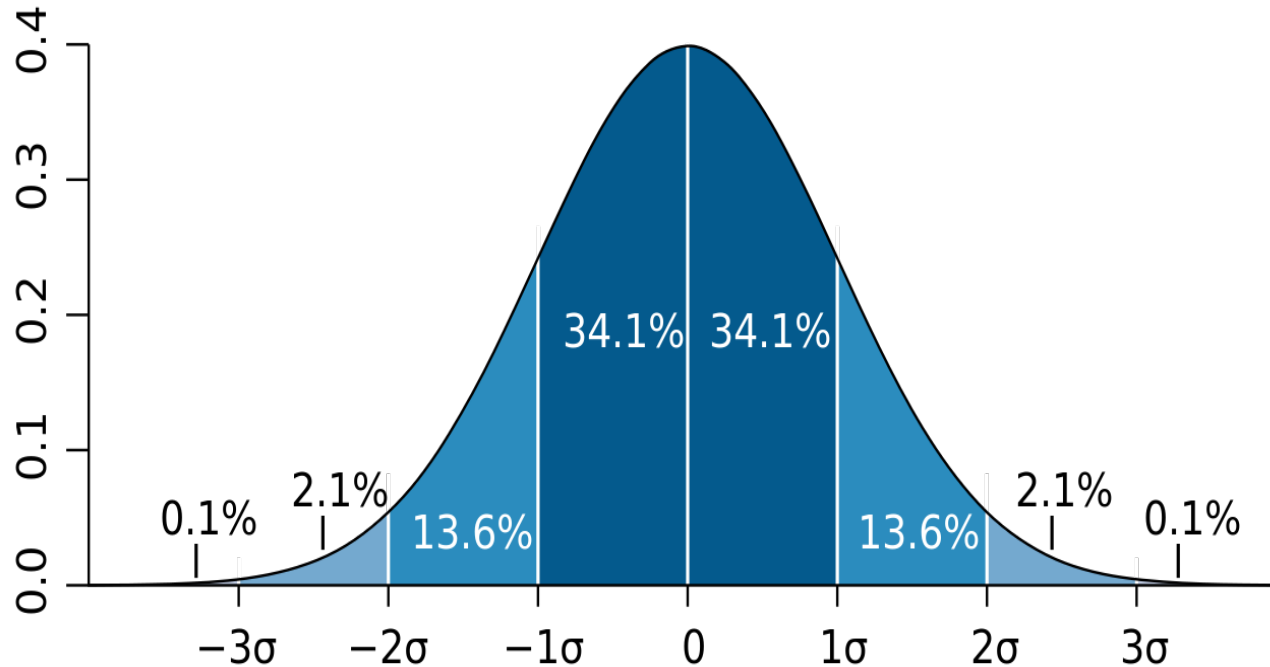
"campana de Gauss"



LA MÁQUINA DE GALTON



DESVIACIÓN STANDARD



$$N = 200$$

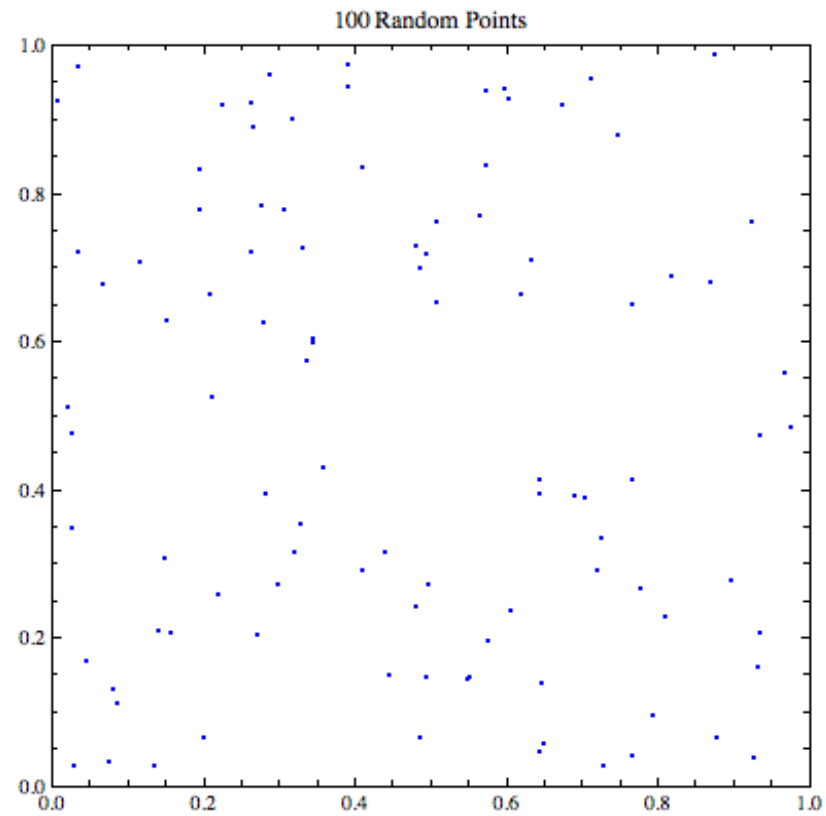
$$|X - 100| \leq 7,071$$

$$P = 0,682$$

$$|X - 100| \leq 14,142$$

$$P = 0,954$$

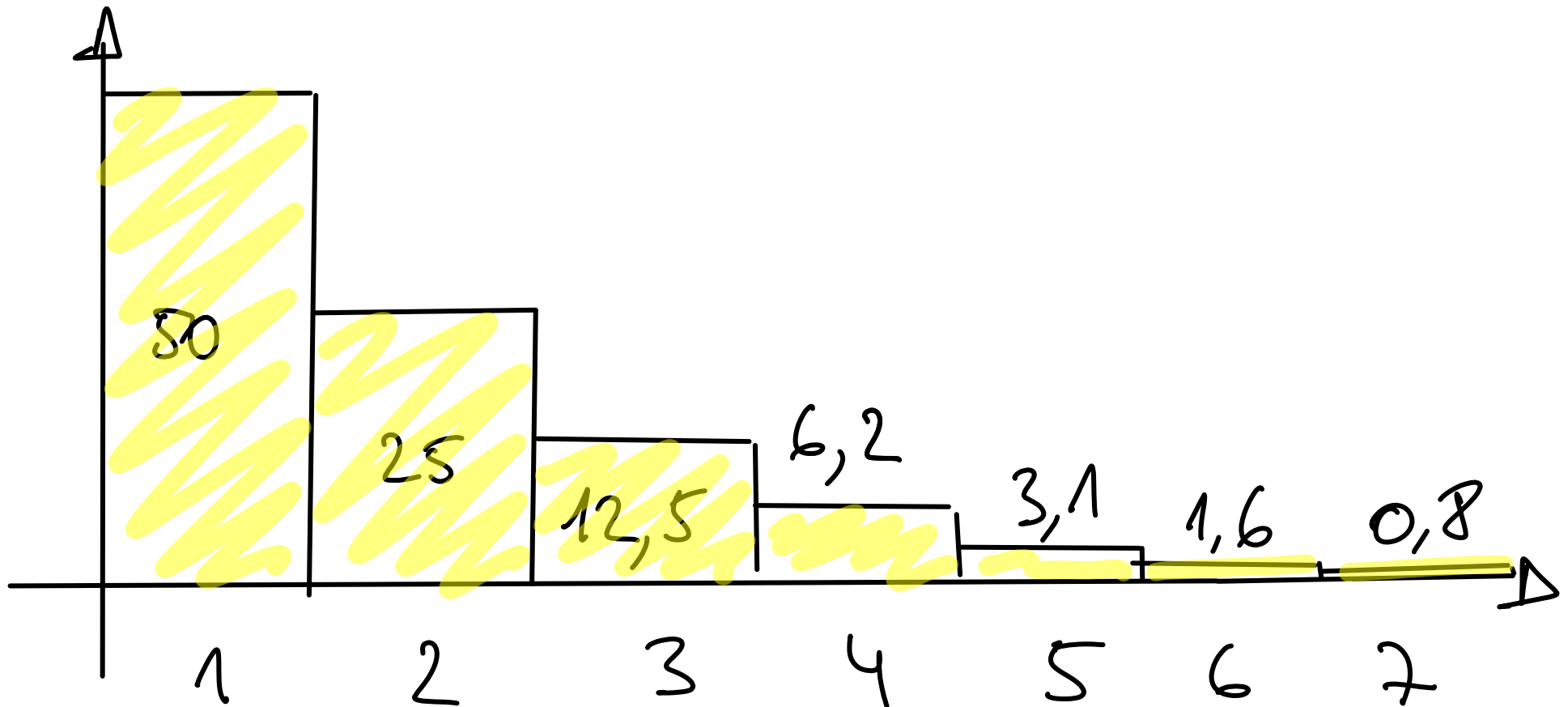
LAS RACHAS SON PROBABLES !



EL NÚMERO "ESPERADO" DE RACHAS

$N = 200$ BITS

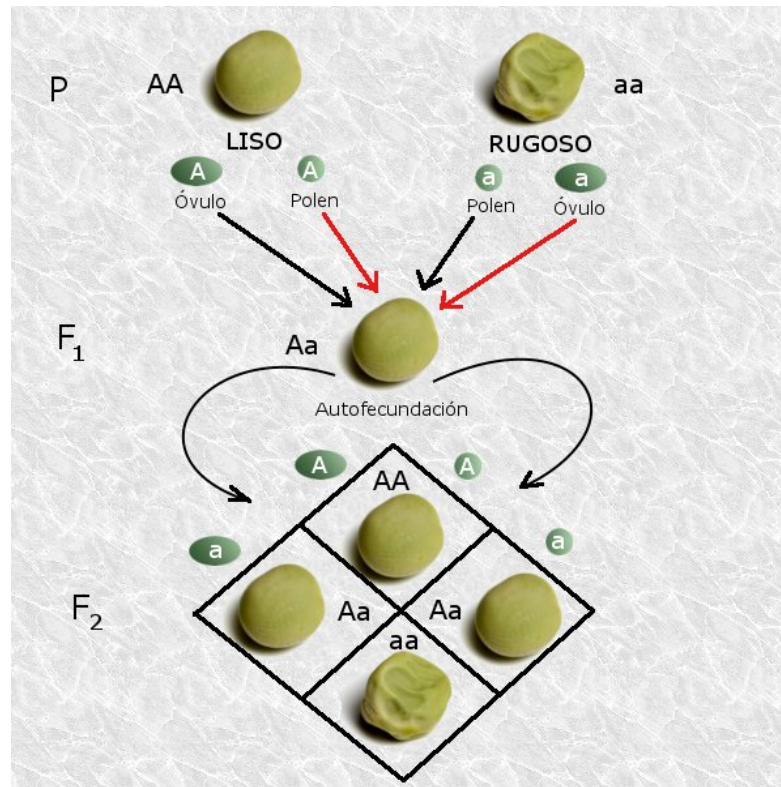
$$E[\# \text{rachas}] = 100$$



LAS LEYES DE LA HERENCIA (MENDEL 1866)



1RA & 2DA LEY



LA CONTROVERSA MENDEL-FISHER



G. MENDEL
1822-1882



SIR R. FISHER
1890-1962

"The data of most, if not all, experiments has been falsified so as to agree with Mendel's expectations"

Fisher (1936)

"EVIDENCIAS"

- "Too good to be true"

Prueba χ^2 ; prueba de repetir Mendel

$$0,00007 = \frac{1}{14.000}$$

- Test de progenie

Resultados cercanos a **media errónea**

01100111110011000111010000000010
00111000001000100010100110011111
11001001000011111101101010100010
00111000001000100010100110011111
00100100001
11001001000011111
01101010100010001
00001011010001100
00100011010
01100010011
00011001100
01010001011
10000000110

000101110000
000110111000
001110011010

110010010000
0011100000100
0100010100110
0111110011000
1110100000000
1011001001000
0111111011010
1010001000100
0010110100011
0000100011010
0110001001100
0110011000101

1010010	1111001101
00000100100110	010100110
1000001000100011	1010011001
101001100111110010001010011	
110001110100	00001000111110
010110010010	00111110110110
111011010101	0100010010011
100001011010	1100001010000
100011010011	100110000100
001100110001	01011101010
000000011011	00111000000
110100010010	0000010000

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