All the possibilities

Conjecture	Ways to produce ●○●
[○○○○]	$0 \times 4 \times 0 = 0$
[●○○○]	$1 \times 3 \times 1 = 3$
[●●○○]	$2 \times 2 \times 2 = 8$
[●●●○]	$3 \times 1 \times 3 = 9$
[●●●●]	$4 \times 0 \times 4 = 0$
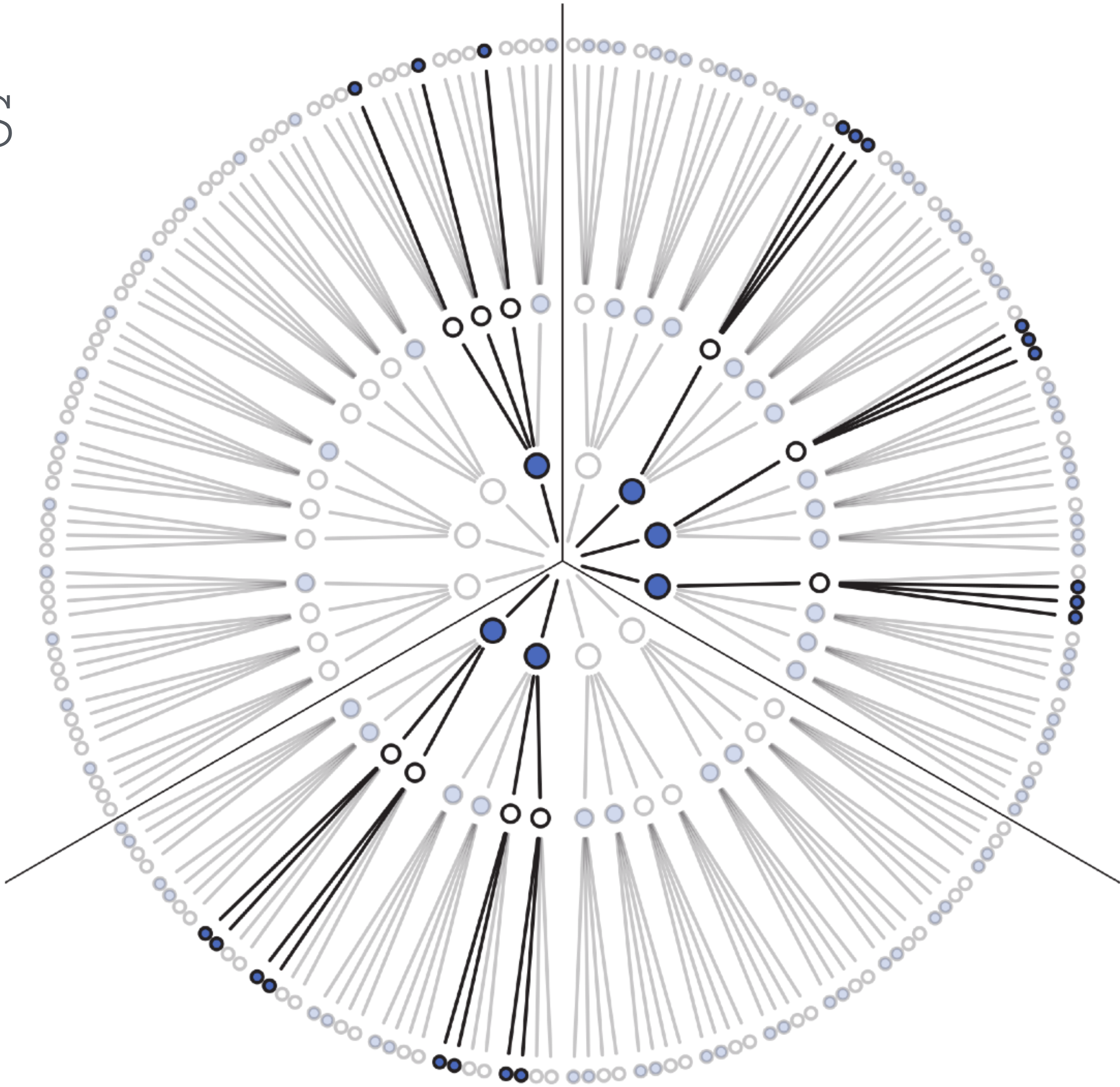
Likelihood is just a scaled measure of these counts

Conjecture	Ways to produce ● ○ ●
[○ ○ ○ ○]	$0 \times 4 \times 0 = 0$
[● ○ ○ ○]	$1 \times 3 \times 1 = 3$
[● ● ○ ○]	$2 \times 2 \times 2 = 8$
[● ● ● ○]	$3 \times 1 \times 3 = 9$
[● ● ● ●]	$4 \times 0 \times 4 = 0$
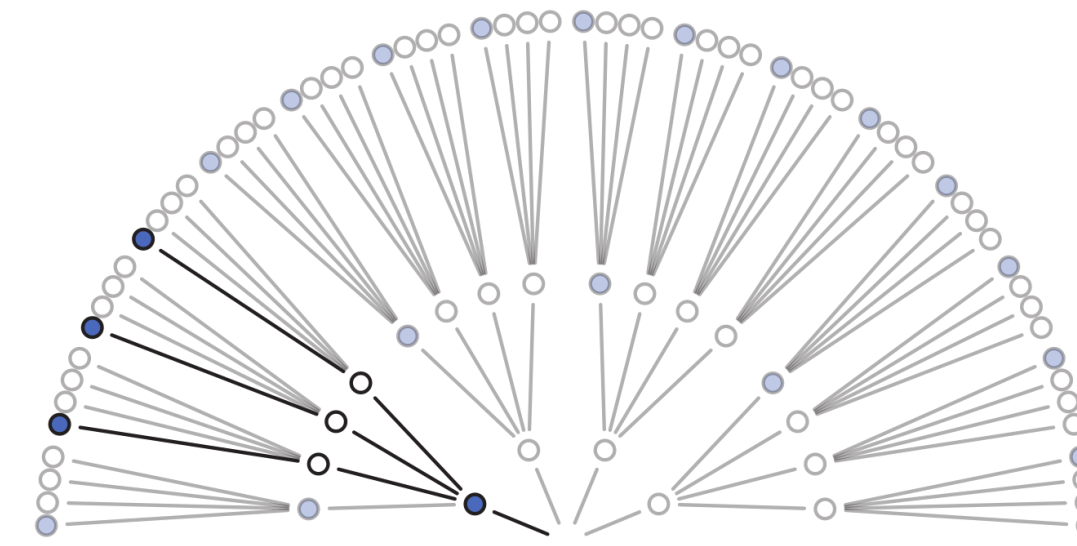
```
> 3/(4^3)
[1] 0.046875
> dbinom(2, 3, 0.25)/3
[1] 0.046875
```