A bell curve emerges

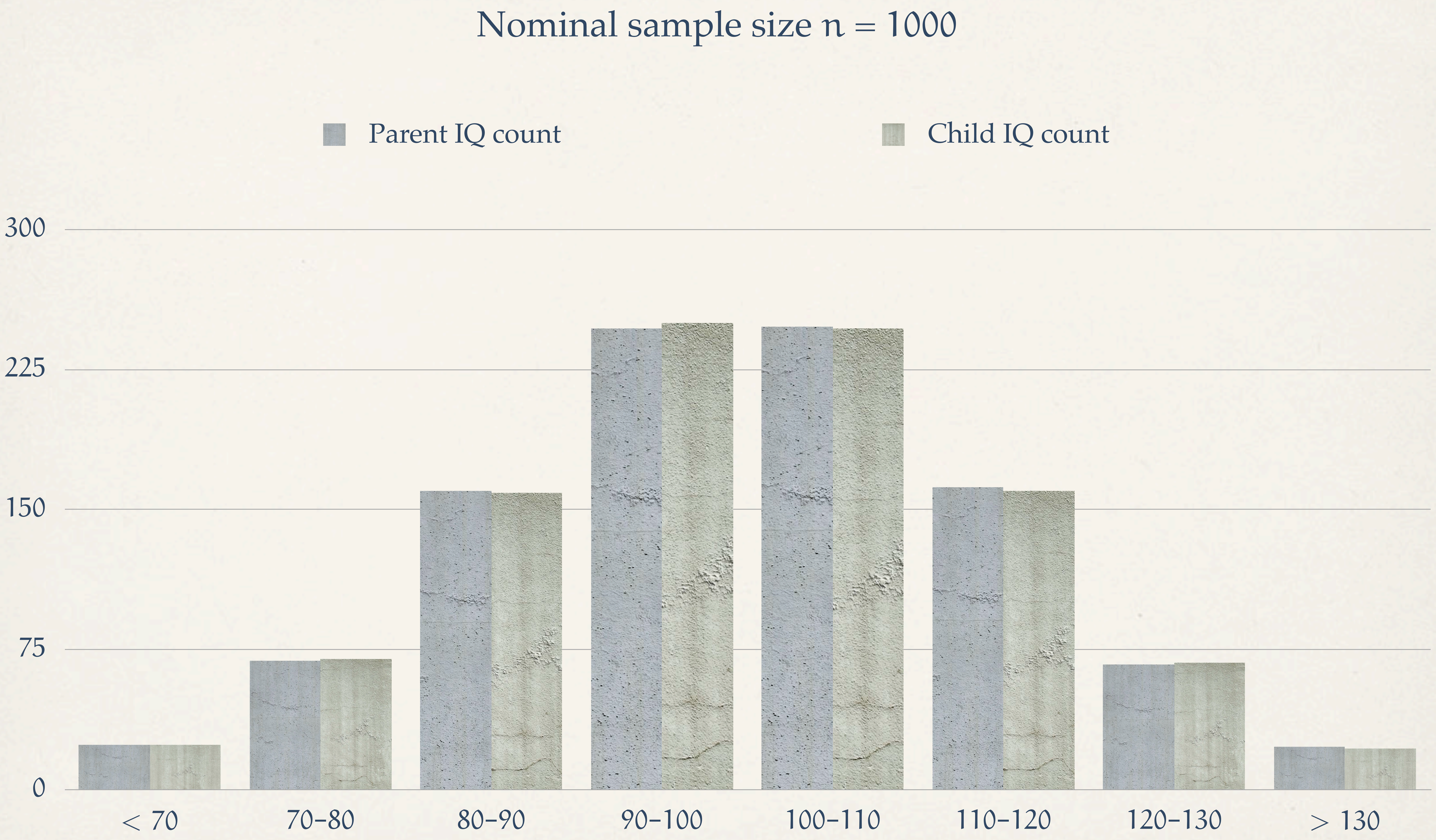
Table I: Distribution of Intelligence According to Occupational Class: Adults

	50–60	60–70	70–80	80–90	90–100	100–110	110–120	120–130	130–140	140+	Total	Mean IQ
I: Higher Professional									2	1	3	139.7
II: Lower Professional							2	13	15	1	31	130.6
III: Clerical				1	8	16	56	38	3		122	115.9
IV: Skilled			2	11	51	101	78	14	1		258	108.2
V: Semiskilled		5	15	31	135	120	17	2			325	97.8
VI: Unskilled	1	18	52	117	53	11	9				261	84.9
Total	1	23	69	160	247	248	162	67	21	2	1000	100.0

Table II: Distribution of Intelligence According to Occupational Class: Children

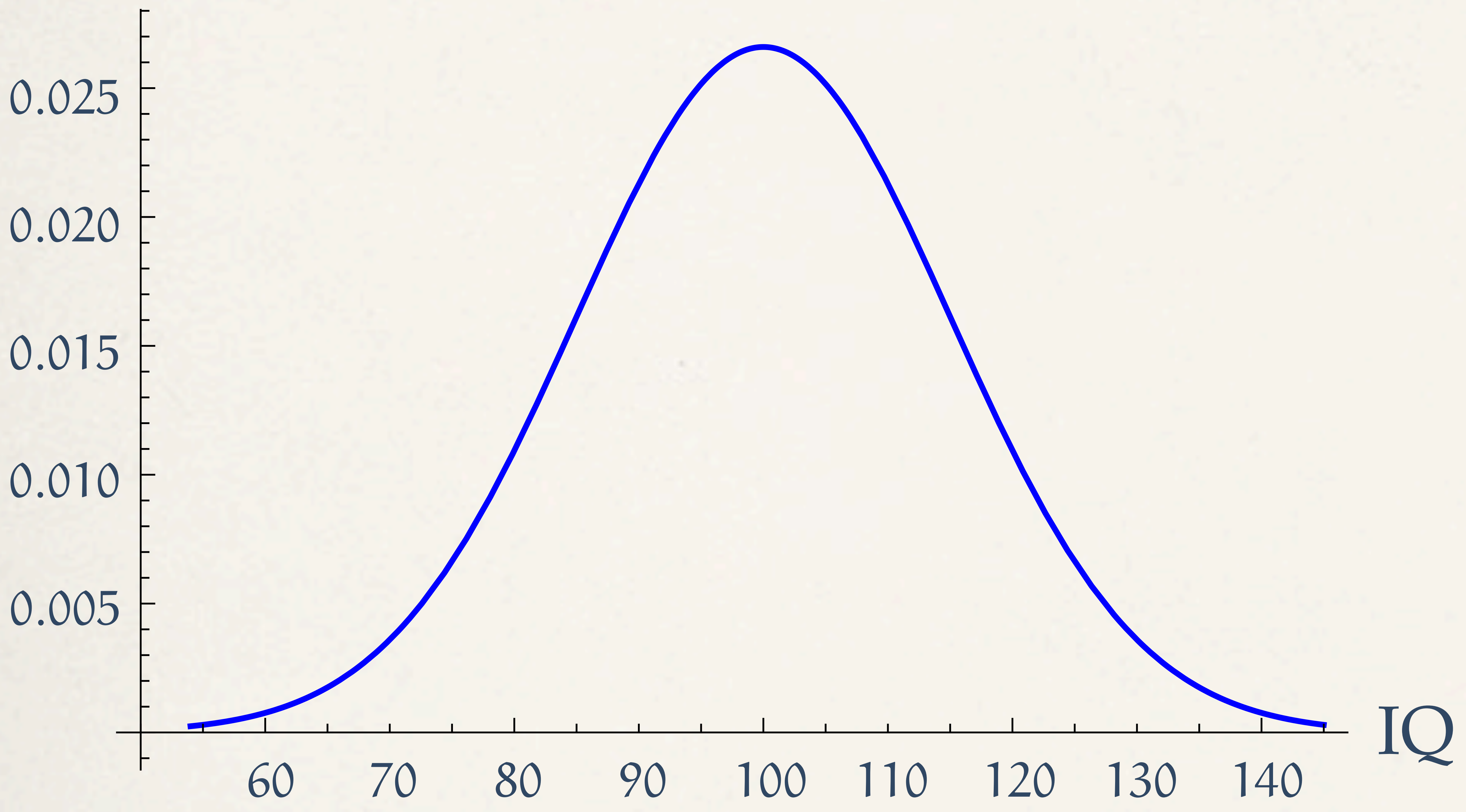
	50–60	60–70	70–80	80–90	90–100	100–110	110–120	120–130	130–140	140+	Total	Mean IQ
I: Higher Professional							1		1	1	3	120.8
II: Lower Professional				1	2	6	12	8	2		31	114.7
III: Clerical			3	8	21	31	35	18	6		122	107.8
IV: Skilled		1	12	33	53	70	59	22	7	1	258	104.6
V: Semiskilled	1	6	23	55	99	85	38	13	5		325	98.9
VI: Unskilled	1	15	32	62	75	54	16	6			261	92.6
Total	2	22	70	159	250	247	160	68	21	1	1000	100.0

Nominal sample size $n = 1000$


Nominal sample size n = 1000
Parent IQ count
Child IQ count
300
225
150
75
0
< 70
70–80
80–90
90–100
100–110
110–120
120–130
> 130

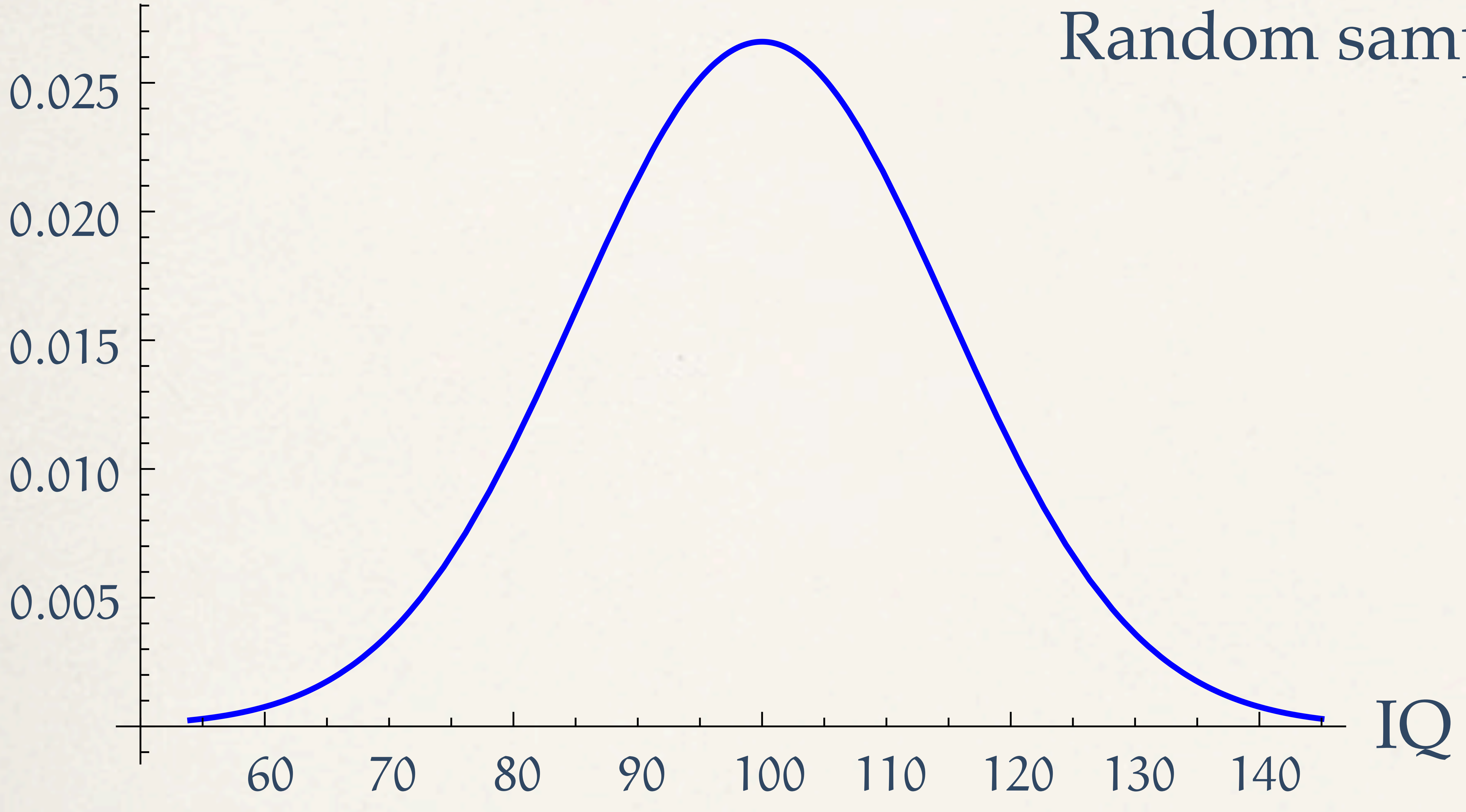
A hypothesised normal distribution of IQs with mean 100 and variance 225

A hypothesised normal distribution of IQs with mean 100 and variance 225



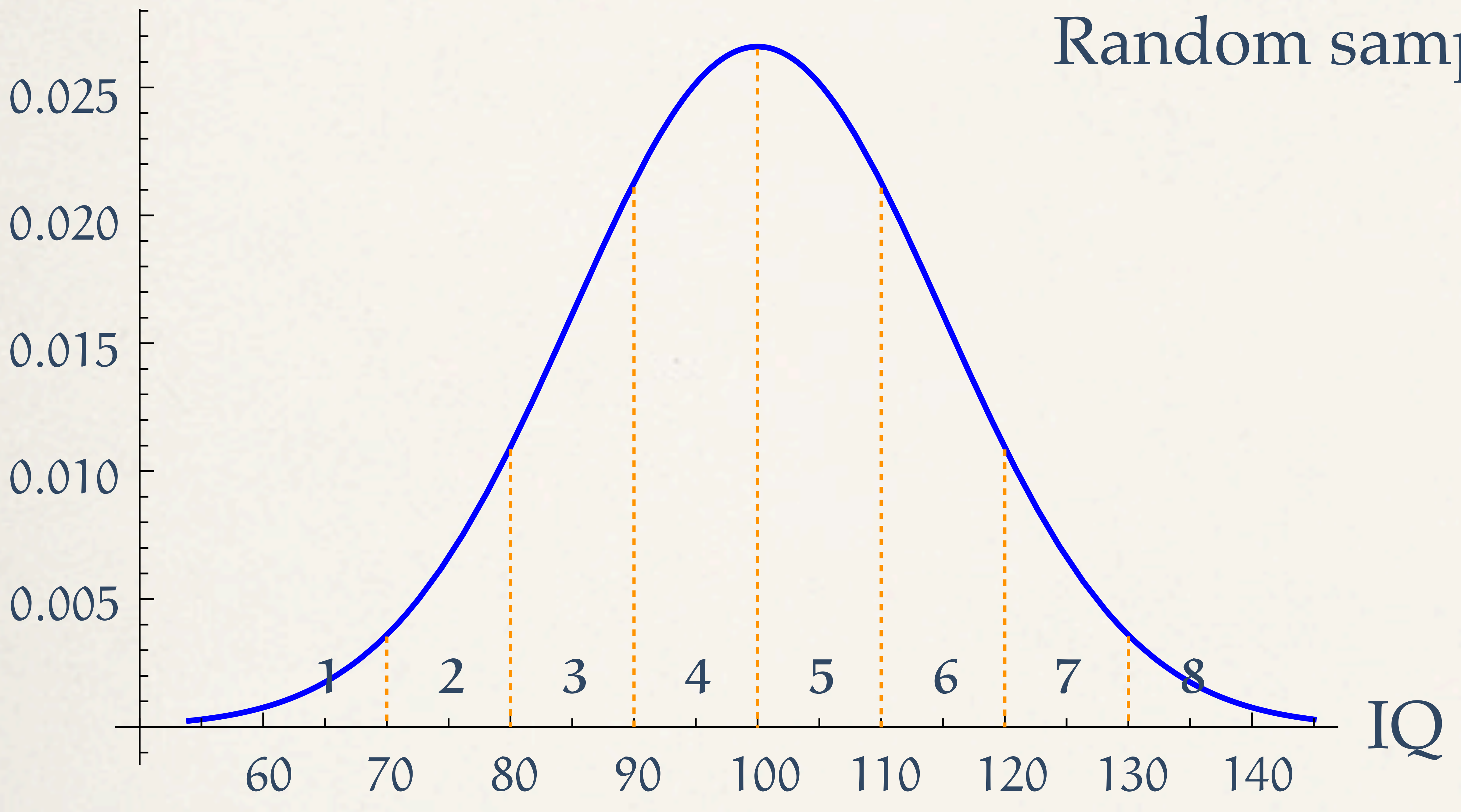
A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$ ($n = 1000$)



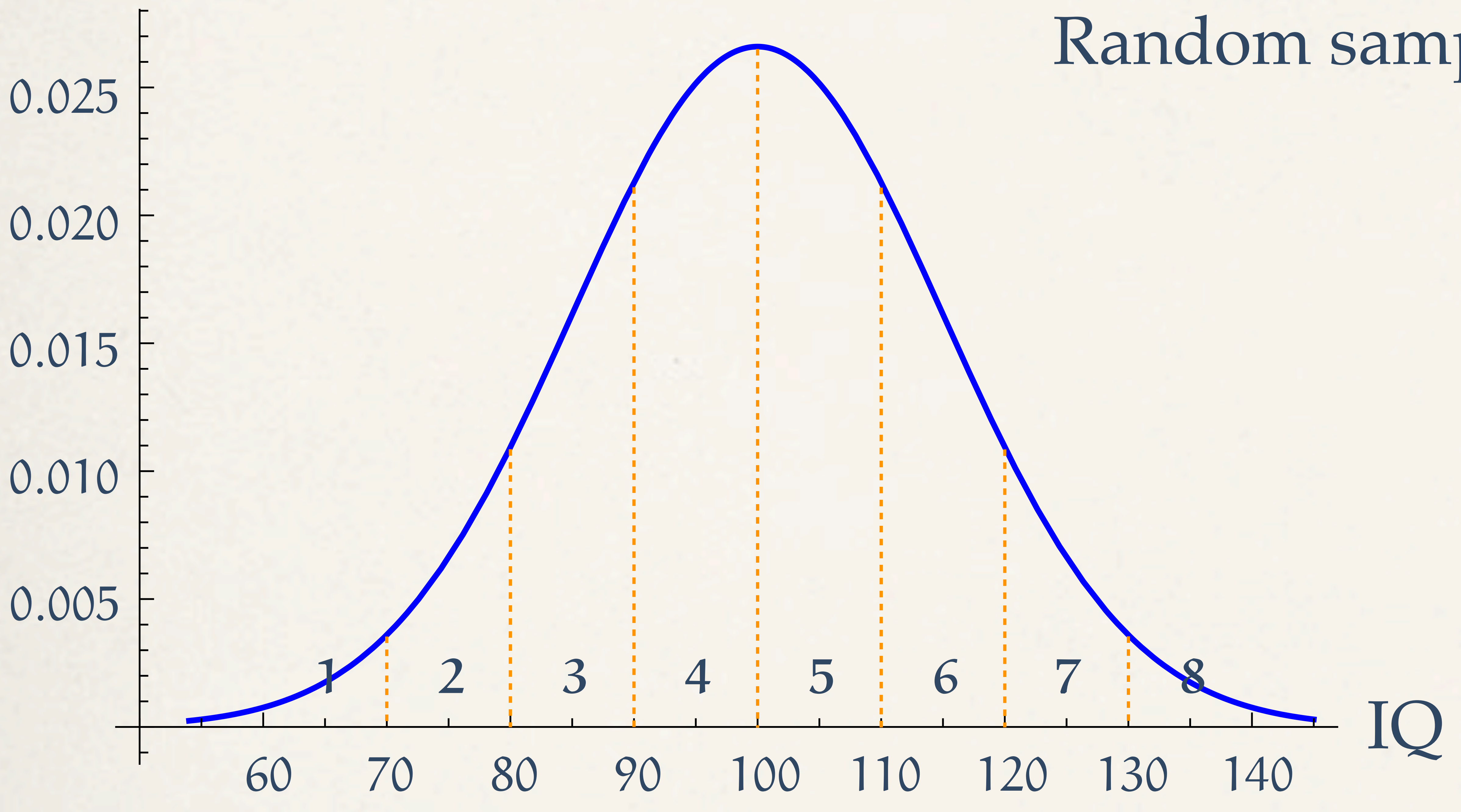
A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$ ($n = 1000$)



A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$ ($n = 1000$)



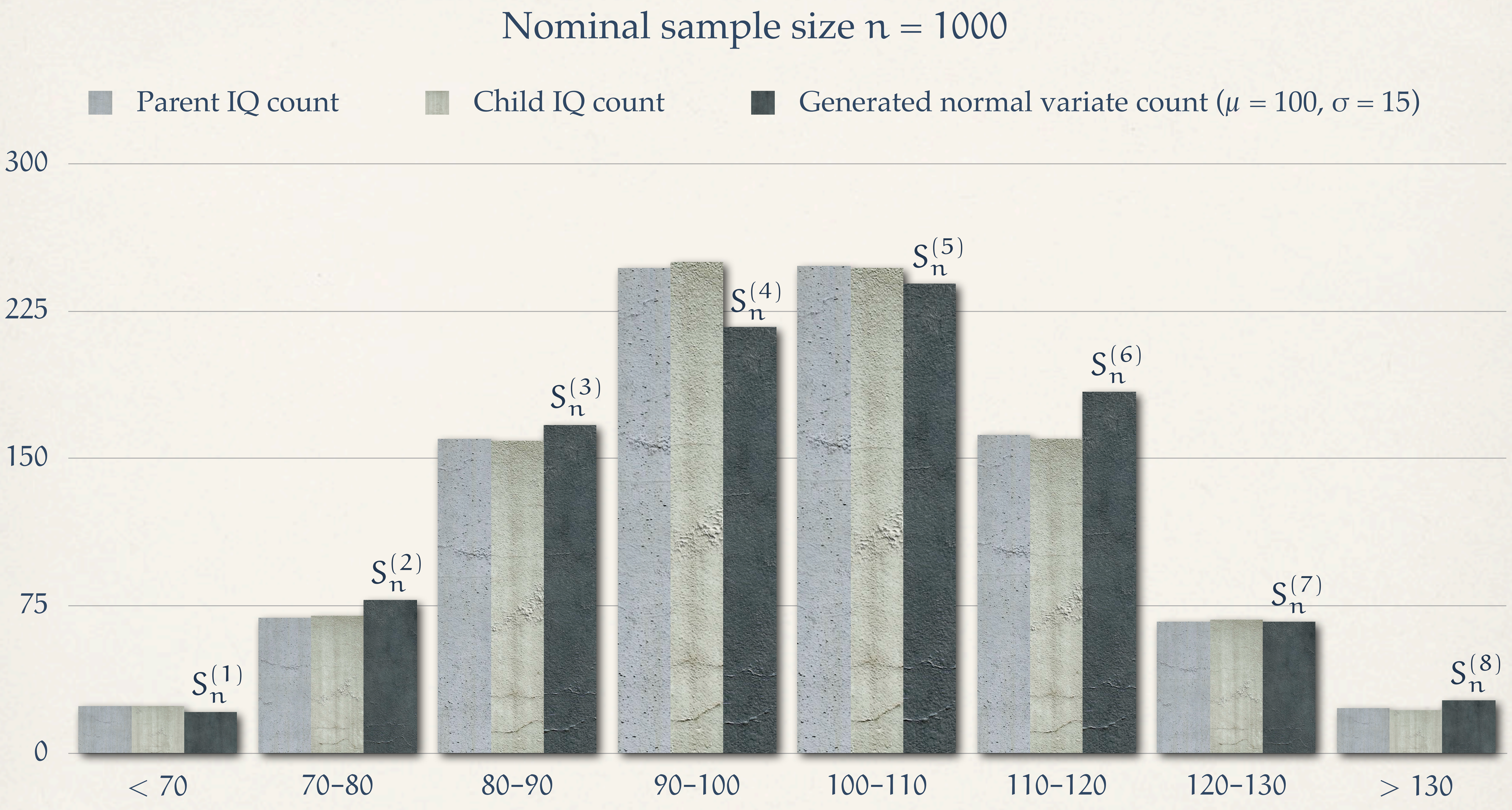
$S_n^{(1)}$:= # outcomes in bin 1 (IQ $\leq$ 70)

$S_n^{(2)}$:= # outcomes in bin 2 (IQ 70–80)

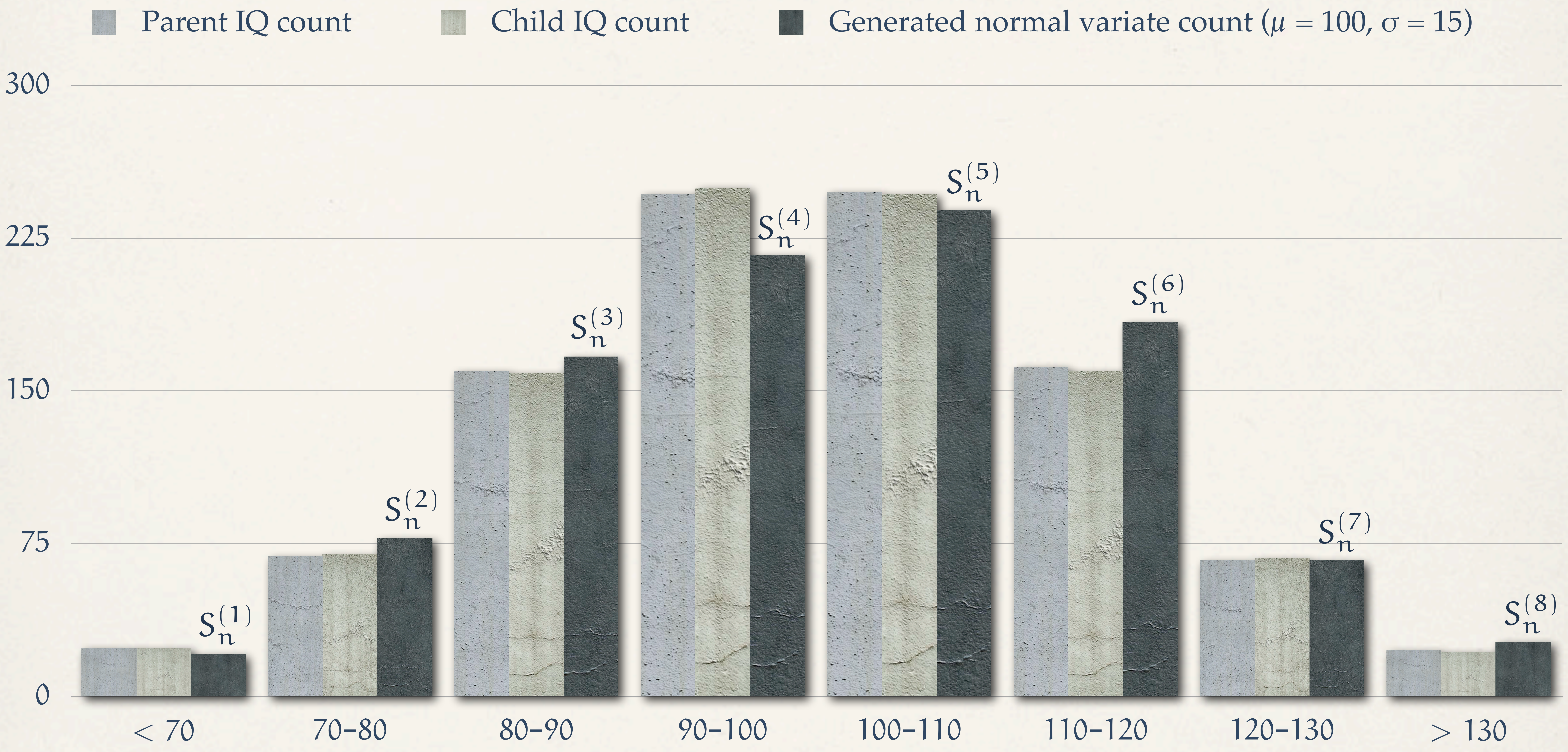
. . . .

$S_n^{(7)}$:= # outcomes in bin 7 (IQ 120–130)

$S_n^{(8)}$:= # outcomes in bin 8 (IQ $\geq$ 130)


Nominal sample size n = 1000
Parent IQ count
Child IQ count
Generated normal variate count ($\mu = 100$, $\sigma = 15$)
300
225
150
75
0
$S_n^{(1)}$
$S_n^{(2)}$
$S_n^{(3)}$
$S_n^{(4)}$
$S_n^{(5)}$
$S_n^{(6)}$
$S_n^{(7)}$
$S_n^{(8)}$
< 70
70–80
80–90
90–100
100–110
110–120
120–130
> 130

Nominal sample size $n = 1000$



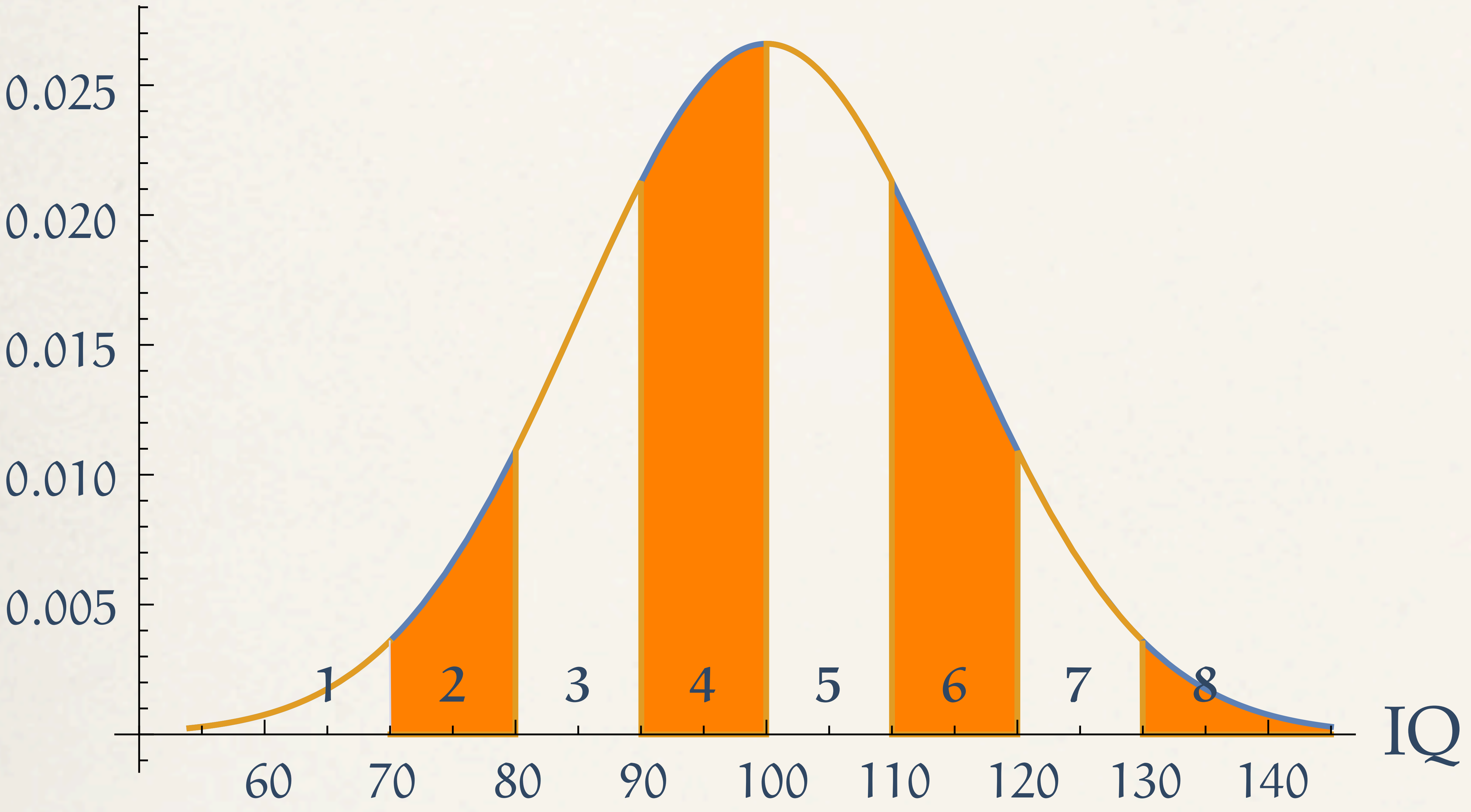
How are the counts $S_n^{(1)}, \ldots, S_n^{(8)}$ distributed?

A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$

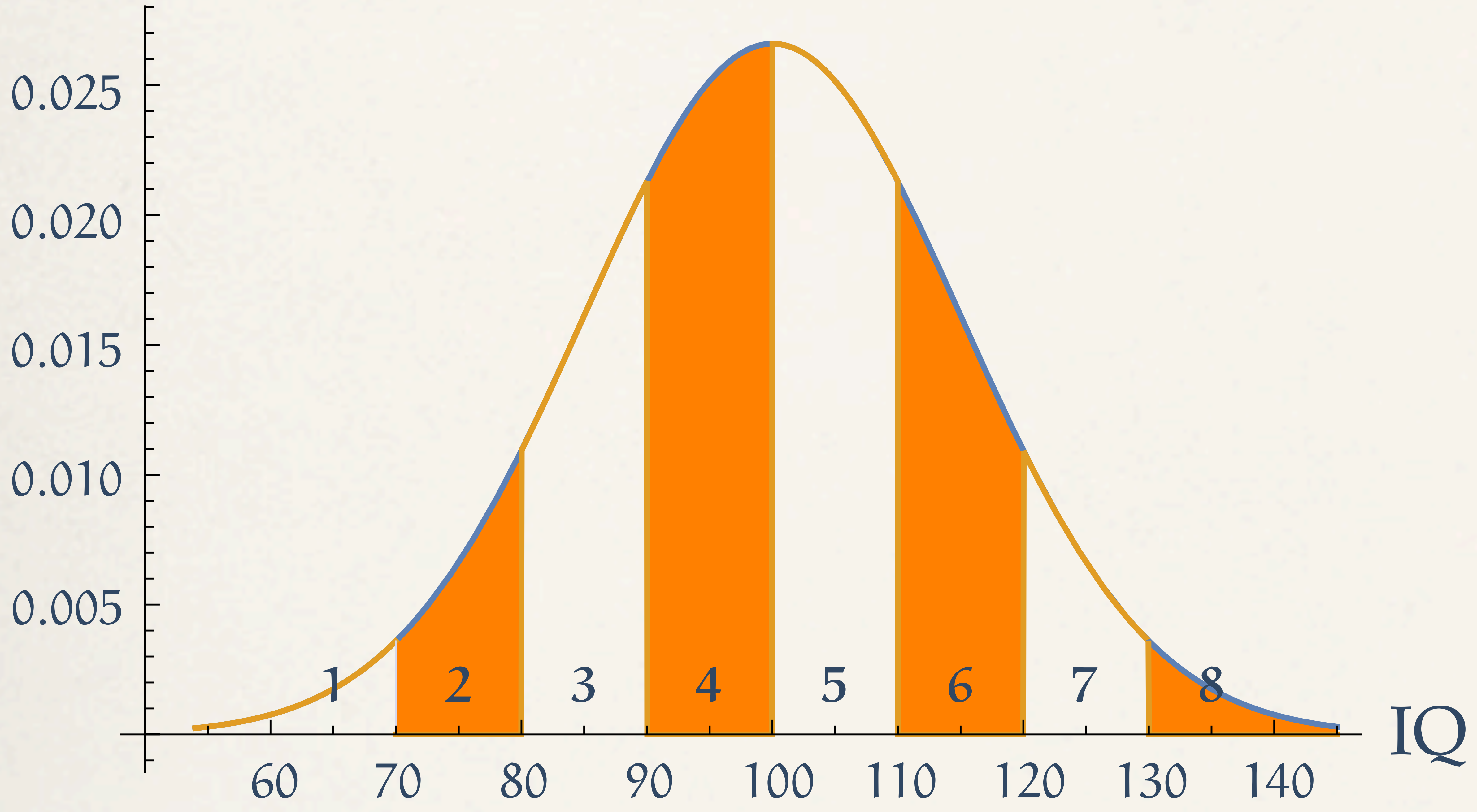
A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$



A hypothesised normal distribution of IQs with mean 100 and variance 225

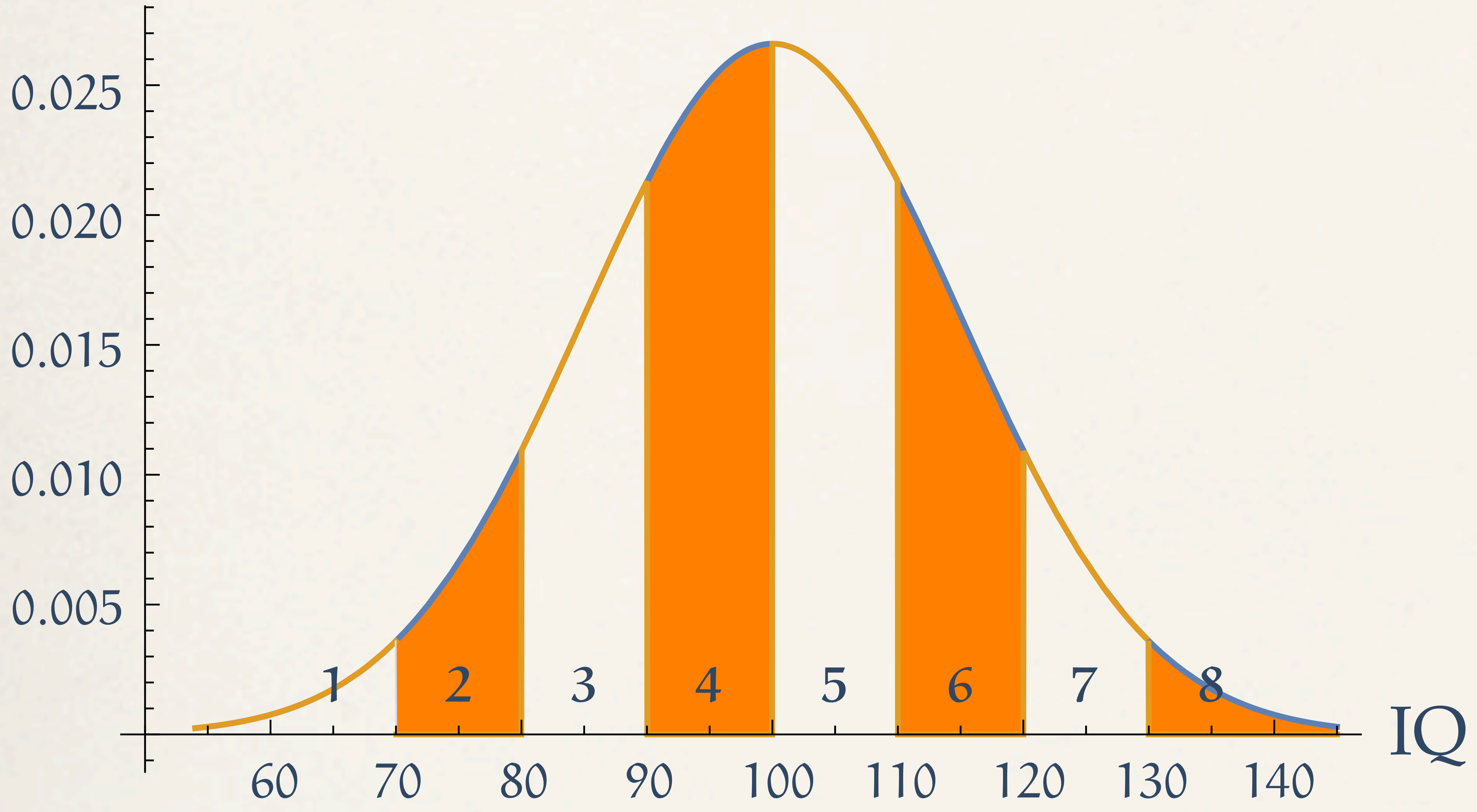
Random sample: $X_1, \dots, X_n$



IQ bins j	< 70 1	70–80 2	80–90 3	90–100 4	100–110 5	110–120 6	120–130 7	> 130 8
Probabilities p_j	0.0228	0.0685	0.1613	0.2475	0.2475	0.1613	0.0685	0.0228

A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$

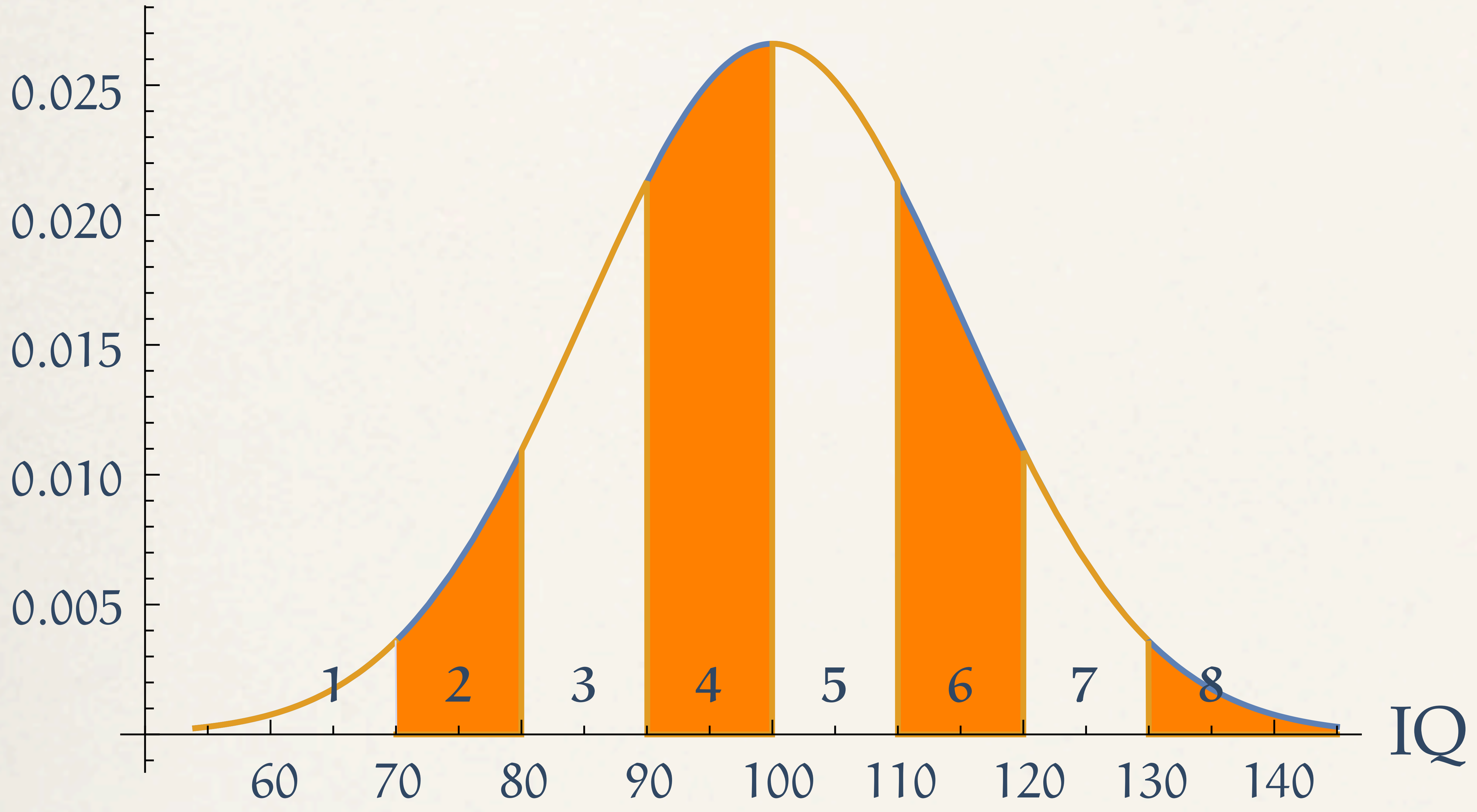


$$S_n^{(1)} \sim \text{Binomial}(n, p_1)$$

IQ bins j	< 70 1	70–80 2	80–90 3	90–100 4	100–110 5	110–120 6	120–130 7	> 130 8
Probabilities p_j	0.0228	0.0685	0.1613	0.2475	0.2475	0.1613	0.0685	0.0228

A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \ldots, X_n$



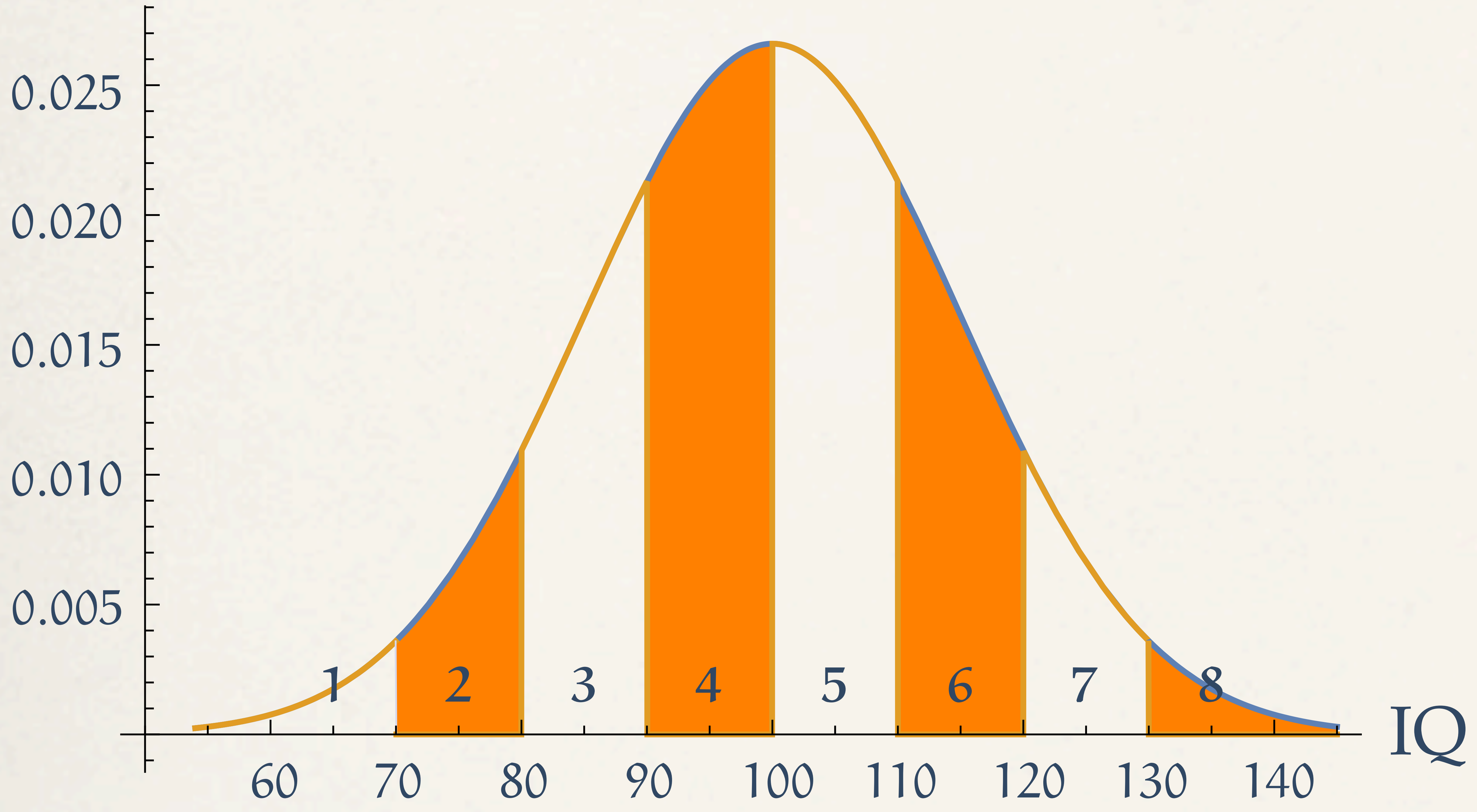
$$S_n^{(1)} \sim \text{Binomial}(n, p_1)$$

$$S_n^{(2)} \sim \text{Binomial}(n, p_2)$$

IQ bins j	< 70 1	70–80 2	80–90 3	90–100 4	100–110 5	110–120 6	120–130 7	> 130 8
Probabilities p_j	0.0228	0.0685	0.1613	0.2475	0.2475	0.1613	0.0685	0.0228

A hypothesised normal distribution of IQs with mean 100 and variance 225

Random sample: $X_1, \dots, X_n$



$S_n^{(1)} \sim \mathrm{Binomial}(n, p_1)$

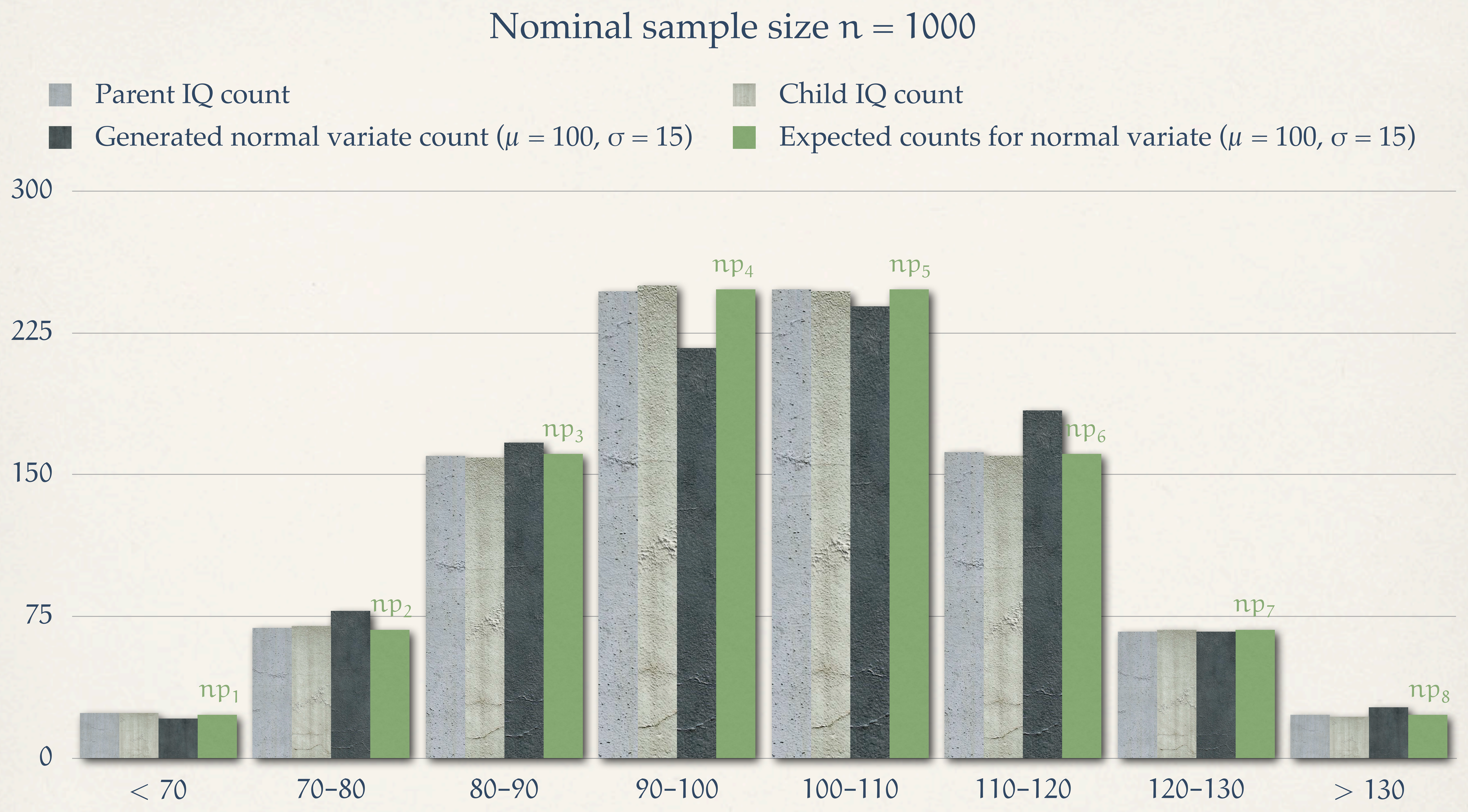
$S_n^{(2)} \sim \mathrm{Binomial}(n, p_2)$

. . . .

$S_n^{(7)} \sim \mathrm{Binomial}(n, p_7)$

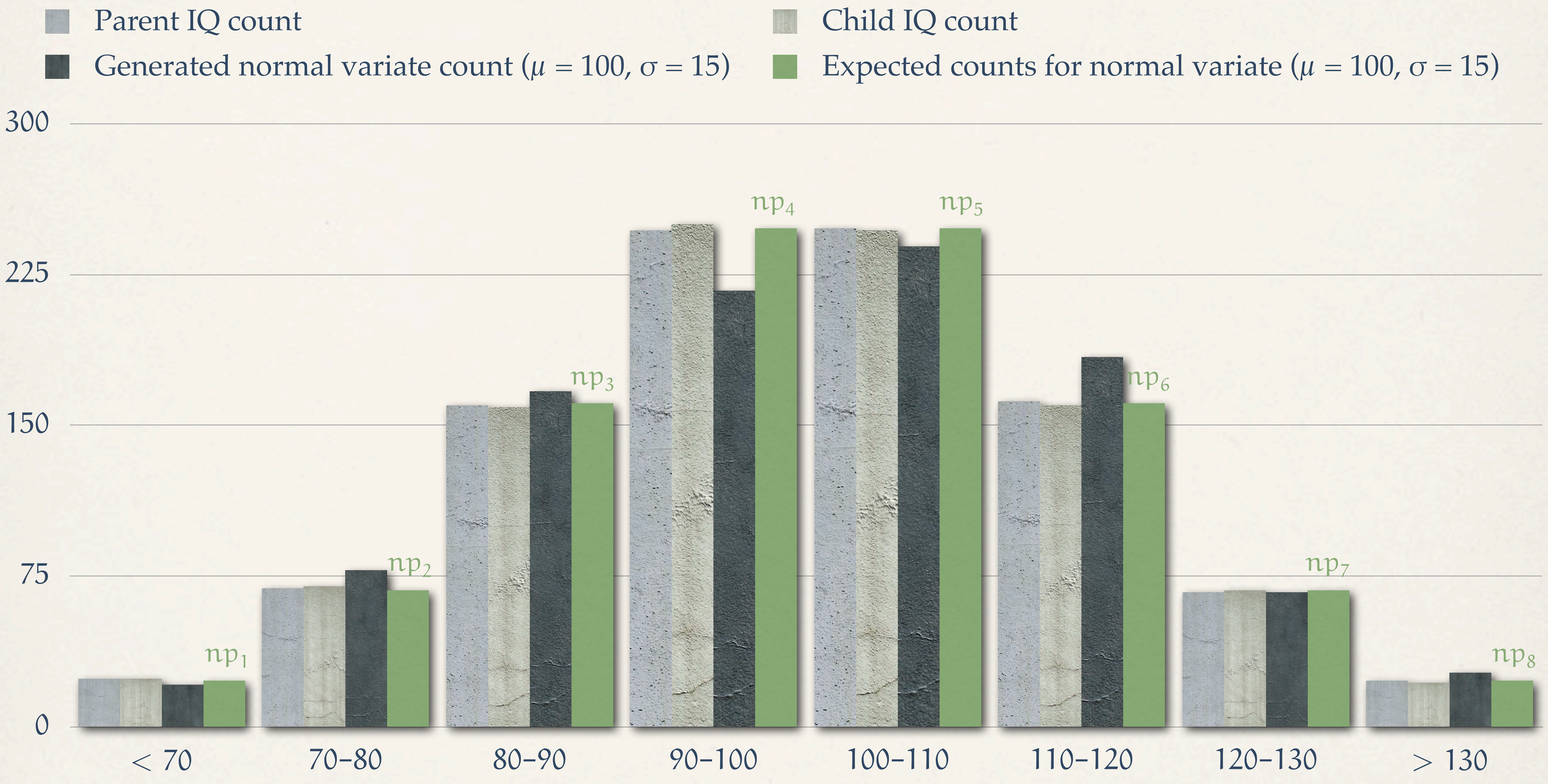
$S_n^{(8)} \sim \mathrm{Binomial}(n, p_8)$

IQ bins j	< 70 1	70–80 2	80–90 3	90–100 4	100–110 5	110–120 6	120–130 7	> 130 8
Probabilities p_j	0.0228	0.0685	0.1613	0.2475	0.2475	0.1613	0.0685	0.0228



Nominal sample size n = 1000
Parent IQ count
Child IQ count
Generated normal variate count ($\mu = 100$, $\sigma = 15$)
Expected counts for normal variate ($\mu = 100$, $\sigma = 15$)
300
225
150
75
0
np_1
np_2
np_3
np_4
np_5
np_6
np_7
np_8
< 70
70–80
80–90
90–100
100–110
110–120
120–130
> 130

Nominal sample size n = 1000



How do the histogram counts compare to the expected values?