

Example 1: Data on Wayne Gretzky's Scoring

Source: www.stat.ualberta.ca/people/schmu/preprints/poisson.pdf

Wayne Gretzky played 9 seasons with Edmonton, scoring 1669 points (goals + assists) in 696 games.

Average number of points per game: 2.398.

Compare data to Poisson with $\lambda = 2.398$.

Points	Games	Expected
0	69	63.3
1	155	151.2
2	171	181.9
3	143	145.4
4	79	87.1
5	57	41.8
6	14	16.7
7	6	5.7
8	2	1.7
9+	0	0.6

Gretzky scored 0 points in 69 games.

The Poisson model predicts that he would score 0 points in

$$(696) \left(\frac{e^{-2.398} (2.398)^0}{0!} \right) = 63.3 \text{ games.}$$

Example 2: Data on radioactive decay of polonium.

Source: D. J. Hand, F. Daly, A. D. Lunn, K. J. McConway, and E. Ostrowski. *A Handbook of Small Data Sets*. London, Chapman and Hall, 1994.

Original Source: E. Rutherford and M. Geiger (1910). The probability variations in the distribution of alpha-particles. *Philosophical Magazine*, Series 6, 20, 698-704.

Total of 10,097 particles decayed over 2608 intervals of length 72 seconds, an average of 3.87 per interval.

Compare the number that decay in an interval to the Poisson distribution with $\lambda = 3.87$.

Number	Observed	Expected
0	57	54.3
1	203	210.3
2	383	407.1
3	525	525.3
4	532	508.4
5	408	393.7
6	273	254.0
7	139	140.5
8	45	68.0
9	27	29.2
10	10	11.3
11	4	4.0
12	0	1.3
13	1	0.4
14	1	0.1

Example 3: Data on palindromes in DNA sequences.

Source: D. Nolan and T. Speed (2000). *Stat Labs: Mathematical Statistics Through Applications*. Springer, New York.

Complementary base pairs: A-T, C-G.

Palindromes: sequence in reverse is the complementary sequence

Example: ACCGCGGT

Reverse: TGGCGCCA

Count palindromes of length 10 or more in DNA of human cytomegalovirus. There are 294 palindromes in 57 intervals of length 4000, average 5.16 per interval.

Number	Observed	Expected
0-2	7	6.4
3	8	7.5
4	10	9.7
5	9	10.0
6	8	8.6
7	5	6.3
8	4	4.1
9+	6	4.5