Paul, next to a football boot with the German flag colours, in his tank

Figure 1: Photograph from Wikipedia article

23 Paul the octopus

Paul the octopus (2008-2010) was born in England but spent most of his life at a Sea Life centre in Germany. He became famous for correctly predicting the outcome of football matches. See Wikipedia for his method of divination, the predictions, and the threats. To be brief, out of 14 predictions, 12 were correct. Can one fairly say that he was clairvoyant? (His predictions made him some friends and some enemies. He was threatened by football fans in Germany and was offered safe passage to Spain by the Spanish Prime Minister.)

In a very simplified model, we consider his predictions as being governed by $B(14, 1/2)$. We apply a 1-tailed hypothesis test.

Null Hypothesis. Paul's predictions are consistent with $B(14, 1/2)$.

Alternative Hypothesis. Paul's successes are too striking to have happened purely by chance.

To investigate this, we inspect the so probability of an outcome being $\geqslant 12$ under the Null Hypothesis (that the predictions are $B(14, 1/2)$) is

k	p_k	$\sum_{j \leqslant k} p_j$
0	0.0001	0.0001
1	0.0009	0.0009
2	0.0056	0.0065
3	0.0222	0.0287
4	0.0611	0.0898
5	0.1222	0.2120
6	0.1833	0.3953
7	0.2095	0.6047

k	p_k	$\sum_{j \leqslant k} p_j$
8	0.1833	0.7880
9	0.1222	0.9102
10	0.0611	0.9713
11	0.0222	0.9935
12	0.0056	0.9991
13	0.0009	0.9999
14	0.0001	1.0000

The probability that Paul's successes can be accounted for by chance is about .066%. **_Significant at the 1% level!_** We accept the alternative hypothesis.