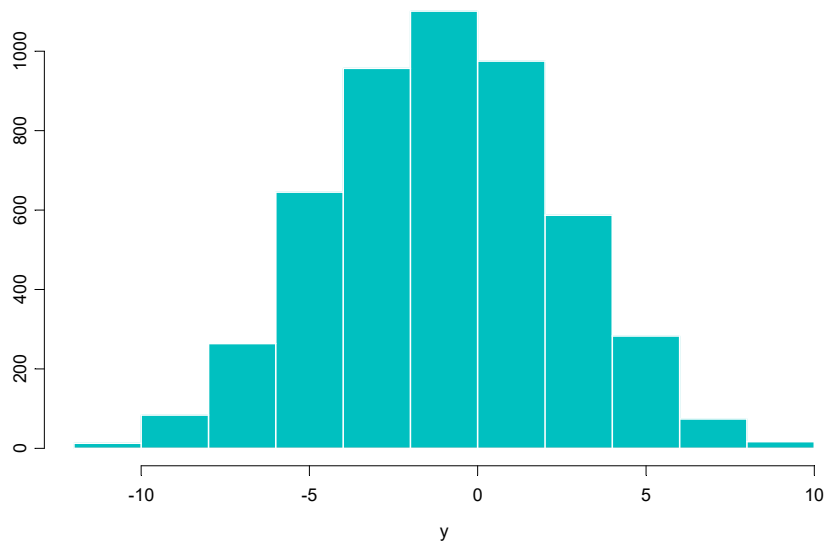# Applications of Statistical Simulation
## (以彈珠模擬常態分配)

1. In typical Taiwan night-markets, we can find 彈珠 game and you will have bigger prizes if there are many or a few holes with balls. It is proved by a statistician that if the number of pins is large enough then the location of the ball would be approximately normal.

Histogram of marble games (12 pins and 5,000 runs)



Note that we cannot use Kolmogorov-Smirnov test to check the normality since the distribution is discrete, and we need to use chi-square test. Of course, the number of pins is critical to the result being normal.

*Question: What would influence the approximation?*

2. Suppose we want to know the probability of getting a big prize. Assume that there are 15 holes, 15 balls and 15 pins. If we get the big prize when there are 1, 2, 14, and 15 holes totally, estimate this probability.

*Question: If we don't drop the balls from the center, where shall we drop them and what is the maximum winning probability?*