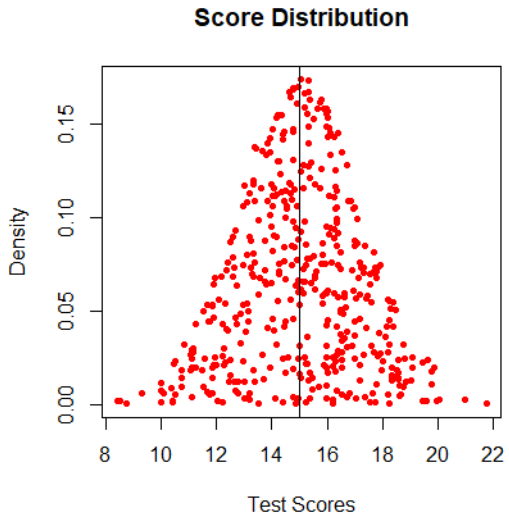
Sample Question to Demonstrate the Normal Nature of Researcher-Made Tests

Question: Suppose mastery of a second language's article system can be measured by 15 researcher-made questions that are each worth up to 2 points (i.e., partial credit is allowed), what could be a likely distribution for overall article knowledge test scores (i.e., sum of 15 questions) of 5000 research participants taking the test?

Find a visual answer in R (see interactive figure HERE):

```
source("https://raw.githubusercontent.com/rnorouzian/m/master/qs.r")
add.norm(n.test.taker = 5000, n.question = 15, pt.worth = 2)
```



Explanation: Think of each test taker as being able to obtain any equally possible points (from 0 to 2 including any possible partial credit e.g., 0.25 etc.) on each question which when added together leads to an overall article knowledge test score for that test taker. Additive phenomena (e.g., sum of 15 questions' point worth) in nature tend to cluster heavily around their average when we study them in large groups (the scientific reason is not exactly clear, see Breiman, 1968). That is, although extremely high or low realizations (e.g., high or low article test scores) of that phenomenon are possible, mid-level realizations (e.g., mid-level test scores) often occur more frequently than others. Because of normal distributions' symmetrical shape, the average overall article knowledge test score among all test takers is simply the midpoint of the lowest (i.e., 0) and the highest (i.e., 30) possible overall test scores (i.e. overall article knowledge test score = 15). Overall, due to the test's additive nature, most likely, the distribution of overall article knowledge test scores across all test takers is going to be normal centered at a mean of 15 (see figure above).

Reflection: In the absence of any other evidence, if a phenomenon in second language research may consist of addition of some measurable subcomponents, it is likely for that phenomenon to have a bell-shaped, normal distribution when studied in a large group (i.e., population).