1. The scientific questions should drive the analysis chosen. A statistical model is a model for the experiment. The statistical framework = the experimental framework.

2. Quantifying variation is central in statistical practice.

3. Asking questions at the design stage can save headaches at the analysis stage: careful data collection can greatly simplify analysis and make it more rigorous.

4. Once the data have been wrestled into a convenient format, have a look! Tinkering around with the data, also known as exploratory data analysis, is often the most informative part of the analysis. Exploratory plots can reveal data quality issues and outliers. Simple summaries, such as means, standard deviations, and quantiles, can help refine thinking and offer face validity checks for hypotheses.

5. The scientific context is critical, and the key to principled statistical analysis is to bring analytic methods into close correspondence with scientific questions. At the same time, a structured algorithmic approach to the steps in your analysis can be very helpful in making this analysis reproducible by yourself at a later time, or by others with the same or similar data.

6. Keep in mind that good design, implemented well, can often allow simple methods of analysis

to produce strong results. Simple models help us to create order out of complex phenomena, and simple models are well suited for communication to our colleagues and the wider world.

7. A basic purpose of statistical analysis is to help assess uncertainty, often in the form of a standard error or confidence interval, and one of the great successes of statistical modeling and inference is that it can provide estimates of standard errors from the same data that produce estimates of the quantity of interest. When reporting results, it is essential to supply some notion of statistical uncertainty. A common mistake is to calculate standard errors without taking into account the dependencies among data or variables, which usually means a substantial underestimate of the real uncertainty.

8. It is therefore important to understand the assumptions embodied in the methods you are using and to do whatever you can to understand and assess those assumptions. At a minimum, you will want to check how well your statistical model fits the data. Visual displays and plots of data and residuals from fitting are helpful for evaluating the relevance of assumptions and the fit of the model

9. The only truly reliable solution to the problem posed by data snooping is to record the statistical inference procedures that produced the key results, together with the features of the data to which they were applied, and then to replicate the same analysis using new data. Independent replications of this type often go a step further by introducing modifications to the experimental protocol, so that the replication will also provide some degree of robustness to experimental details.

10. One can dramatically improve the ability to reproduce findings by being very systematic about the steps in the analysis (see Rule 5), by sharing the data and code used to produce the results.