Weaver, W. [1948]. "Science and Complexity". American Scientist, 36(4): 536-44.

**Key Points**

- Up into the 1900's, physical science dealt with very simple problems ("problems of simplicity") that had very few moving variables. Life sciences, because of the complexity of the problems, was stuck at the observation and recording state and was not moving forward as much as physical science.
- There are three different types of problems, and gave a very good pool table example.
    - Simple problems, having a small number of variables. Imagine predicting the motion and speed of one pool ball on the table.
    - Organized, complex problems, having many variables. Imagine predicting the final state of all pool balls after a break.
    - Disorganized, complex problems. Imagine 100,000 pool balls constantly moving around the table. You become less concerned with specific pool balls and can use statistics and probability to answer questions!
- Warren says that we are really good at solving simple problems. We have the tools (statistics, probability) and are pretty good at solving disorganized, complex problems. Where we need to improve is solving organized, complex problems.
- What makes these "problems of organized complexity" difficult is that there can be many variables which are all "interrelated into an organic whole."
    - Example: rush hour traffic. The exact timing of rush hour depends on a whole host of factors, including but not limited to the following: when every company ends its own workday, if any ramps or exits are closed for construction, an accident occurring with a variable number of lane closures, popularity of carpooling.
- This problem occurs in a space where neither simple experiments (for simple problems) nor statistical techniques (for disorganized, complex problems) alone cannot yield the answers.
- Two things come to the rescue: computers and operations analysis.
    - Computers can be programmed and act more like the human brain which much greater speed for crunching numbers and iterating over data.
    - Operations Analysis, or "mixed-teams," which is an interdisciplinary group that comes together to solve problems outside of a regular domain silo.
- Science, with these its new tool (computing) and a new method (operations analysis), can begin to solve these "problems of organized complexity."

**Personal Take**

The paper is a high-level overview of different types of problems and the history behind how science has approached each type of problem differently. I enjoyed the rich examples woven throughout the ideas that Weaver covers – they helped explain key concepts in a very informative fashion. Reaching the last section of the paper, one key finding dawned on me: this paper lays out a great case for informatics as a discipline, specifically its strength as being a multi-disciplinary approach to solving problems using computers.

Personally, I think that there is still much work left to be done on the collaboration front, specifically related to the sharing of data between organizations. Specifically, in my area of interest (data science for emergencies, disasters, and public safety) it can be challenging to attain data sets from different organizations due to privacy, legal, and safety concerns. Data ownership and control can definitely be a hindrance to a mixed-team approach in this area.