Statistical Research and Reading Statistical Papers

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Transition to Research – Your Research!

- **Q**: How does one "do" research?
  - Strategy
  - Process
  - Key elements
- **Q**: How does one "digest" literature?
  - Be clear about purpose (I usually have only one goal)
  - Match depth to goal

Hamada and Sitter (2004)

- "...doing research is a **creative** process, there is no one way or right way of doing it; you need to discover what strategies work best for you."
- PJH: It is also a **strategic** process...
- Transition from "being taught" or "searching for a correct answer" to asking questions like:
  - ▷ Why is it done this way?
  - ▷ Why isn't it done another way?

Hamada and Sitter (2004)

- From L.J. Savage via F. Mosteller:
  1. As soon as a problem is stated, start right away to solve it; use simple examples.
  2. Keep starting from first principles, explaining again and again just what it is you are trying to do.
  3. Believe that this problem can be solved and that you will enjoy working it out.
  4. Try other problems in the neighborhood.
  5. Work an hour or so on it frequently.
  6. Talk about it; explain it to people.

Hamada and Sitter (2004)

- **Q**: How do I start?
  - ▷ "We think motivation is important. Thus, you should work on something that interests you. For us, working in a new application area not previously considered by statisticians has many benefits; new statistical problems are likely to arise so that any advance you make is likely to be a contribution. In general, solving real problems that have data provide valuable motivation."

Motivation from Applications

Hamada and Sitter (2004)

- Identifying Relevant Work (later today)
- Digesting the Literature
  - Look for ideas and the types of problems in the research area.
  - "Look for discussion of the ramifications of theorems rather than wading through the details of their proofs."
  - Read abstracts, introductions, and conculsions as you sort your way through..."
  - Only **sometimes** read in depth (repeat!).

Murphy (1997)

- Focus on **why** you are reading the article. "A statistician has three basic reasons to read an article:"
  - "General interest"
  - "Relevance to a particular application"
  - "Broader knowledge of a specific statistical method"
- **Q**: Do you agree with these?

Murphy (1997)

- State the Problem in Your Terms
  - Read abstract, introduction, and discussion so that you can state the problem in your words.
  - Find a Similar Problem
  - Apply the Problem to Data
  - Separate Theory from Technical Details of Execution
  - Read. Reread with updated goals. (repeat!)

Summary

- Research is a **creative** process.
- Efficient research is **strategic**.
- Scientific **motivation** is essential.
- Your **motivation** is necessary!