THAT'S SO UNFAIR! STATISTICS ETHICS CASE STUDIES FOR INCREASING ENGAGEMENT IN STATISTICS EDUCATION

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"THANK YOU!"

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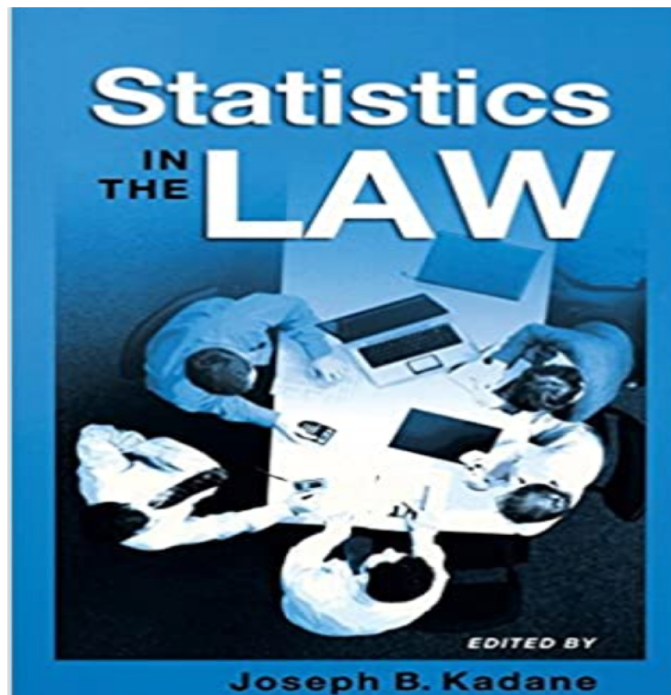# STATISTICS AND DATA SCIENCE (SDS)

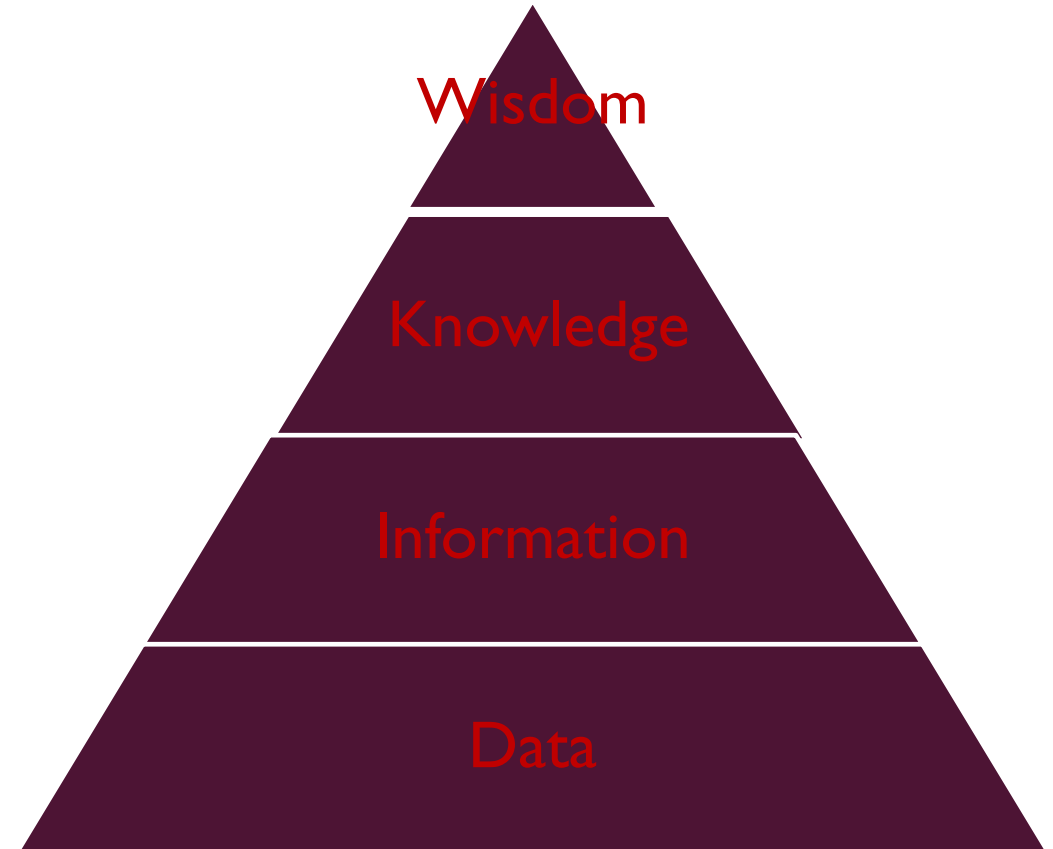Individual rights   Fair outcomes   welfare   community benefits   loyalty

SOME ASSUMPTIONS

Bioethics & Criminal Law use SDS to help make ETHICAL decisions; SDS uses ethics to help make better quantitative decisions

does not always equal higher achievement

Wisdom

Knowledge

Information

Data

STORIES ARE AWESOME, BUT…

Abundance of information imposes a heavy cognitive load for:

- Reading and comprehending story narrative **+**

- Breaking down story-features and elements **+**

- Holding all relevant material in working memory **+**

- Doing all of the above for both quantitative AND ethical material **=**

   A RECIPE FOR HIGH ENGAGEMENT, LOW LEARNING

Two different learners can go vastly different ways with story narrative meaning and purpose

LEARNING SCIENCES PRINCIPLES ALLEVIATE COGNITIVE LOAD

- Shorter, focused, themed case studies with
  - With worked examples
  - Case commentaries
- Guided discovery
  - Through deliberate, spaced, repeated practice
- Assessment and feedback
- Progressive removal of instructional scaffolds
  - Using increasingly complex cases
  - Demanding more learner autonomy

- Separating instructional from learning strategies
  - Instruction: what the instructor does
  - Learning: what the learner does

- Teach efficacious generative learning strategies:
  - Summarization
  - Self-testing
  - Self-explanation
  - Imagination and role-immersion

REASON, INTUITION, OR BOTH?!

REASON

Many popular ethical decision-making frameworks:

- Laura Nash's 12 questions
- Kidder's ethical checkpoints
- Army-Baylor 7-step model
- Foursquare protocol
- Lonergan/Baird method
- All cost time, people, energy

INTUITION

But my gut feeling says…

- Availability heuristic
- Recency heuristic
- Anchoring heuristic
- I could go on and on…

CHOOSE BOTH AND ENGAGE
MORAL DUAL PROCESSING

PUTTING IT INTO PRACTICE

The best case studies will consider course level, student experience and ability, SDS domain, etc.

Value-added modeling in teacher performance evaluations.

Model assumptions and selection => SDS ethics.

Don't have access to worked examples? No problem:

Box I. A Value-Added Model for a Given Subject, Grade, and Year

$$Y_{ti} = \zeta + \lambda Y_{0i} + \beta' X_i + \sum_{l(district)} \sum_{k(school)} \sum_{j(class)} \left\{ \alpha_{jkl}^{class*} I_{Cijkl} + \alpha_{kl}^{school*} I_{Sikl} + \alpha_l^{district*} I_{Dil} \right\} + \varepsilon_i$$

Posttest | Pretest | Student Characteristics | True Total Classroom Effect | True Total School Effect | True Total District Effect | Stud. Error Term | Classroom Participation Indicator | School Participation Indicator | District Participation Indicator

- Use peer professors (can I buy you a cup of coffee?).

- Do the homework beforehand and identify the dilemmas and underlying root causes, if possible.

- Prepare a logically reasonable defensible argument and another based on heuristics and biases.

- Let the students practice.

- Assess them, even for minimal points.
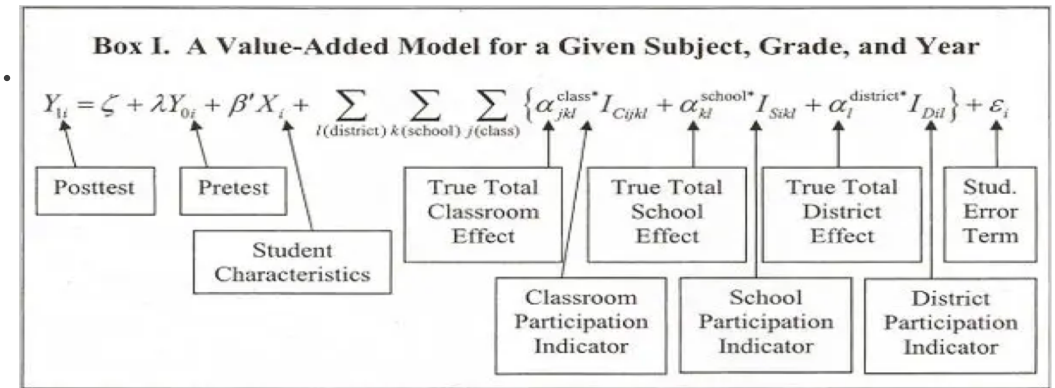
SUMMARY AND RECAP

Recall Professor Roxy Peck's 4 Cs:

- Context (within SDS initiatives)

- Communication (about values)

- Connections (that are culturally relevant)
- Commitments (such as promoting justice)

Heed Dr. Hilary Parker's Call to go beyond:

- Technical analysis

- Derivations

- Proofs

And explore other fields (design=YES; ethics=YES)

Training and educating the future SDS professional needs to embrace a deliberate progression:

Unconscious Incompetence → Conscious Incompetence → Conscious Competence → Unconscious Competence

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