

## How to Talk about Statistics

...to **Smart People** who don't know the difference between an **Odds Ratio** and an **Odd Fellow**

Sandy Weisberg,  
revised by Aaron Rendahl

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## The Sovereign Grand Lodge Independent Order of Odd Fellows

- Social and mutual-aid society started in 17th century England to "...benefit all mankind in Friendship, Love and Truth."
- Established in the US in 1819.
- Included women, an innovation, in 1851.
- Established homes for senior members and for orphaned children; still runs nursing homes.

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## Odds Ratio

### 1974 New York Births

	Dead	Alive	Total
Low Birth Weight	618	4597	5215
Normal Birth Weight	422	67093	67515
Total	1040	71690	72730

$$\text{Odds ratio} = (618/4597) / (422/67093) = 21.4$$

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## Odd Fellows and Odds Ratios

- Odd fellows, and groups like them, seek to help themselves and others, thereby repairing the world.
- Odds ratios, and other statistical methods, can help us understand the way the world works.
- This knowledge should be used by us to repair the world.

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## Michael Ball

a “human rights  
statistician”



- testified against (and was cross examined by) Serbian dictator Slobodan Milosevic
- helped show ethnic cleansing in Kosovo
- has also worked in South Africa, Haiti, Guatemala, East Timor, and Peru

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## Communication is Important...

*But difficult!*

- You all have experience communicating with non-statisticians already.
- What are some of your tips?  
verbal? non-verbal? written?
- Think – Pair – Share

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## Good Advice from Famous People

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## Michael Faraday, 1791-1867



- British *natural philosopher* and experimentalist who did pioneering work in electricity and magnetism, including the principles behind the electric motor.
- Little formal education, apprenticed to a bookbinder at age 14. He read what he bound!

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Faraday's magneto-spark apparatus

- As a teenager, he wrote notes for lectures by prominent chemist Humphry Davy, which led Faraday to be appointed assistant at the Royal Institution at age 21 in 1813.
- In 1821, Faraday became Superintendent of the House at the Royal Institution, where he worked most of his life.

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Faraday lecturing, 1855 Christmas lecture. The audience included Prince Albert and the Prince of Wales

- In 1827-1861, Faraday gave **123** lectures for the public.
  - In addition, he gave **19** Christmas Lectures for youth.
- Lectures for *non-specialists* ranged over chemistry, electricity, and other topics in *natural philosophy*.

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## Faraday's rules

- “Never repeat a phrase”
- “Never go back to amend”
- “If at a loss for a word, not to *ch-ch-ch* or *eh-eh-eh*, but stop and wait for it. It soon comes, and the bad habits are broken and fluency soon acquired.”
- “Never doubt a correction given to me by another”

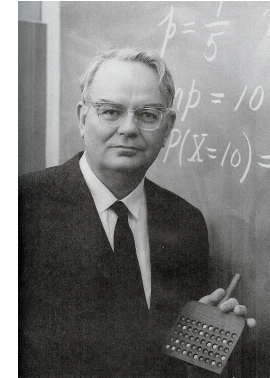
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## Frederick Mosteller, 1916-2006

- American statistician and *scientific generalist*, inheritor of the *natural philosopher*.
- Student of S. Wilks (and J. W. Tukey) at Princeton around WW II.
- At Harvard from 1946



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## Stuff Fred did

- President of ASA, IMS and AAAS
- Chair of Departments of Social Relations; Statistics; Biostatistics; Health Policy and Management (Harvard record?)
- ...also Law, Applied Mathematics, Kennedy School of Government
- Continental Classroom, 1960-61
- Emphasis on statistics in K-12 education

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## Prof. of Mathematical Statistics

- **57** books, monographs, textbooks, reports and commissions, almost all co-authored, often with non-statisticians, mostly public policy.
- About **200** papers, from very theoretical, to very applied, for many audiences.

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## *Statistical Problems of the Kinsey Report...* (with J. W. Tukey & W. G. Cochran), 1954

- Public policy issues
- Sampling issues (Kinsey used “no detectable semblance of probability sampling ideas”)
- Survey design

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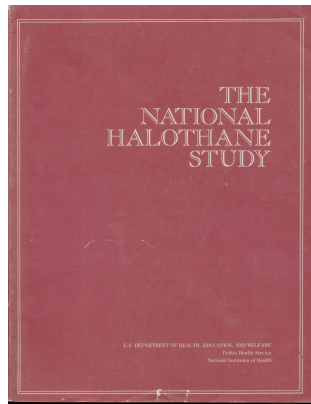
## From the *Kinsey* study...

- “Begin your criticism with a compliment. Remember this fellow has a lot of time invested in this enterprise, and if you are going to get him to change what he is doing, you need to convince him that you are on his side.”

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- Halothane is an anesthetic: does it cause excess liver damage?
- Randomized trial *versus* observational design (politics and hysteria)
- Very rare events imply a very large study
- Log-linear models invented

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## Mosteller's Rules (as Sandy remembers them)

- Always bring your own chalk.
- Always have a plan in case of equipment failure or other disaster.
- Never blame the audience.
- Use physical demonstrations.
- Date everything. Put your name on everything.
- NEVER (**ever**) speed up!

"Classroom and platform performance," *The American Statistician*, 34 (1980): 11-17; *A Statistical Model*, Appendix to Chapter 7.

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## Sandy Weisberg

- Ph.D. from Harvard, Fred Mosteller, advisor
- Professor at UM “for an incredibly long time” and Director of Consulting Service
- Wrote “Applied Linear Regression,” a standard regression text, in third edition
- Lots of teaching and consulting, including for government agencies and court cases

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- The Newport (Minn.) Resource Recovery (garbage burner) opened in 1986, but planning for it began earlier.

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## The Law

- “... [T]he County may require owners of real property to pay volume or tonnage-based fee[s] for waste management services provided by the County or by persons under contract to the County.”

Resolution 85-569  
Ramsey County Board of Commissioners

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## Statistical Issues

- HOW MUCH garbage is produced?
- WHO produces it?
- **Data collection** Via survey: Who? How? What to ask?
- **Prediction** of properties not surveyed.
- **Telling** Different people need different information

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## People involved

- County technical staff (public policy experts with engineering background)
- Student recommended by me to do the survey (and dumpster-diving)
- Info needed from County Assessor (20 minutes work, 6 months real time)
- County Commission

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## Talking to public officials

- Public officials can have a **low opinion** of people with technical expertise because of fear and distrust, poor communication, and bad product design.
- **Surprise them!** Use good graphs. Be smart with tables (digits, arrangement). Minimize/eliminate jargon. Emphasize the relevant. Answer important questions.

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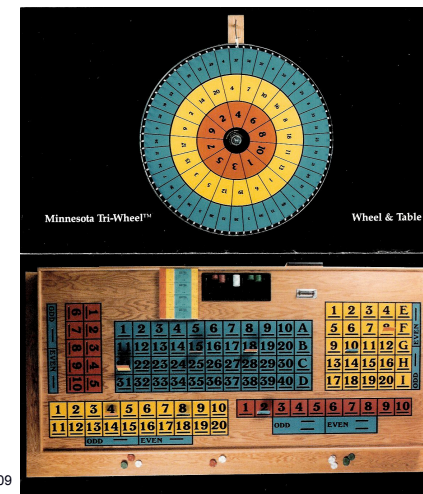
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## Gambling in Minnesota

- FY 2004 Gambling receipts:
  - Casinos: \$5-10 Billion?
  - Lottery: \$0.4 Billion
  - **Charitable**: \$1.4 Billion
- 93% from pulltabs
- 1.2% (\$18 million) from “chance” games
- Operators **steal** with chance games!



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## Lawyers and juries

- Good lawyers seem to be slow, methodical, and dull, but are really just careful.
- Document everything. Check everything. Take nothing on faith. Read articles. Learn jargon.
- Tell the truth (harder than it sounds).
- Testifying before a jury or a judge is not like teaching or scholarly talks.

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## Weisberg's Rules

- **Listen.** Be respectful. Body language counts.
- Don't pretend you know more than you do. Ask questions. Let others teach you.
- There are no stupid questions – statistics is **threatening and alien** to many people.
- Answer the questions that **should have been asked** as well as those that were asked.
- **Different people may need different answers** to the same question.
- Never underestimate your impact on others.

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## Weisberg's Rules (concluded)

- Theory, analysis, and communication are all important, and in **the long run communication may be the most important.**
- **Apart from this class, you probably won't learn communication skills in a stats graduate program.**

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### References

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5. Michael Faraday:
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  - b. Apparatus: <http://www.rigb.org/rimain/heritage/faradaypage.jsp>
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