data-ppf.github.io 2021-02-09

lecture 5 of 14: intelligence, causality, and policy

chris wiggins + matt jones, Columbia

logistics/housecleaning

logistics/housecleaning

- hw 1 due Thursday 2021-02-11

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- please contact graders (Aisse, Erin, Juvaria) for help on hw1 or see #homeworks

student reactions/themes

```
119 spearman
 65 gould
 31 freedman
 17 reification/ reify
 13 factors
 12 jensen
 12 epidemiology
 11 yule
  6 quetelet
  6 cholera
  5 sat
  4 causality
  4 350
  4 302
  3 thomson
  3 hoffman
```

correlation and reification in Jensen ('23-'12) (p350)

▶ "The most alarming demonstration of this was Jensen's
determination that all life could be ranked on a g scale, and his
quest to prove an "innate deficiency of intelligence among
blacks" (350) during the tail end of the 20th century."

correlation and reification in Jensen ('23-'12) (p350)

- ▶ "The most alarming demonstration of this was Jensen's determination that all life could be ranked on a g scale, and his quest to prove an "innate deficiency of intelligence among blacks" (350) during the tail end of the 20th century."

- ▶ "In stark contrast to this position, Jensen arguing from the basis that"g" was not culturally dependent, asserted that "the white-black difference in test scores" was not a result of cultural bias in the tests, but was rather a real phenomenon (Gould, p.350). "

Hoffman vs. Dubois

▶ "Instead of using Black morality rates as evidence of the physical and psychological toll of racial oppression, Hoffman uses this data to postulate a supposed 'physical inferiority'. At the same time, he uses white mortality rates to attribute blame to the inequitable state of society and class relations. To make matters worse, he calls himself an 'impartial investigator', and states that prejudice has no place in statistical research. What incredible veil of disillusion must he have been operating under to make any of these claims? I find it hard to believe that he was unaware of the fallacy of his own arguments. Statistics can be manipulated to support any prevailing belief, the evidence molded to fit a predetermined conclusion. How, then, are we meant to trust data?"

Freedman

▶ "Freedman notes that Yule's "The form of his equation is somewhat arbitrary, and the coefficients are not consistent over time and space." It is striking, then, to read that "Yule's approach is strikingly modem." In this light, I wonder if the arbitrariness of the application of models to relevant data is a problem that has a pragmatic solution? And if social sciences deal with this problem more effectively than natural sciences (or vice versa)?"

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- "there is a strong desire to substitute intellectual capital for labor"

big Qs: accountability, objectivity, hope

- "Technologies can be considered as tools. So too can statistical methods and techniques. . . The creator of any given tool might have an intended use in mind, but. . . people may use it for a variety of purposes. . . Are creators of tools responsible for the damage caused by those tools, even when those damages were created by using the tool in a way the creator did not intend? . . . On the one hand, I don't think the inventor of the hammer should be held responsible for a homicide in which a hammer was the murder weapon of choice. . . . This question seems equally if not more relevant concerning various genres of technological innovation in the present."

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▶ "Though I'm now starting to question the "objectivity" of all science. . . I'm moving forward with less hope than last week."

▶ "This week's readings were enlightening (and worrisome). . . I closed my laptop screen in a mild state of distress!"

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▶ Correlation is not causation. . . .
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▶ (which is why they are correlated).

reminder of guiding questions each week:

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- ▶ ask: How did new capabilities rearrange power? Who can now do what, from what, to whom? What is the role of rights, harms, and justice?

Readings: Gould, Spearman, Freedman (Yule)

Gould: context

To situate today's reading (g-factor) within arc of data, science, and (societal) bias. . .

- ▶ 1981: 1st ed

Gould: context

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Gould: context

To situate today's reading (g-factor) within arc of data, science, and (societal) bias...

- 1981: 1st ed
- 1994 Bell Curve
- 1996
- ... (present day)... still here (cf. *Intelligence* 1977-, American Renaissance Foundation, Pioneer Fund)

Gould: long arc of reification

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- reification = making a thing from an abstraction or idea
- correlation
  - your examples of good and bad thinking?

Gould: PCA and correlation

▶ principal components as continuation of correlation/regression
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Gould: PCA and correlation

- principal components as continuation of correlation/regression program
- "history often cycles its errors" - SJG

Gould on Spearman's program

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- naming something in Capital Letters doesn't make it real

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- naming something in Capital Letters doesn't make it real
- cf. genes and dream of simplicity

Gould on Spearman's politics

"Spearman tried to resolve a traditional dilemma of conventional education for the British elite: why should training in the classics make a better soldier or a statesman?"

Spearman: educational hierarchy

Activity.	Correlation with Gen. Intell.	Ratio of the common factor to the specific factor.	
Classics,	0.99	99 to	1
Common Sense,	0.98	96	4
Pitch Dis.,	0.94	89	11
French,	0.92	84	16
Cleverness,[3]	0.90	81	19
English,	0.90	81	19
Mathematics,[4]	0.86	74	26
Pitch Dis. among the uncultured,[5]	0.72	52	48
Music,	0.70	49	51
Light Dis.,[5]	0.57	32	68
Weight Dis.,[5]	0.44	19	81

Figure 1: hierarchy

Spearman: educational hierarchy

> *"In the above Hierarchy one of the most noticeable features is the high position of languages; to myself, at any rate, it was no small surprise to find Classics and even French placed unequivocally above English."*

Spearman: validity of educational hierarchy

► "Instead of continuing ineffectively to protest that high marks in Greek syntax are no test as to the capacity of men to command troops or to administer provinces, we shall at last actually determine the precise accuracy of the various means of measuring General Intelligence, and then we shall in an *equally positive objective manner* ascertain the exact relative importance of this General Intelligence as compared with the other character" (1904, p. 277, our italics).

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- how does this rearrange power?

Spearman: reality of general intelligence

> *Conclusion. On the whole, then, we reach the profoundly important conclusion that there really exists a something that we may provisionally term "General Sensory Discrimination" and similarly a "general Intelligence," and further the functional correspondence between these two is not appreciably less than absolute.*

- ▶ i.e. Reification good

Back to Gould

"different styles of doing science" (Gould, 292)

- ▶ beetle taxonomist "delights in noting the peculiarities of each new species"

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Spearman: science/"physics envy"

- first section of paper: "Signs of Weakness in Experimental Psychology"

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Spearman: science/"physics envy"

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- "we must venture to hope that the so long missing genuinely scientific foundation for psychology has at last been supplied, so that it can henceforward take its due place along with the other solidly founded sciences, even physics itself." (1923)

Correlation as alternative vision of science: Karl Pearson

▶ Pearson heir to Galton, runs Eugenics lab in London

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- ▶ (more next week!)

Correlation as alternative vision of science: Karl Pearson

Galton "relieved us from the old superstition that where causal relationships could not be traced, there exact or mathematical inquiry was impossible" (quoted in Porter 261)

- ▶ correlation as substitute for mistaken old forms of reasoning

Correlation as alternative vision of science: Karl Pearson

Galton "relieved us from the old superstition that where causal relationships could not be traced, there exact or mathematical inquiry was impossible" (quoted in Porter 261)

- ▶ correlation as substitute for mistaken old forms of reasoning
- ▶ "correlation between two occurrences embracing all relationship from absolute independence to complete dependence [. . .] the wider category by which we have to replace the old idea of causation." (Grammar of Science, 3rd ed., 157)

Big fights to come

- philosophers vs. statisticians

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- philosophers vs. statisticians
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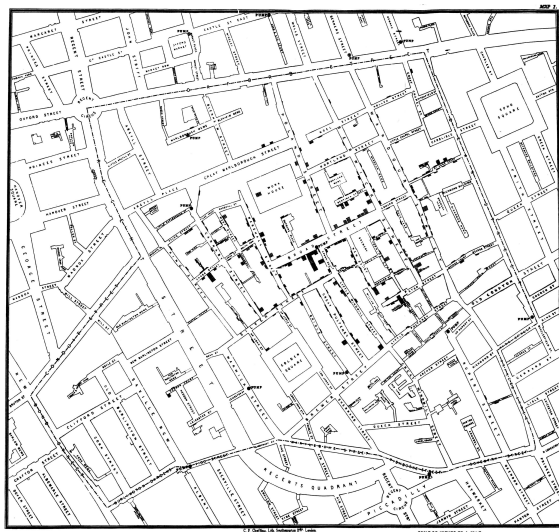- statisticians vs statisticians

Freedman '99 on Snow: Snow's map

Figure 2: map

Freedman: on the limits of regression

▶ Legendre (1805)+Gauss (1809): astronomy, known model

Freedman: on the limits of regression

- Legendre (1805)+Gauss (1809): astronomy, known model
- on Yule: "The framework combines the ideas of Quetelet with the mathematics of Gauss" - Freedman

Yule, "An Investigation into the Causes of Changes in Pauperism in England" (1899)

▶ not simply explore the relations between public assistance and poverty,

Yule conscious of dangers: ""The investigation of causal relations between economic phenomena . . . offers many opportunities for fallacious conclusions."

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- ▶ footnote 25: "strictly speaking, for 'due to' read 'associate with'" - Yule

Pearson against Yule: medieval realist

> *It's the old contxoversy of nominalism against realism. Mr Yule juggles with the names of categories as if they represented real entities, and his statistics are merely a form of symbolic logic. No practical knowledge ever resulted from these logical theories. They may hold some pedagogical interest as exercises for students of logic, but modern statistics will suffer great harm if Mr Yule's methods become widespread, consisting as they do of treating as identical all the individuals ranged under the same dass index. (in Derosières, 144)*

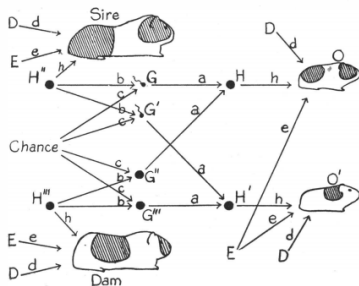# causality and probability, a view from 1920

FIG. 5.

Diagram illustrating the casual relations between litter mates (O, O') and between each of them and their parents. H, H', H'', H''' represent the genetic constitutions of the four individuals, G, G', G'', and G''' that of four germ cells. E represents such environmental factors as are common to litter mates. D represents other factors, largely ontogenetic irregularity. The small letters stand for the various path coefficients.

Figure 3: Wright, S. (1920). The relative importance of heredity and environment in determining the piebald pattern of guinea-pigs. Proceedings of the National Academy of Sciences of the United States of America, 6(6), 320.

Freedman: presaging Ronald, causality, and science

▶ Smoking, cancer, and "confounders"

FIG 1. — Yule's Model. Metropolitan Unions, 1871-81.

Figure 4: Freedman's view

Freedman: presaging Ronald, causality, and science

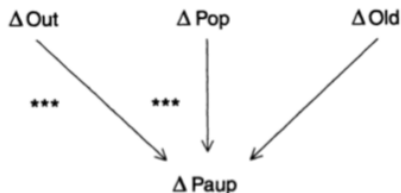- Smoking, cancer, and "confounders"
- preview of p-values

FIG 1. — Yule's Model. Metropolitan Unions, 1871-81.

Figure 4: Freedman's view

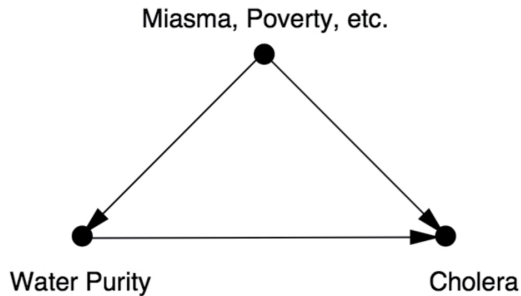# Pearl (2018): before Snow and "shoe leather" (more Thurs!)

Figure 5: I mean, maybe?

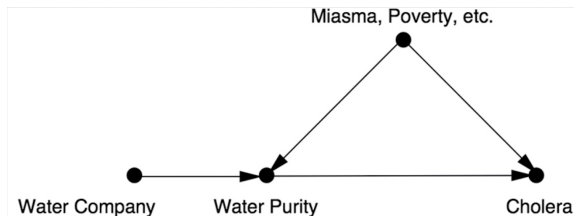# Pearl (2018): after Snow and "shoe leather" (more Thurs!)

Figure 6: "instrumental variable"

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appendix

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- 2021-01-12: intro to course

appendix

- 2021-01-12: intro to course
- 2021-01-19: setting the stakes

appendix

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- ▶ 2021-01-26: risk and social physics

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- 2021-02-02: statecraft and quantitative racism

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- ▶ 2021-01-19: setting the stakes
- ▶ 2021-01-26: risk and social physics
- ▶ 2021-02-02: statecraft and quantitative racism
- ▶ 2021-02-09: intelligence, causality, and policy

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