data-ppf.github.io feb 18 2020

lecture 5 of 14: intelligence, causality, and policy

chris wiggins + matt jones, Columbia

logistics/housecleaning

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- hw #1 due thursday
- please contact graders (mel+chaim) for help on hw1
- FAQ here: https://github.com/data-ppf/data-ppf.github.io/wiki/FAQ

student reactions

student reactions: some data on people

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189 spearman/spearman's
127 gould/gould's
 54 freedman/freedman's
 19 yule/yule's
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student reactions: some data on ideas+things

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144 intelligence
 65 factor
 59 correlation
 30 causation
 20 confounding
 16 causality
 21 reify/reification
 13 cholera
  5 quetelet
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student reactions: on "intelligence"

I was very surprised to learn that intelligence gets measured with correlations.

I found Freedman's readings the most fascinating. Yule's study of the social physics of poverty showed the

student reactions: but why, though?

It makes me wonder to myself what is the purpose of IQ measurement? What do we hope to do with this information?

Gould mentions that intelligence has some implications for leadership qualities, but he also recognized that most leading statesmen at the time were well-heeled and well-educated rather than necessarily imbued with innate intelligence. Even today, there is much focus on innate intelligence and IQ scores, even though it doesn't necessarily tell us much about (for example) a person's skills, work ethic, etc. that may be much more relevant indicators depending on the context. Some experts mentioned in the readings believed in environmental rather than hereditary determinants of intelligence - which might have some policy implications in terms of childcare and education. But I still ask myself what is the overall goal for measuring intelligence? How would we be able to apply this knowledge in practice? (edited)

student reactions: Yule

Freedman brings up the point that the validity and applicability of a study relies on the robustness of its assumptions and how they can be obscured by more complex algebra, as seen in Yule's study

themes for today

1. description, prediction, and prescription

- g-factor/PCA as description
- association as aid to prediction
- causality problems and prescription
  - cholera
  - poverty (yule)
  - smoking
- "weak" and "strong" predictive power (same v diff. distribution)

2. modeling assumptions: causality and shoe leather
3. scientism: "physics envy"

guiding questions every week:

- Scientific and mathematical development
- Technologies and engineering (not so much in "part 1", more in parts 2/3 of class)
- Driving forces: money, prestige, resources, Imperial competition... and "truth!"
- how did new capabilities rearrange power? (who can now do what, from what, to whom?) (rights, harms, justice)

Readings: Gould, Spearman, Freedman (Yule)

Gould: context

- Let's look at Gould's TOC and remember his program
- g-factor within arc of data, science, and (societal) bias

Gould: long arc of reification

- 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 program
- “history often cycles its errors” - SJG

Gould on Spearman's program

- "claim that intelligence is a single, measurable entity" - SJG
- the 'science' of "do you get good grades?"
- general program (inc. IQ) "[intelligence]'s operational definition in terms of correlational techniques" - Hearnshaw, quoted in SJ
- 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 characteri" (1904, p. 277, our italics).

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 " eneral 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 pecularities of each new species"
  - no interest "probing for the essence of 'beetleness'
- Spearman types: "the externalities of this world are only superficial guides to a simpler underlying reality."
  - physics envy

Spearman: science/"physics envy"

- first section of paper: "Signs of Weakness in Experimental Psychology"
- "Objectively. . . Measured" (title)
- "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
- greatly extend anthropometric program
- diagnoses of dangers of reification and imputing causation go back to Al Ghazali and David Hume

  The law of causation is a conceptual figment extracted from phenomena, it is not of their very essence. (Grammar of Science, 3rd ed., 157)

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 mathemati- cal inquiry was impossible" (quoted in Porter 261)

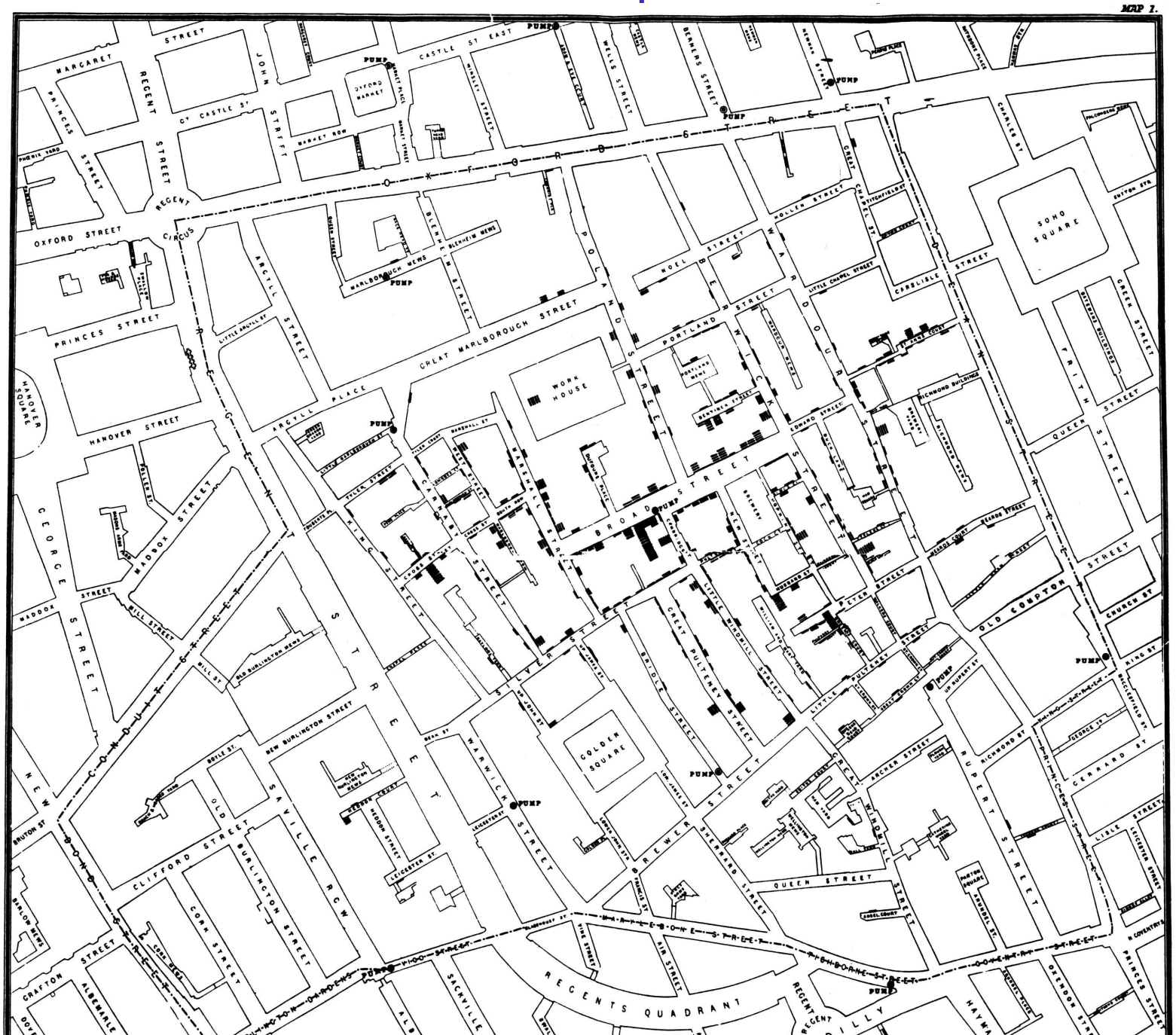
- correlation as substitute for mistaken old forms of reasonins

  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
- physicists vs statisticians
- computer scientists vs statisticians
- statisticians vs statisticians

Freedman on Snow: Snow's map



Freedman on Snow: see also

- Snow on cholera: see also

1. interactive version
2. walking map

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,
- but reveal the causes of increasing and declining poverty

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

- 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

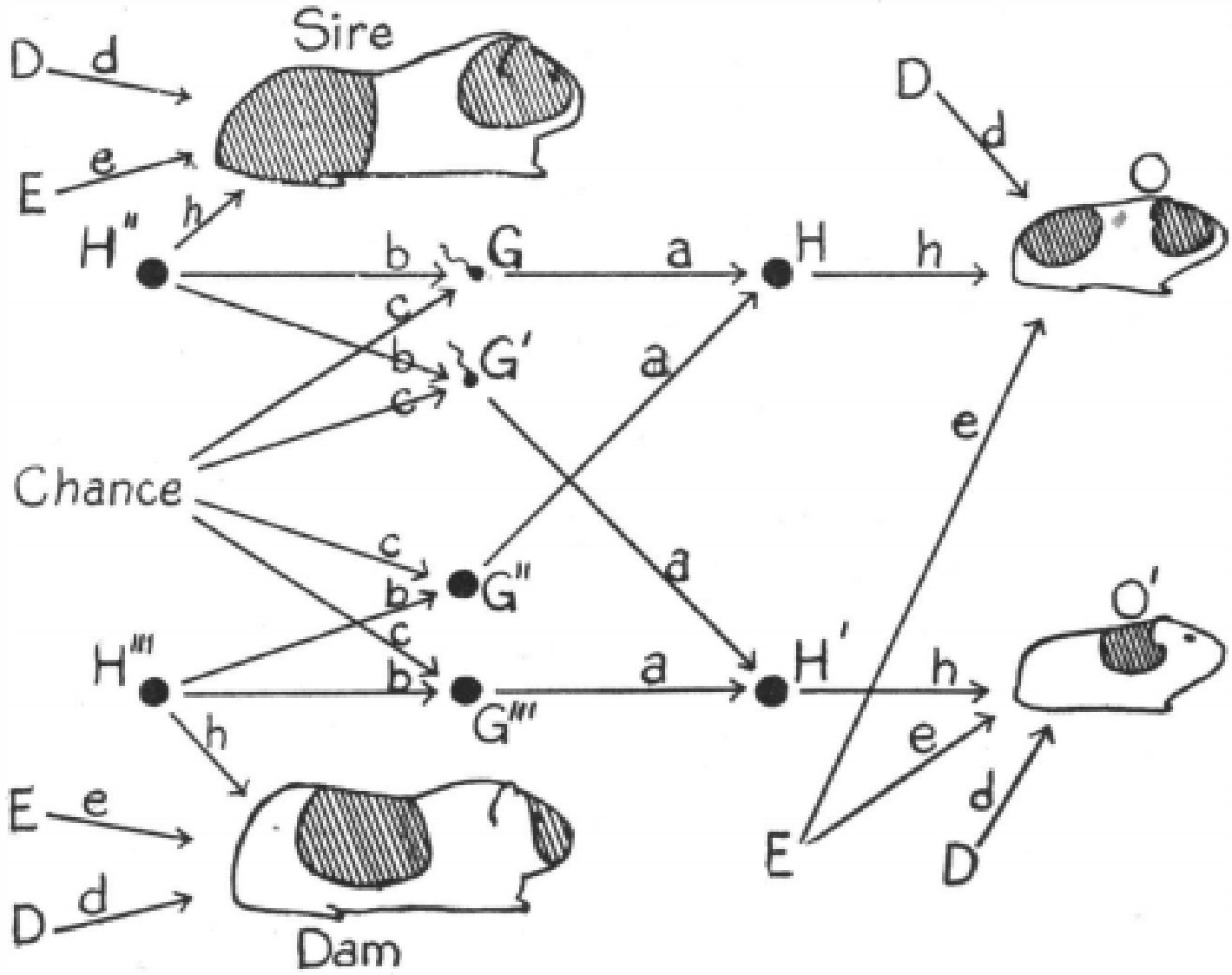


FIG. 5.

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

Freedman: presaging Ronald, causality, and science

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

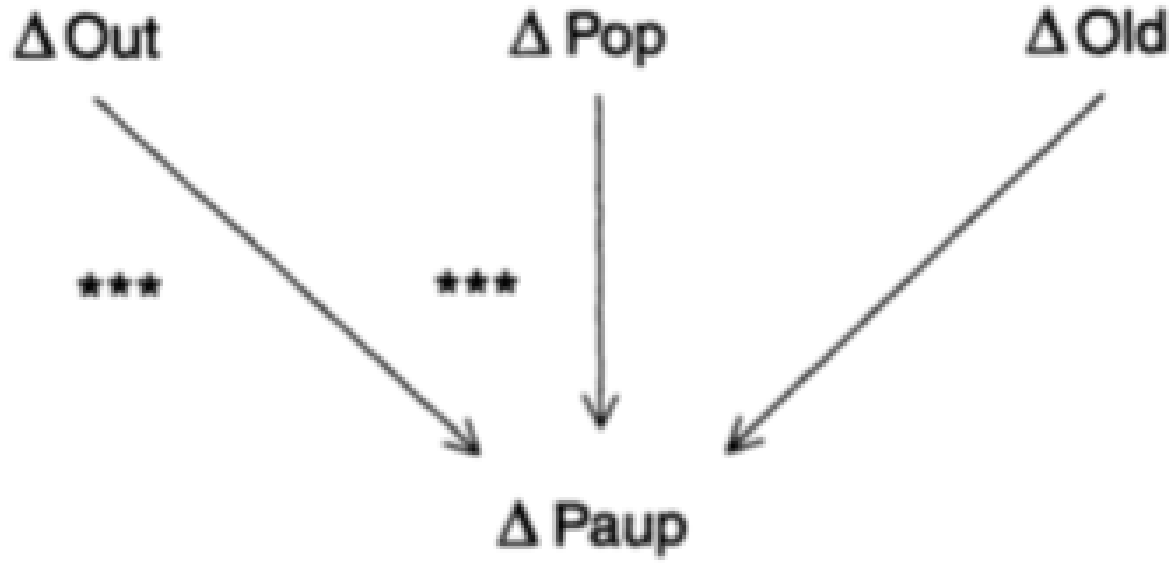


FIG 1. — Yule's Model. Metropolitan Unions, 1871-81.

Figure 4: Freedman's view

Freedman: presaging Ronald, causality, and science

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appendix

appendix

- 2020-01-21 : 1 of 14 intro to course
- 2020-01-28 : 2 of 14 setting the stakes
- 2020-02-04 : 3 of 14 risk and social physics
- 2020-02-11 : 4 of 14 statecraft and quantitative racism
- 2020-02-18 : 5 of 14 intelligence, causality, and policy
- 2020-02-25 : 6 of 14 data gets real: mathematical baptism
- 2020-03-03 : 7 of 14 WWII, dawn of digital computation
- 2020-03-10 : 8 of 14 birth and death of AI
- 2020-03-24 : 9 of 14 big data, old school (1958-1980)
- 2020-03-31 : 10 of 14 data science, 1962-2017
- 2020-04-07 : 11 of 14 AI2.0
- 2020-04-14 : 12 of 14 ethics
- 2020-04-21 : 13 of 14 present problems: attention economy+VC=dumpsterfire
- 2020-04-28 : 14 of 14 future solutions